Fiche de données de sécurité
selon RÈGLEMENT (UE) 2020/878 DE LA COMMISSION

ACIDE CITRIQUE MONOHYDRATE

RUBRIQUE 1: IDENTIFICATION DE LA SUBSTANCE/DU MÉLANGE ET DE LA SOCIÉTÉ/L'ENTREPRISE

1.1 Identificateur de produit:

acide citrique monohydraté

CAS: 5949-29-1

EC: 201-069-1

Index: Pas pertinent

REACH: 01-2119457026-42-XXXX

Autres moyens d'identification:

UFI: CFU0-S0V6-T00H-JW98

1.2 Utilisations identifiées pertinentes de la substance ou du mélange et utilisations déconseillées:

Utilisations identifiées pertinentes (Utilisateur professionnel): intermédiaire
Utilisations identifiées pertinentes (Utilisateur industriel): intermédiaire
Formulation
Produits de nettoyage
Produits de soins personnels
Industrie du papier
Produits retardateurs de ciment
Polymères et plastiques
Inhibition du tartre dans les systèmes d'eau des champs pétrolifères
Industrie textile
Enduits et peintures
Traitement photographique
Agent antitartre et complexant dans les systèmes de traitement d'eau
Traitement des surfaces métalliques
Nettoyage des surfaces métalliques
Applications agricoles
Réactif de laboratoire
Utilisations déconseillées: Toute utilisation non spécifiée dans cette section ou dans la sous-rubrique 7.3

1.3 Renseignements concernant le fournisseur de la fiche de données de sécurité:

Mon-Droguiste.Com
39 Bis Rue Du Moulin Rouge
10150 Charmont Sous Barbuise
Tél : +33.(0)3.25.41.04.05
Email : contact@mon-droguiste.com
Web : www.mon-droguiste.com

1.4 Numéro d'appel d'urgence: +01 45 42 59 59 (ORFILA)

RUBRIQUE 2: IDENTIFICATION DES DANGERS

2.1 Classification de la substance ou du mélange:

Règlement n° 1272/2008 (CLP) :

La classification de ce produit a été réalisée conformément au Règlement n° 1272/2008 (CLP).

Eye Irrit. 2: Irritation oculaire, catégorie 2, H319
STOT SE 3: Toxicité pour les voies respiratoires (exposition unique), Catégorie 3, H335

2.2 Éléments d'étiquetage:

Règlement n° 1272/2008 (CLP) :

Attention

Indications de danger:

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RUBRIQUE 2: IDENTIFICATION DES DANGERS (suite)

Eye Irrit. 2: H319 - Provoque une sévère irritation des yeux.
STOT SE 3: H335 - Peut irriter les voies respiratoires.

Conseils de prudence:

P261: Éviter de respirer poussières
P264: Se laver les mains soigneusement après manipulation.
P280: Porter des gants de protection/des vêtements de protection/protection respiratoire/un équipement de protection des yeux/chaussures de protection.
P305+P351+P338: EN CAS DE CONTACT AVEC LES YEUX: Rincer avec précaution à l'eau pendant plusieurs minutes. Enlever les lentilles de contact si la victime en porte et si elles peuvent être facilement enlevées. Continuer à rincer.
P312: Appeler un CENTRE ANTIPOISON/un médecin en cas de malaise.
P337+P313: Si l´irritation oculaire persiste: consulter un médecin.

UFI: CFU0-S0V6-T00H-JW98

2.3 Autres dangers:

Le produit ne répond pas aux critères des substances persistantes, bioaccumulables et toxiques (PBT) / des substances très persistantes et très bioaccumulables (vPvB)
Le produit ne répond pas aux critères relatifs aux propriétés de perturbation endocrinienne.

RUBRIQUE 3: COMPOSITION/INFORMATIONS SUR LES COMPOSANTS

3.1 Substances:

Description chimique: Acides carboxyliques

Conformément à l´Annexe II du Règlement (CE) nº1907/2006 (point 3), le produit contient:

Identification	Nom chimique /classification		Concentration
CAS: 5949-29-1 EC: 201-069-1 Index: Pas pertinent REACH: 01-2119457026-42-XXXX	**Acido citrico monohidratado** Auto classifiée		**100 %**
	Règlement 1272/2008	Eye Irrit. 2: H319; STOT SE 3: H335 - Attention	

Pour plus d'informations sur les dangers du produit, voir les rubriques 11, 12 et 16.

3.2 Mélanges:

Pas pertinent

RUBRIQUE 4: PREMIERS SECOURS

4.1 Description des premiers secours:

Les symptômes résultant d´une intoxication peuvent survenir après l´exposition, raison pour laquelle, en cas de doute, toute exposition directe au produit chimique ou persistance de la gêne exige des soins médicaux, en fournissant la FDS du produit concerné.

Par inhalation:

Transporter immédiatement la victime à l´air frais et la maintenir au repos. Dans les cas graves tels qu´un arrêt cardiaque et respiratoire, des techniques de respiration artificielle seront exécutées (respiration bouche à bouche, massage cardiaque, apport d´oxygène,etc.) en exigeant immédiatement les soins d´un médecin.

Par contact cutané:

En cas de contact, il est recommandé de rincer la zone affectée à l'eau claire et de nettoyer avec du savon neutre. En cas de manifestations cutanées (démangeaison, rougeur, éruptions cutanées, ampoules,...), consultez un médecin muni de la Fiche de Données de Sécurité.

Par contact avec les yeux:

Rincer les yeux avec de l´eau en abondance à température ambiante au minimum pendant 15 minutes. Éviter que la personne affectée se frotte ou ferme les yeux. Si la personne accidentée utilise des lentilles de contact, celles-ci devront être enlevées à condition qu´elles ne soient pas collées aux yeux, auquel cas, cela pourrait provoquer des lésions supplémentaires. Dans tous les cas et après nettoyage, il faudra se rendre chez un médecin le plus rapidement possible muni de la FDS du produit.

Par ingestion/aspiration:

En cas d´ingestion, demander des soins médicaux immédiatement en fournissant la FDS du produit concerné.

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RUBRIQUE 4: PREMIERS SECOURS (suite)

4.2 Principaux symptômes et effets, aigus et différés:

Les effets aigus et à retardement sont ceux signalés dans les rubriques 2 et 11.

4.3 Indication des éventuels soins médicaux immédiats et traitements particuliers nécessaires:

Pas pertinent

RUBRIQUE 5: MESURES DE LUTTE CONTRE L'INCENDIE

5.1 Moyens d'extinction:

Moyens d'extinction appropriés:

Produit non inflammable dans des conditions normales de stockage, de manipulation et d´utilisation. En cas d´inflammation provoquée par manipulation, stockage ou usage non conforme, utiliser de préférence des extincteurs à poudre polyvalente (poudre ABC), conformément au règlement sur les installations de protection incendie.

Moyens d'extinction inappropriés:

Pas pertinent

5.2 Dangers particuliers résultant de la substance ou du mélange:

La réaction suite à la combustion ou décomposition thermique peut s'avérer très toxique et par conséquent, représenter un risque très élevé pour la santé.

5.3 Conseils aux pompiers:

En fonction de l´ampleur de l´incendie, il pourra être nécessaire de porter des vêtements de protection intégrale ainsi qu´un équipement respiratoire personnel. Disposer d´un minimum d´installations d´urgence ou d´éléments d´intervention (couvertures ignifuges, trousse à pharmacie...) selon la Directive 89/654/CE.

Dispositions supplémentaires:

Intervenir conformément au Plan d´Urgences Intérieur et aux Fiches d´information relatives aux interventions en cas d´accidents et autres urgences. Supprimer toute source d´ignition. En cas d´incendie, refroidir les containers de stockage des produits susceptibles de s´enflammer ou d´exploser en raison des températures élevées. Éviter le déversement des produits servant à éteindre l´incendie en milieu aquatique.

RUBRIQUE 6: MESURES À PRENDRE EN CAS DE DISPERSION ACCIDENTELLE

6.1 Précautions individuelles, équipement de protection et procédures d'urgence:

Pour les non-secouristes:

Balayer, récupérer à la pelle ou par d'autres moyens et conserver le produit dans des récipients adaptés et hermétiques pour une éventuelle réutilisation ou élimination.

Pour les secouristes:

Porter un équipement de sécurité. Eloigner les personnes non protégées. Voir rubrique 8.

6.2 Précautions pour la protection de l'environnement:

Produit jugé non dangereux pour l´environnement. Éviter la contamination des égouts, des eaux de surface et des eaux souterraines.

6.3 Méthodes et matériel de confinement et de nettoyage:

Nous préconisons:

Balayer, récupérer à la pelle ou par d'autres moyens et conserver le produit dans des récipients adaptés et hermétiques pour une éventuelle réutilisation ou élimination.

6.4 Référence à d´autres rubriques:

Voir les rubriques 8 et 13.

RUBRIQUE 7: MANIPULATION ET STOCKAGE

7.1 Précautions à prendre pour une manipulation sans danger:

A.- Précautions pour une manipulation en toute sécurité

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RUBRIQUE 7: MANIPULATION ET STOCKAGE (suite)

Respecter la législation en vigueur en matière de prévention des risques au travail. Maintenir les récipients hermétiques. Contrôler les écoulements et déchets, élimination par des méthodes sûres (chapitre 6). Éviter le déversement libre à partir du récipient. Maintenir les lieux ordonnés et propres, où sont manipulés les produits dangereux.

B.- Recommandations techniques pour la prévention des incendies et des explosions.

Compte tenu de ses caractéristiques d´inflammabilité, le produit ne présente pas de risque d´incendie, dans les conditions normales de stockage, manipulation et utilisation.

C.- Recommandations techniques pour la prévention des risques ergonomiques et toxicologiques.

Pour le contrôle de l'exposition, consulter la rubrique 8. Ne pas manger, boire et fumer dans les zones de travail; se laver les mains après chaque utilisation; enlever les vêtements et l'équipement de protection contaminés avant d'entrer dans une zone de restauration

D.- Recommandations techniques pour la prévention des risques environnementaux

Il est recommandé de disposer de matériel absorbant à proximité du produit (Voir sous-rubrique 6.3)

7.2 Conditions d'un stockage sûr, y compris d'éventuelles incompatibilités:

A.- Exigences spécifiques en matière de stockage

Stocker dans un endroit frais, sec et bien aéré

B.- Conditions générales de stockage

Éviter toutes sources de chaleur, radiation, électricité statique et tout contact avec des aliments. Pour obtenir des informations supplémentaires voir sous-rubrique 10.5

7.3 Utilisation(s) finale(s) particulière(s):

A l'exception des indications déjà spécifiées, il n'est pas nécessaire de suivre des recommandations spéciales concernant l'usage de ce produit.

RUBRIQUE 8: CONTRÔLES DE L'EXPOSITION/PROTECTION INDIVIDUELLE

8.1 Paramètres de contrôle:

Substances dont les valeurs limites d´exposition professionnelle doivent être contrôlées sur le lieu de travail:

Il n´existe pas de valeurs limites d´exposition pour les substances qui constituent le produit

DNEL (Travailleurs):

Pas pertinent

DNEL (Population):

Pas pertinent

PNEC:

Identification				
Acido citrico monohidratado	STP	1000 mg/L	Eau douce	0,44 mg/L
CAS: 5949-29-1	Sol	33,1 mg/kg	Eau de mer	0,044 mg/L
EC: 201-069-1	Intermittent	Pas pertinent	Sédiments (Eau douce)	34,6 mg/kg
	Oral	Pas pertinent	Sédiments (Eau de mer)	3,46 mg/kg

8.2 Contrôles de l'exposition:

A.- Mesures de protection individuelle, telles que les équipements de protection individuelle

À titre de mesure préventive, il est recommandé d'utiliser les équipements de protection individuelle basiques, avec le <marquage CE> correspondant. Pour plus de renseignements sur les équipements de protection individuelle (stockage, utilisation, nettoyage, entretien, type de protection,…) consulter la brochure d'informations fournie par le fabricant de l'EPI. Les indications formulées dans ce point concernent le produit pur. Les mesures de protection concernant le produit dilué pourront varier en fonction de son degré de dilution, de son utilisation, de la méthode d'application, etc. Pour déterminer l'obligation d'installer des douches de sécurité et/ou des rince-œil de secours dans les entrepôts, respecter la règlementation concernant le stockage de produits chimiques applicable dans chaque cas. Pour plus de renseignements, se référer aux sous-rubriques 7.1 et 7.2. Toute l´information contenue ici est une recommandation qui nécessite une spécification de la part des services de prévention des risques au travail, si la société dispose de mesures supplémentaires.

B.- Protection respiratoire.

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RUBRIQUE 8: CONTRÔLES DE L'EXPOSITION/PROTECTION INDIVIDUELLE (suite)

Pictogramme	PPE	Marquage	normes ECN	Observations
 Protection des voies respiratoires obligatoire	Masque auto filtrant contre les gaz et les vapeurs (Type de filtre: P2/FFP2)	CE CAT III	EN 405:2002+A1:2010	À remplacer dès lors qu´une odeur ou un goût du produit contaminant à l´intérieur du masque ou de l´adaptateur facial est détecté. Quand le produit contaminant ne présente pas les avertissements corrects, il est recommandé d´utiliser des équipements isolants.

C.- Protection spécifique pour les mains.

Pictogramme	PPE	Marquage	normes ECN	Observations
 Protection des mains obligatoire	Gants de protection contre les risques mineurs	CE CAT I		Remplacer les gants en cas de détérioration. Pour les périodes d´exposition prolongées du produit, il est recommandé aux utilisateurs professionnels/industriels d´utiliser des gants CE III, conformément aux normes EN 420 et EN 374

D.- Protection du visage et des yeux

Pictogramme	PPE	Marquage	normes ECN	Observations
 Protection du visage obligatoire	Lunettes panoramiques contre les éclaboussures/projections	CE CAT II	EN 166:2002 EN ISO 4007:2018	Nettoyer quotidiennement et désinfecter régulièrement en suivant les instructions du fabricant. À utiliser s´il y a un risque d'éclaboussements.

E.- Protection du corps

Pictogramme	PPE	Marquage	normes ECN	Observations
	Vêtements de travail	CE CAT I		Remplacer en cas de signe de détérioration. Pour les périodes prolongées d´exposition au produit par des utilisateurs professionnels/industriels, il est recommandé d´utiliser CE III, conformément aux normes EN ISO 6529:2001, EN ISO 6530:2005, EN ISO 13688:2013, EN 464:1994
	Chaussures de travail antidérapantes	CE CAT II	EN ISO 20347:2022	Remplacer en cas de signe de détérioration. Pour les périodes prolongées d´exposition au produit par des utilisateurs professionnels/industriels, il est recommandé d´utiliser CE III, conformément aux normes EN ISO 20345 et EN 13832-1

F.- Mesures complémentaires d'urgence

Il est recommandé de mettre en place des équipements d´urgence supplémentaires dans les lieux de travail particulièrement exposés au produit ou dans les situations où l´évaluation des risques met en évidence la nécessité d´un tel équipement.

Mesure d'urgence	normes	Mesure d'urgence	normes
 Douche d'urgence	ANSI Z358-1 ISO 3864-1:2011, ISO 3864-4:2011	 Rincer œil	DIN 12 899 ISO 3864-1:2011, ISO 3864-4:2011

Contrôles d'exposition liés à la protection de l'environnement:

En vertu de la législation communautaire sur la protection environnementale, il est recommandé d´éviter tout déversement du produit mais aussi de son emballage dans l´environnement. Pour obtenir des informations supplémentaires voir sous-rubrique 7.1.D

Composés organiques volatiles:

Conformément à l´application de la Directive 2010/75/EU, ce produit offre les caractéristiques suivantes:

C.O.V. (2010/75/UE):	0 % poids
Concentration de C.O.V. à 20 ºC:	0 kg/m³ (0 g/L)
Nombre moyen de carbone:	Pas pertinent
Poids moléculaire moyen:	Pas pertinent

RUBRIQUE 9: PROPRIÉTÉS PHYSIQUES ET CHIMIQUES

*Pas pertinent en raison de la nature du produit / non déterminant pour les propriétés de danger du produit

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RUBRIQUE 9: PROPRIÉTÉS PHYSIQUES ET CHIMIQUES (suite)

9.1 Informations sur les propriétés physiques et chimiques essentielles:

Pour plus d'informations voir la fiche technique du produit.

Aspect physique:

État physique à 20 ºC:	Solide
Aspect:	Cristalline
Couleur:	☐ Blanc
Odeur:	Inodore
Seuil olfactif:	Pas pertinent *

Volatilité:

Température d'ébullition à pression atmosphérique:	Pas pertinent *
Pression de vapeur à 20 ºC:	Pas pertinent *
Pression de vapeur à 50 ºC:	Pas pertinent *
Taux d'évaporation à 20 ºC:	Pas pertinent *

Caractéristiques du produit:

Masse volumique à 20 ºC:	Pas pertinent *
Densité relative à 20 ºC:	Pas pertinent *
Viscosité dynamique à 20 ºC:	Pas pertinent *
Viscosité cinématique à 20 ºC:	Pas pertinent *
Viscosité cinématique à 40 ºC:	Pas pertinent *
Concentration:	Pas pertinent *
pH:	Pas pertinent *
Densité de vapeur à 20 ºC:	Pas pertinent *
Coefficient de partage n-octanol/eau à 20 ºC:	-1,8 - -1,6
Solubilité dans l'eau à 20 ºC:	592 kg/m³
Propriété de solubilité:	Pas pertinent *
Température de décomposition:	>175 ºC
Point de fusion/point de congélation:	153 ºC

Inflammabilité:

Point d'éclair:	Pas pertinent *
Inflammabilité (solide, gaz):	Pas pertinent *
Température d'auto-ignition:	Pas pertinent *
Limite d'inflammabilité inférieure:	Pas pertinent *
Limite d'inflammabilité supérieure:	Pas pertinent *

Explosivité (Solide):

Limite inférieure d´explosivité:	Pas pertinent *
Limite supérieure d´explosivité:	Pas pertinent *

Caractéristiques des particules:

Diamètre équivalent médian:	Pas pertinent *

9.2 Autres informations:

Informations concernant les classes de danger physique:

Propriétés explosives:	Pas pertinent *
Propriétés comburantes:	Pas pertinent *
Substances ou mélanges corrosifs pour les métaux:	Pas pertinent *
Chaleur de combustion:	Pas pertinent *

*Pas pertinent en raison de la nature du produit / non déterminant pour les propriétés de danger du produit

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RUBRIQUE 9: PROPRIÉTÉS PHYSIQUES ET CHIMIQUES (suite)

Aérosols-pourcentage total suivant (en masse) de composants inflammables:	Pas pertinent *

Autres caractéristiques de sécurité:

Tension superficielle à 20 ºC:	Pas pertinent *
Indice de réfraction:	Pas pertinent *

*Pas pertinent en raison de la nature du produit / non déterminant pour les propriétés de danger du produit

RUBRIQUE 10: STABILITÉ ET RÉACTIVITÉ

10.1 Réactivité:

Aucune réaction dangereuse attendue dans les conditions normales de stockage, manipulation et utilisation. Voir la rubrique 7 de la Fiche de Données de Sécurité.

10.2 Stabilité chimique:

Chimiquement stable dans les conditions indiquées de stockage, manipulation et utilisation.

10.3 Possibilité de réactions dangereuses:

En conditions normales, pas de réactions dangereuses susceptibles de produire une pression ou des températures excessives.

10.4 Conditions à éviter:

Applicables pour manipulation et stockage à température ambiante :

Choc et friction	Contact avec l'air	Échauffement	Lumière Solaire	Humidité
Non applicable	Non applicable	Non applicable	Non applicable	Non applicable

10.5 Matières incompatibles:

Acides	Eau	Matières comburantes	Matières combustibles	Autres
Eviter les acides forts	Non applicable	Non applicable	Non applicable	Éviter les alcalins ou les bases fortes

10.6 Produits de décomposition dangereux:

Voir sous-rubriques 10.3, 10.4 et 10.5 pour connaître précisément les produits de décomposition. En fonction des conditions de décomposition et à l´issue de cette dernière, certains mélanges complexes à base de substances chimiques peuvent se dégager: dioxyde de carbone (CO_2), monoxyde de carbone et autres composés organiques.

RUBRIQUE 11: INFORMATIONS TOXICOLOGIQUES

11.1 Informations sur les classes de danger telles que définies dans le règlement (CE) no 1272/2008:

Effets dangereux pour la santé:

En cas d'exposition répétée, prolongée ou de concentrations supérieures à celles qui sont établies par les limites d'exposition professionnelles, des effets néfastes pour la santé peuvent survenir selon le mode d'exposition :

A- Ingestion (effets aigus):

- Toxicité aiguë: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses par ingestion. Pour plus d´information, voir rubrique 3.
- Corrosivité/irritabilité: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses dans ce cadre. Pour plus de renseignements, se référer à la rubrique 3.

B- Inhalation (effets aigus):

- Toxicité aiguë: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses par inhalation. Pour plus d´information, voir rubrique 3.
- Corrosivité/irritabilité: Provoque une irritation des voies respiratoires, normalement réversible et est limitée aux voies respiratoires supérieures.

C- Contact avec la peau et les yeux (effets aigus):

- Contact avec la peau: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, et ne contiennent pas de substances jugées dangereuses au vu des effets décrits. Pour plus d´information, voir rubrique 3.
- Contact avec les yeux: Produit des lésions oculaires après un contact

D- Effets CMR (carcinogénicité, mutagénicité et toxicité pour la reproduction):

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RUBRIQUE 11: INFORMATIONS TOXICOLOGIQUES (suite)

- Carcinogénicité: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses au vu des effets décrits. Pour plus d´information, voir rubrique 3.
  IARC: Pas pertinent
- Mutagénicité: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses dans ce cadre. Pour plus de renseignements, se référer à la rubrique 3.
- Toxicité sur la reproduction: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses dans ce cadre. Pour plus de renseignements, se référer à la rubrique 3.

E- Effets de sensibilisation:

- Respiratoire: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses à effets sensibilisants. Pour plus d´information, voir rubrique 3.
- Cutané: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses dans ce cadre. Pour plus de renseignements, se référer à la rubrique 3.

F- Toxicité pour certains organes cibles (STOT)-temps d'exposition:

Provoque une irritation des voies respiratoires, normalement réversible et est limitée aux voies respiratoires supérieures.

G- Toxicité pour certains organes cibles (STOT)-exposition répétée:

- Toxicité pour certains organes cibles (STOT)-exposition répétée: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses dans ce cadre. Pour plus de renseignements, se référer à la rubrique 3.
- Peau: Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses dans ce cadre. Pour plus de renseignements, se référer à la rubrique 3.

H- Danger par aspiration:

Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses dans ce cadre. Pour plus de renseignements, se référer à la rubrique 3.

Autres informations:

Pas pertinent

Information toxicologique spécifique produit:

Toxicité sévère		Genre
DL50 orale	3000 mg/kg	Rat
DL50 cutanée	>5000 mg/kg	Rat

Information toxicologique spécifique des substances:

Identification	Toxicité sévère		Genre
Acido citrico monohidratado CAS: 5949-29-1 EC: 201-069-1	DL50 orale	3000 mg/kg	Rat
	DL50 cutanée	>5000 mg/kg	Rat
	CL50 inhalation de poussières	>5 mg/L	

11.2 Informations sur les autres dangers:

Propriétés perturbant le système endocrinien

Le produit ne répond pas aux critères relatifs aux propriétés de perturbation endocrinienne.

Autres informations

Pas pertinent

RUBRIQUE 12: INFORMATION ÉCOLOGIQUE

Compte tenu des données disponibles, les critères de classification ne sont pas remplis, car le produit ne contient pas de substances jugées dangereuses dans ce cadre. Pour plus de renseignements, se référer à la rubrique 3.

12.1 Toxicité:

Toxicité aquatique spécifique produit:

Toxicité sévère		Espèce	Genre
CL50	1516 mg/L (96 h)	Pas pertinent	Poisson
CE50	120 mg/L (48 h)	Pas pertinent	Crustacé

Toxicité aquatique spécifique des substances:

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RUBRIQUE 12: INFORMATION ÉCOLOGIQUE (suite)

Pas pertinent

12.2 Persistance et dégradabilité:

Informations spécifiques à la substance:

Identification	Dégradabilité		Biodégradabilité	
Acido citrico monohidratado	DBO5	Pas pertinent	Concentration	Pas pertinent
CAS: 5949-29-1	DCO	Pas pertinent	Période	5 jours
EC: 201-069-1	DBO5/DCO	Pas pertinent	% Biodégradé	72 %

12.3 Potentiel de bioaccumulation:

Informations spécifiques à la substance:

Identification	Potentiel de bioaccumulation	
Acido citrico monohidratado	FBC	3
CAS: 5949-29-1	Log POW	-1,64
EC: 201-069-1	Potentiel	Bas

12.4 Mobilité dans le sol:

Identification	L´absorption/désorption		Volatilité	
Acido citrico monohidratado	Koc	3,1	Henry	4,3E-14 Pa·m³/mol
CAS: 5949-29-1	Conclusion	Très élevé	Sol sec	Pas pertinent
EC: 201-069-1	Tension superficielle	Pas pertinent	Sol humide	Pas pertinent

12.5 Résultats des évaluations PBT et VPVB:

Le produit ne répond pas aux critères des substances persistantes, bioaccumulables et toxiques (PBT) / des substances très persistantes et très bioaccumulables (vPvB)

12.6 Propriétés perturbant le système endocrinien:

Le produit ne répond pas aux critères relatifs aux propriétés de perturbation endocrinienne.

12.7 Autres effets néfastes:

Non décrits

RUBRIQUE 13: CONSIDÉRATIONS RELATIVES À L'ÉLIMINATION

13.1 Méthodes de traitement des déchets:

Code	Description	Type de déchet (Règlement (UE) n °1357/2014)
20 01 14*	acides	Dangereux

Type de déchets (Règlement (UE) n °1357/2014):

HP5 Toxicité spécifique pour un organe cible (STOT)/toxicité par aspiration, HP4 Irritant — irritation cutanée et lésions oculaires

Gestion du déchet (élimination et évaluation):

Consulter le responsable des déchets compétent en matière d´évaluation et élimination conformément à l´Annexe 1 et l´Annexe 2 (Directive 2008/98/CE, Décret no 2011-828, Ordonnance no 2010-1579). Conformément aux codes 15 01 (2014/955/CE), au cas où l´emballage entrerait en contact avec le produit, il faudra procéder de la même façon qu´avec le propre produit, dans le cas contraire, il faudra le traiter comme un résidu non dangereux. Il est fortement déconseillé de le verser dans des cours d´eau. Voir sous-rubrique 6.2.

Dispositions se rapportant au traitement des déchets:

Conformément à l´Annexe II du Règlement (CE) nº1907/2006 (REACH) les dispositions communautaires ou nationales se rapportant au traitement des déchets sont appliquées.
Législation communautaire: Directive 2008/98/CE, 2014/955/CE, Règlement (UE) n °1357/2014

RUBRIQUE 14: INFORMATIONS RELATIVES AU TRANSPORT

Ce produit n´est pas réglementé pour le transport (ADR/RID, IMDG, IATA)

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RUBRIQUE 15: INFORMATIONS RELATIVES À LA RÉGLEMENTATION

15.1 Réglementations/législations particulières à la substance ou au mélange en matière de sécurité, de santé et d'environnement:

- : Pas pertinent
- Article 95, RÈGLEMENT (UE) No 528/2012: Pas pertinent
- Règlement (UE) 2024/590 sur les substances qui perforent la couche d´ozone : Pas pertinent
- RÈGLEMENT (UE) No 649/2012 régissant l´exportation et l´importation de produits chimiques dangereux: Pas pertinent
- Substances candidates à l´autorisation dans le Règlement (CE) 1907/2006 (REACH): Pas pertinent
- Substances inscrites à l´annexe XIV de REACH (liste d´autorisation) et date d´expiration: Pas pertinent

Seveso III:

Pas pertinent

Restrictions en matière de commercialisation et d´usage de certaines substances et mélanges dangereux (Annexe XVII REACH, etc...):

Pas pertinent

Dispositions spéciales en matière de protection des personnes ou d'environnement:

Il est recommandé d'utiliser l'information recueillie sur cette fiche de données de sécurité faisant office d'information de départ pour une évaluation des risques des circonstances locales dans le but d'établir les mesures nécessaires en matière de prévention des risques pour la manipulation, l'utilisation, le stockage et l'élimination du produit.

Autres législations:

Pas pertinent

15.2 Évaluation de la sécurité chimique:

Le fournisseur a effectué l´évaluation de la sécurité chimique.

RUBRIQUE 16: AUTRES INFORMATIONS

Législation s'appliquant aux fiches de données en matière de sécurité:

Cette fiche de données en matière de sécurité a été réalisée conformément à l´ANNEXE II - Guide pour élaborer des Fiches de Données en matière de Sécurité du Règlement (CE) Nº 1907/2006 (RÈGLEMENT (UE) 2020/878 DE LA COMMISSION)

Modifications par rapport à la fiche de sécurité précédente avec répercussions sur les mesures de gestion du risque :

Pas pertinent

Textes des phrases législatives dans la rubrique 2:

H319: Provoque une sévère irritation des yeux.
H335: Peut irriter les voies respiratoires.

Textes des phrases législatives dans la rubrique 3:

Les phrases inscrites ne portent pas sur le produit lui-même, elles sont seulement à titre d'information et se réfèrent aux composants individuels qui apparaissent dans la section 3

Règlement n° 1272/2008 (CLP) :

Eye Irrit. 2: H319 - Provoque une sévère irritation des yeux.
STOT SE 3: H335 - Peut irriter les voies respiratoires.

Conseils relatifs à la formation:

Une formation minimum en matière de prévention des risques au travail est recommandée pour le personnel qui va manipuler ce produit, dans le but de faciliter la compréhension et l´interprétation de cette fiche de données de sécurité au même titre que l´étiquetage du produit.

Sources de documentation principale:

http://echa.europa.eu
http://eur-lex.europa.eu

Abréviations et acronymes:

- SUITE À LA PAGE SUIVANTE -

RUBRIQUE 16: AUTRES INFORMATIONS (suite)

ADR: Accord européen relatif au transport international des marchandises dangereuses par route
IMDG: Code maritime international des marchandises dangereuses
IATA: Association internationale du transport aérien
ICAO: Organisation de l´aviation civile internationale
DCO: Demande chimique en oxygène
DBO5: Demande biologique en oxygène après 5 jours
FBC: Facteur de bioconcentration
DL50: Dose létale 50 CL50: Concentration létale 50
CE50: Concentration effective 50
Log Pow: Coefficient de partage octanol/eau
UFI: identifiant unique de formulation
IARC: Centre international de recherche sur le cancer

- FIN DE LA FICHE DE DONNÉES DE SÉCURITÉ -

9.1 Exposure scenario 2: Formulation or re-packing - Formulation of citric acid into preparations

Market sector: Generic formulation of citric acid into preparations
Product category formulated: PC 1: Adhesives, Sealants; PC 3: Air care products; PC 9a: Coatings and Paints, Thinners, paint removers; PC 12: Fertilizers; PC 30: Photo-chemicals; PC 31: Polishes and Wax Blends; PC 35: Washing and Cleaning Products; PC 39: Cosmetics, personal care products

Environment contributing scenario(s):		
CS 1	Formulation of citric acid into preparations	ERC 2
CS 2	Formulation into solid matrix	ERC 3
Worker contributing scenario(s):		
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid	PROC 1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 5	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 6	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 7	Mixing or blending in batch processes; Liquid	PROC 5
CS 8	Industrial spraying; Liquid	PROC 7
CS 9	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 10	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 11	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9
CS 12	Treatment of articles by dipping and pouring; Liquid	PROC 13
CS 13	Laboratory chemicals; Liquid	PROC 15
CS 14	Manual activities involving hand contact; Liquid	PROC 19
CS 15	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 1
CS 16	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 2
CS 17	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness	PROC 3
CS 18	Chemical production where opportunity for exposure arises; Solid, medium dustiness	PROC 4
CS 19	Mixing or blending in batch processes; Solid, medium dustiness	PROC 5
CS 20	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a

CS 21	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 22	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, medium dustiness	PROC 9
CS 23	Laboratory chemicals; Solid, medium dustiness	PROC 15
CS 24	Manual activities involving hand contact; Solid, medium dustiness	PROC 19

Further description of the use:

Citric acid is formulated into a wide range of products, often at specialist formulation sites. The processes and exposures are expected to be broadly similar across different industries. Formulation is generally carried out in batch processes, which may be open or closed; several steps may be involved.

9.1.1 Env CS 1: Formulation of citric acid into preparations (ERC 2)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.1.2 Env CS 2: Formulation into solid matrix (ERC 3)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.1.3 Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid (PROC 1)

9.1.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.4 Worker CS 4: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.1.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.5 Worker CS 5: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.1.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.6 Worker CS 6: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.1.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.7 Worker CS 7: Mixing or blending in batch processes; Liquid (PROC 5)

9.1.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.8 Worker CS 8: Industrial spraying; Liquid (PROC 7)

9.1.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.9 Worker CS 9: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.1.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.10 Worker CS 10: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.1.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.11 Worker CS 11: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.1.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.11.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.12 Worker CS 12: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.1.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.12.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.13 Worker CS 13: Laboratory chemicals; Liquid (PROC 15)

9.1.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.13.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.14 Worker CS 14: Manual activities involving hand contact; Liquid (PROC 19)

9.1.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and forearms (1980 cm^2)	

9.1.14.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.15 Worker CS 15: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 1)

9.1.15.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.15.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.16 Worker CS 16: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 2)

9.1.16.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.16.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.17 Worker CS 17: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness (PROC 3)

9.1.17.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.17.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.18 Worker CS 18: Chemical production where opportunity for exposure arises; Solid, medium dustiness (PROC 4)

9.1.18.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *(Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.18.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.19 Worker CS 19: Mixing or blending in batch processes; Solid, medium dustiness (PROC 5)

9.1.19.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.19.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.20 Worker CS 20: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.1.20.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.20.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.7 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.21 Worker CS 21: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.1.21.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.21.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.8 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.22 Worker CS 22: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, medium dustiness (PROC 9)

9.1.22.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.22.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.9 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.23 Worker CS 23: Laboratory chemicals; Solid, medium dustiness (PROC 15)

9.1.23.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.23.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.10 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.24 Worker CS 24: Manual activities involving hand contact; Solid, medium dustiness (PROC 19)

9.1.24.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and forearms (1980 cm^2)	

9.1.24.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.11 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2 Exposure scenario 3: Use at industrial sites - Use of citric acid as a chemical intermediate

Market sector: Use of citric acid as a chemical intermediate
Product category used: PC 0: Other
Sector of use: SU 8: Manufacture of bulk, large scale chemicals (including petroleum products); SU 9: Manufacture of fine chemicals

Environment contributing scenario(s):		
CS 1	Use of citric acid as a chemical intermediate	ERC 6a
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 2
CS 4	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness	PROC 3
CS 5	Chemical production where opportunity for exposure arises; Solid, medium dustiness	PROC 4
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citric acid may be used as an intermediate in the formation of:
- Metal-salts, such as magnesium citrate, iron citrate or zinc citrate.
- Others salts, for example ammonium citrate.
- Esters such as triethyl citrate or tributyl citrate.

In a typical process for the production of citrate salts, citric acid is dissolved in deionised water. Addition of a source of the other ion results in conversion of citric acid to its salt. The salt is separated by evaporation and centrifugation, then dried, sieved and bagged.
The reactions may take place in a closed batch or continuous process with occasional opportunities for exposure arising, for example, during sampling.

9.2.1 Env CS 1: Use of citric acid as a chemical intermediate (ERC 6a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.2.2 Worker CS 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 1)

9.2.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Closed process with no likelihood of exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.3 Worker CS 3: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 2)

9.2.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.4 Worker CS 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness (PROC 3)

9.2.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.5 Worker CS 5: Chemical production where opportunity for exposure arises; Solid, medium dustiness (PROC 4)

9.2.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.2.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.3 Exposure scenario 4: Use at industrial sites - Industrial use of citric acid in detergent and cleaning products

Market sector: Use of citric acid in detergent and cleaning products
Product category used: PC 3: Air care products; PC 28: Perfumes, Fragrances; PC 31: Polishes and Wax Blends; PC 35: Washing and Cleaning Products; PC 36: Water softeners

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 4	Industrial spraying; Liquid	PROC 7
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 7	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9
CS 8	Roller application or brushing; Liquid	PROC 10
CS 9	Treatment of articles by dipping and pouring; Liquid	PROC 13
CS 10	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, low dustiness	PROC 2
CS 11	Chemical production where opportunity for exposure arises; Solid, low dustiness	PROC 4
CS 12	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, low dustiness	PROC 8a
CS 13	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, low dustiness	PROC 8b
CS 14	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, low dustiness	PROC 9

Further description of the use:

Citric acid and its salts are used in a wide variety of cleaning and maintenance products for industrial and professional uses.
The main use or function of citric acid and its salts in detergents and cleaning products is as a complexing agent/ sequestering builders to remove water hardness minerals and ‘build’ the cleaning efficiency of the surfactant. They can also function as additives (e.g. in hand-washing liquids [RIVM, 2006]) or acids (*e.g.*, in bathroom/ toilet cleaning liquids or silver polish).

Technical applications of citric acid and its salts in various industries as a complex-forming agent, cleaning agent, softening agent, decalcifying agent, de-rusting agent, corrosive agent and synergist in antioxidant mixtures accounted for 20% of the total production volume (500 000 tons/annum) in Europe (including Eastern Europe and Israel) in 1999 [HERA, 2005]. The total consumption of citric acid in household cleaning applications in the EEA (*i.e.*, EU + Iceland, Switzerland and Norway) in 2002 was 103 000 tons [HERA, 2005].
The concentration of citrate used in these applications varies. Concentrations of citrate (citric acid or trisodium citrate) in the most important consumer products are estimated as follows:
Dishwasher Tablets up to *approx.* 40%
Dishwashing machine cleaner solid and liquid up to 70%
Descaler solid and liquid up to 70 %
Dishwasher Rinse Aids 0.5 - 5 %
Fabric care powder (phosphonate free) 2- 30%
Liquid fabric care (phosphonate free) 2 - 10%
Bath room cleaner, all purpose cleaner up to 10 %
Toilet bowl cleaner up to 10 %CAA

9.3.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.3.2 Worker CS 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.3.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC

(No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.3 Worker CS 3: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.3.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP

Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.4 Worker CS 4: Industrial spraying; Liquid (PROC 7)

9.3.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.3.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined

concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.3.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.7 Worker CS 7: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.3.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.8 Worker CS 8: Roller application or brushing; Liquid (PROC 10)

9.3.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.8.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.9 Worker CS 9: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.3.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP

Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.10 Worker CS 10: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, low dustiness (PROC 2)

9.3.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.10.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	4E-3 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.11 Worker CS 11: Chemical production where opportunity for exposure arises; Solid, low dustiness (PROC 4)

9.3.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.11.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.12 Worker CS 12: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, low dustiness (PROC 8a)

9.3.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.12.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.13 Worker CS 13: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, low dustiness (PROC 8b)

9.3.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.13.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.14 Worker CS 14: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, low dustiness (PROC 9)

9.3.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.14.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4 Exposure scenario 5: Widespread use by professional workers - Professional use of citric acid in cleaning products

Market sector: Use of citric acid in detergent and cleaning products
Product category used: PC 3: Air care products; PC 31: Polishes and Wax Blends; PC 35: Washing and Cleaning Products; PC 36: Water softeners

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
CS 2	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8 d
CS 3	Widespread use of functional fluid (indoor)	ERC 9a
CS 4	Widespread use of functional fluid (outdoor)	ERC 9b
Worker contributing scenario(s):		
CS 5	Roller application or brushing; Indoor use; Liquid	PROC 10
CS 6	Roller application or brushing; Outdoor use; Liquid	PROC 10
CS 7	Non-industrial spraying; Indoor use; Liquid	PROC 11
CS 8	Non-industrial spraying; Outdoor use; Liquid	PROC 11
CS 9	Treatment of articles by dipping and pouring; Indoor use; Liquid	PROC 13
CS 10	Treatment of articles by dipping and pouring; Outdoor use; Liquid	PROC 13
CS 11	Manual activities involving hand contact; Indoor use; Liquid	PROC 19
CS 12	Manual activities involving hand contact; Outdoor use; Liquid	PROC 19
CS 13	Manual activities involving hand contact; Indoor use; Solid, low dustiness	PROC 19
CS 14	Manual activities involving hand contact; Outdoor use; Solid, low dustiness	PROC 19

Further description of the use:

This scenario covers professional use of citric acid in cleaning products.
The large number of household products includes, but is not limited to:
· Laundry products: These include detergent powders, detergent liquids, laundry pre-treatment products and fabric softeners.
· Dish washing products: These are hand dishwashing liquids and machine dishwashing products (dishwashing powders/detergents and dishwashing liquids/rinse aids).
· All purpose cleaners: These are used in cleaning hard surfaces like windows, mirrors, wood, floors and tiled walls [RIVM, 2006]. The products can be liquid cleaners, spray cleaners or wet tissue application.
· Abrasive cleaners: These are used in remove soil which is firmly attached to the surface (e.g. lavatory pan, washbasins and kitchen sink/ working top) and can be powders, liquids or scouring pads [RIVM, 2006]
· Sanitary products: These are bathroom cleaners (sprays and liquids) and toilet cleaners.

· Floor, carpet and furniture products: These are products that provide a combined effect of cleaning and polishing.
· Metal polish: Consumer or professional use of, *e.g.*, silver polishes, either ready-to-use or solid preparations which need to be dissolved in water.
· Water treatment/scale inhibition products for household appliances.
· Vehicle care products.

9.4.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.2 Env CS 2: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.3 Env CS 3: Widespread use of functional fluid (indoor) (ERC 9a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.4 Env CS 4: Widespread use of functional fluid (outdoor) (ERC 9b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.5 Worker CS 5: Roller application or brushing; Indoor use; Liquid (PROC 10)

9.4.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.6 Worker CS 6: Roller application or brushing; Outdoor use; Liquid (PROC 10)

9.4.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.7 Worker CS 7: Non-industrial spraying; Indoor use; Liquid (PROC 11)

9.4.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.8 Worker CS 8: Non-industrial spraying; Outdoor use; Liquid (PROC 11)

9.4.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	56 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.9 Worker CS 9: Treatment of articles by dipping and pouring; Indoor use; Liquid (PROC 13)

9.4.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid *Product ingredients mixed, diluted and/or suspended*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP

Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.10 Worker CS 10: Treatment of articles by dipping and pouring; Outdoor use; Liquid (PROC 13)

9.4.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.11 Worker CS 11: Manual activities involving hand contact; Indoor use; Liquid (PROC 19)

9.4.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.11.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.12 Worker CS 12: Manual activities involving hand contact; Outdoor use; Liquid (PROC 19)

9.4.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.12.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or

inhalation exposure to citric acid.

9.4.13 Worker CS 13: Manual activities involving hand contact; Indoor use; Solid, low dustiness (PROC 19)

9.4.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.13.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.14 Worker CS 14: Manual activities involving hand contact; Outdoor use; Solid, low dustiness (PROC 19)

9.4.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.14.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.14 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5 Exposure scenario 6: Consumer use - Consumer use of citric acid in cleaning products

Market sector: Use of citric acid in detergent and cleaning products

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
CS 2	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8 d
Consumer contributing scenario(s):		
CS 3	Air care products	PC 3
CS 4	Polishes and wax blends	PC 31
CS 5	Washing and cleaning products	PC 35
CS 6	Water Softeners	PC 36

Further description of the use:

This scenario covers consumer use of citric acid in cleaning products.

9.5.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.5.2 Env CS 2: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.5.3 Cons CS 3: Air care products (PC 3)

9.5.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5.4 Cons CS 4: Polishes and wax blends (PC 31)

9.5.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.4.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5.5 Cons CS 5: Washing and cleaning products (PC 35)

9.5.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.5.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory

tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5.6 Cons CS 6: Water Softeners (PC 36)

9.5.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.6.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.6 Exposure scenario 7: Widespread use by professional workers - Professional use of personal care products

Market sector: Personal care use
Product category used: PC 39: Cosmetics, personal care products

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Worker contributing scenario(s):		
CS 2	Cosmetics, personal care products; Professional use	PROC 0

Further description of the use:

This scenario covers professional use of personal care products.
Citric acid and its salts are used in a wide range of personal care products, including:· Shampoos and conditioners· Astringent lotions· Bubble baths· Creams and lotions· Facial cleaners· Feminine hygiene products· Permanent wave neutraliser· Propellants for aerosol-type dispensers· Toothpastes· Mouth rinses· Body wash/cleanser· Hair colour and bleaching· Moisturisers· Hand soaps· Nail polish· Anti-aging productsIn these products, citric acid acts as clarifying agents, water softeners, buffers, foam boosters and stabilizers, complexing agents (for example to stabilize the formulation by complexing metal ions and preventing discoloration and decomposition).The human health effects of the end us of these products is exempt from REACH, however, the environmental impact must be assessed.

9.6.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.6.2 Worker CS 2: Cosmetics, personal care products; Professional use (PROC 0)

9.6.2.1 Conditions of use

Conditions of use were not defined for this contributing scenario.

9.6.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The human health assessment is not considered for professional use of personal care products, since these are outside the scope of REACH.

9.7 Exposure scenario 8: Consumer use - Consumer use of personal care products

Market sector: Personal care use

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Consumer contributing scenario(s):		
CS 2	Cosmetics, personal care products; Consumer use	PC 39

Further description of the use:

This scenario covers consumer use of personal care products.

9.7.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.7.2 Cons CS 2: Cosmetics, personal care products; Consumer use (PC 39)

The human health assessment is not considered for consumer use of personal care products, since these are outside the scope of REACH.

9.7.2.1 Conditions of use

Conditions of use were not defined for this contributing scenario.Outside the scope of REACH.

9.7.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.8 Exposure scenario 9: Use at industrial sites - Use in the Paper industry

Market sector: Use in the Paper industry
Product category used: PC 26: Paper and board treatment products
Sector of use: SU 6b: Manufacture of pulp, paper and paper products

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 4	Mixing or blending in batch processes; Liquid	PROC 5
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citric acid is used in the cleaning of papermaking machines and to prevent build up of deposits. Cleaning applications are covered under another exposure scenario; this scenario covers use of citric acid as an additive or processing aid in the paper-making industry.
Citric acid may be added to pulp slurry prior to bleaching to control paper staining by sequestering metal ions. Bleaching of pulp is usually carried out in several stages, typically 3-5. Each stage typically contains pumps, mixers, a washer, and a retention tower. Citric acid may be added prior to one or more stages. Opportunities for exposure may arise during mixing/blending and transfer operations.
It is possible that a small amount of citric acid is incorporated into the finished paper products. However, it is considered that releases from these products will be minimal compared to those from the paper manufacturing process and release from articles is not considered in this scenario.
Citric acid may also be used as additives in paper products, such as tobacco papers. The human health and environmental exposures resulting from use as an additive in paper-making are expected to be equivalent to or less than the exposures resulting from use as a processing aid in the paper industry. Therefore, the same exposure scenario is considered adequate to cover both uses. The human health aspects of end use effects of tobacco products are outside the scope of this assessment. Environmental exposures to citric acid resulting from this end use are not expected to be significant compared to losses from other sources examined in the exposure scenarios of this report and are not considered further.

9.8.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.8.2 Worker CS 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.8.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.3 Worker CS 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.8.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.4 Worker CS 4: Mixing or blending in batch processes; Liquid (PROC 5)

9.8.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*.	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.8.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid substance*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.8.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.8.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid substance*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.8.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.9 Exposure scenario 10: Use at industrial sites - Use in cement retardation products

Market sector: Use in cement retardation products
Product category used: PC 0: Other

Environment contributing scenario(s):		
CS 1	Use at industrial site leading to inclusion into/onto article	ERC 5
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 4	Industrial spraying; Liquid	PROC 7
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 7	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, high dustiness	PROC 2
CS 8	Chemical production where opportunity for exposure arises; Solid, high dustiness	PROC 4
CS 9	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, high dustiness	PROC 8a
CS 10	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, high dustiness	PROC 8b

Subsequent service life exposure scenario(s):
ES13: Service life (worker at industrial site) - Service life of articles; cement retardation product; industrial use

Further description of the use:

Citric acid can be used to retard the setting rate of cement and reduce the amount of water needed. They may therefore be added to concrete, mortar, plaster, sealant and render formulations. The concentration of citric acid in these products is generally low (<1%).
Citric acid may be used in construction materials in industrial settings. This may include: mixing of citric acid (generally as part of a solid formulation) with cement and other ingredients to form concrete, mortar, plaster or render; and spreading, moulding or spraying of the product.
Cement-products containing citric acid may be used by members of the public (consumer use) and by workers at the commercial level e.g. skilled trades (professional use). This may include mixing, spreading, moulding or spraying operations. The citric acid may form part of a solid or liquid formulation.
Citric acid will remain in the concrete, mortar, plaster or render during its service life. Release is not intended, however, limited exposure is possible.
Both indoor and outdoor use of the formulations and articles is possible.

9.9.1 Env CS 1: Use at industrial site leading to inclusion into/onto article (ERC 5)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.9.2 Worker CS 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.9.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.3 Worker CS 3: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.9.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.4 Worker CS 4: Industrial spraying; Liquid (PROC 7)

9.9.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.9.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for

substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.9.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.7 Worker CS 7: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, high dustiness (PROC 2)

9.9.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.8 Worker CS 8: Chemical production where opportunity for exposure arises; Solid, high dustiness (PROC 4)

9.9.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.9 Worker CS 9: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, high dustiness (PROC 8a)

9.9.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.9.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.10 Worker CS 10: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, high dustiness (PROC 8b)

9.9.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.10.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10 Exposure scenario 11: Widespread use by professional workers - Professional use in cement retardation products

Market sector: Use in cement retardation products
Product category used: PC 0: Other

Environment contributing scenario(s):		
CS 1	Widespread use leading to inclusion into/onto article (indoor)	ERC 8c
CS 2	Widespread use leading to inclusion into/onto article (outdoor)	ERC 8f
Worker contributing scenario(s):		
CS 3	Roller application or brushing; Indoor use; Liquid	PROC 10
CS 4	Roller application or brushing; Outdoor use; Liquid	PROC 10
CS 5	Non-industrial spraying; Indoor use; Liquid	PROC 11
CS 6	Non-industrial spraying; Outdoor use; Liquid	PROC 11
CS 7	Treatment of articles by dipping and pouring; Indoor use; Liquid	PROC 13
CS 8	Treatment of articles by dipping and pouring; Outdoor use; Liquid	PROC 13
CS 9	Manual activities involving hand contact; Indoor use; Liquid	PROC 19
CS 10	Manual activities involving hand contact; Outdoor use; Liquid	PROC 19
CS 11	Tabletting, compression, extrusion, pelettisation, granulation; Indoor use; Solid, high dustiness	PROC 14
CS 12	Tabletting, compression, extrusion, pelettisation, granulation; Outdoor use; Solid, high dustiness	PROC 14
CS 13	Manual activities involving hand contact; Indoor use; Solid, high dustiness	PROC 19
CS 14	Manual activities involving hand contact; Outdoor use; Solid, high dustiness	PROC 19
CS 15	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use; Solid, high dustiness	PROC 21
CS 16	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use; Solid, high dustiness	PROC 21

Subsequent service life exposure scenario(s):
ES14: Service life (professional worker) - Service life of articles; cement retardation product; professional use

Further description of the use:

This scenario cover professional use in cement retardation products.

9.10.1 Env CS 1: Widespread use leading to inclusion into/onto article (indoor) (ERC 8c)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.10.2 Env CS 2: Widespread use leading to inclusion into/onto article (outdoor) (ERC 8f)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.10.3 Worker CS 3: Roller application or brushing; Indoor use; Liquid (PROC 10)

9.10.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.4 Worker CS 4: Roller application or brushing; Outdoor use; Liquid (PROC 10)

9.10.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.5 Worker CS 5: Non-industrial spraying; Indoor use; Liquid (PROC 11)

9.10.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.6 Worker CS 6: Non-industrial spraying; Outdoor use; Liquid (PROC 11)

9.10.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	56 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.7 Worker CS 7: Treatment of articles by dipping and pouring; Indoor use; Liquid (PROC 13)

9.10.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.8 Worker CS 8: Treatment of articles by dipping and pouring; Outdoor use; Liquid (PROC 13)

9.10.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.8.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable

risk to humans from eye or inhalation exposure to citric acid.

9.10.9 Worker CS 9: Manual activities involving hand contact; Indoor use; Liquid (PROC 19)

9.10.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.10 Worker CS 10: Manual activities involving hand contact; Outdoor use; Liquid (PROC 19)

9.10.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.11 Worker CS 11: Tabletting, compression, extrusion, pelettisation, granulation; Indoor use; Solid, high dustiness (PROC 14)

9.10.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.11.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.12 Worker CS 12: Tabletting, compression, extrusion, pelettisation, granulation; Outdoor use; Solid, high dustiness (PROC 14)

9.10.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.12.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	14 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.13 Worker CS 13: Manual activities involving hand contact; Indoor use; Solid, high dustiness (PROC 19)

9.10.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.13.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	20 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.14 Worker CS 14: Manual activities involving hand contact; Outdoor use; Solid, high dustiness (PROC 19)

9.10.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.14.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	14 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.15 Worker CS 15: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use; Solid, high dustiness (PROC 21)

9.10.15.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.15.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.7 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	8 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.16 Worker CS 16: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use; Solid, high dustiness (PROC 21)

9.10.16.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.16.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.8 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	5.6 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.11 Exposure scenario 12: Consumer use - Consumer use in Cement retardation products

Market sector: Use in cement retardation products

Environment contributing scenario(s):		
CS 1	Widespread use leading to inclusion into/onto article (outdoor)	ERC 8f
CS 2	Widespread use leading to inclusion into/onto article (indoor)	ERC 8c
Consumer contributing scenario(s):		
CS 3	Cement retardation products; indoor use	PC 0
CS 4	Cement retardation products; outdoor use	PC 0

Subsequent service life exposure scenario(s):
ES15: Service life (consumers) - Service life of articles; cement retardation product; consumer use

Further description of the use:

This scenario covers consumer use in cement retardation products.

9.11.1 Env CS 1: Widespread use leading to inclusion into/onto article (outdoor) (ERC 8f)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.11.2 Env CS 2: Widespread use leading to inclusion into/onto article (indoor) (ERC 8c)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.11.3 Cons CS 3: Cement retardation products; indoor use (PC 0)

9.11.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	

9.11.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.11.4 Cons CS 4: Cement retardation products; outdoor use (PC 0)

9.11.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	

9.11.4.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12 Exposure scenario 13: Service life (worker at industrial site) - Service life of articles; cement retardation product; industrial use

Market sector: Use in cement retardation products
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Industrial	ERC 12b, ERC 12a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use; Solid	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use; Solid	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES10: Use at industrial sites - Use in cement retardation products

Further description of the use:

This scenario covers the industrial service life of articles which may contain residual registration substance in cement retardation products.

9.12.1 Env CS 1: Service life - workers; Industrial (ERC 12b), ERC 12a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.12.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.12.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.12.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.12.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.12.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.12.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.12.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.12.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13 Exposure scenario 14: Service life (professional worker) - Service life of articles; cement retardation product; professional use

Market sector: Use in cement retardation products
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Professional	ERC 10a, ERC 11a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES11: Widespread use by professional workers - Professional use in cement retardation products

Further description of the use:

This scenario covers the professional service life of articles which may contain residual registration substance in cement retardation products.

9.13.1 Env CS 1: Service life - workers; Professional ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.13.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.13.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.13.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.13.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.13.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.14 Exposure scenario 15: Service life (consumers) - Service life of articles; cement retardation product; consumer use

Market sector: Use in cement retardation products

Environment contributing scenario(s):		
CS 1	Service life - consumers	ERC 10a, ERC 11a
Consumer contributing scenario(s):		
CS 2	Cement retardation products; Indoor	AC 0
CS 3	Cement retardation products; Outdoor	AC 0

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES12: Consumer use - Consumer use in Cement retardation products

Further description of the use:

This scenario covers the consumer service life of articles which may contain residual registration substance in cement retardation products.

9.14.1 Env CS 1: Service life - consumers ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.14.2 Cons CS 2: Cement retardation products; Indoor (AC 0)

9.14.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	

9.14.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.14.3 Cons CS 3: Cement retardation products; Outdoor (AC 0)

9.14.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	

9.14.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.15 Exposure scenario 16: Use at industrial sites - Use in polymers and plastics

Market sector: Use in polymers and plastics
Product category used: PC 32: Polymer Preparations and Compounds
Sector of use: SU 11: Manufacture of rubber products; SU 12: Manufacture of plastics products, including compounding and conversion

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 3	Mixing or blending in batch processes; Liquid	PROC 5
CS 4	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 5	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citric acid and citrate salts may be used as a component of blowing agents in the manufacture of foamed thermoplastics. This application, described below, should be taken as representative of where and why citric acid or citrate salts may be used within the plastics and polymers industry; other applications are possible.
Polyolefin foams are used for a variety of applications such as automotive, construction, food packaging, sport and leisure, and many other industrial and consumer uses. They usually have a high strength to weight ratio and are manufactured in a variety of processes and in low density (25 - 250 kg/m^3) or high density (250 - 700 kg/m^3) versions, or even in densities as low as 16 kg/m^3 for polystyrene. All current extrusion processes involve the following steps: melting, mixing with blowing agents, cooling of melt, expansion and degassing/aging. The steps in this process can be realized in different configurations of equipment, *e.g.*, with long single-screw extruders, twin-screw extruders, or tandem extruder lines.
The choice of chemical or physical blowing agents depends on the foam density to be reached (*e.g.* the foam application) and influences the necessary foaming equipment and the costs of the foamed materials. High-density thermoplastic foams based on, *e.g.*, polypropylene or polystyrene, may be produced using blowing agents which decompose to generate gas which is soluble in the melt but which is released as the pressure is reduced (*e.g.*, by passing through a dye) to produce a foam. The foaming process is complex but involves bubble nucleation followed by bubble growth.
One example of a commercially used chemical foaming agent is based on citric acid (or monosodium citrate) in combination with sodium carbonate or (sodium bicarbonate) in a weight ratio of between about 1:1 and about 5:1 respectively [US 5 302 455]. The citric acid/sodium bicarbonate system decomposes at 160 – 210°C to release 120 cm^3/g of CO_2. [Karger-Kocsis, 1999; Brydson, 1999; Holmberg, 2002]
Both citric acid (or citrate salt) and (bi)carbonate may be surface-treated with, for example, a fatty acid ester to make them compatible with the polyolefin. A concentrated master batch of the formulated foaming agent in polymer at loading levels of from about 5% to about 50% actives may then be prepared. The master batch is added to the polymer melt which is to be foamed such that the blowing agents are at 0.1 to 2.0% active levels in the final formulation [US 5 302 455 and refs. therein]. The pre-treatment formulation and foaming processes are typically closed or open batch

processes. The citrate is typically present as a solid prior to mixing with the polymer melt.
By-products of this reaction are mono-, di-, and/or trisodium citrate, in combination with other sodium salts, which will still be present within the foamed polymer. These residues are typically present at around 50 wt.% of the initial foaming agent formulation which is equivalent to <1 wt.% of the total foamed polymer in most cases [RAPRA, 2004]. No citric acid is present in the final polymer.

9.15.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.15.2 Worker CS 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.15.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.15.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.15.3 Worker CS 3: Mixing or blending in batch processes; Liquid (PROC 5)

9.15.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.15.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.15.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.15.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.15.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.15.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.15.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.15.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 % *transfer of solid*	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.15.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.15.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16 Exposure scenario 17: Use at industrial sites - Use in scale inhibition in oilfield water systems

Market sector: Use in scale inhibition in oilfield water systems
Product category used: PC 35: Washing and Cleaning Products; PC 37: Water treatment chemicals
Sector of use: SU 2a: Mining (without offshore industries); SU 2b: Offshore industries

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 3	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 4	Mixing or blending in batch processes; Liquid	PROC 5
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b

Further description of the use:

Citric acid may be used as a complexing agent to decrease scale formation and inhibit corrosion of metal equipment and pipelines.
This includes, for example, cleaning of (steam) boilers or reheaters, removal of calcium and rust layers from steam blocks and hot water systems, removal of rust in cleaning bilges and desalination units aboard ships, removal of mill scale from welding operations in nuclear reactors. It may also be used as an additive in circulating cooling water systems. These systems typically use high substance concentration at low discharges and would usually have a waste water treatment plant (WWTP) in place. Citric acid would generally be formulated in an additive package prior to use, and typically supplied in aqueous solution form with active ingredient content of 25 – 65%.

9.16.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.16.2 Worker CS 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.16.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.3 Worker CS 3: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.16.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.4 Worker CS 4: Mixing or blending in batch processes; Liquid (PROC 5)

9.16.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.16.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.16.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17 Exposure scenario 18: Use at industrial sites - Use in the textiles industry

Market sector: Use in the textiles industry
Product category used: PC 20: Products such as ph-regulators, flocculants, precipitants, neutralization agents; PC 23: Leather treatment products; PC 34: Textile dyes and impregnating products
Sector of use: SU 5: Manufacture of textiles, leather, fur

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Industrial spraying; Liquid	PROC 7
CS 3	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 4	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 5	Roller application or brushing; Liquid	PROC 10
CS 6	Treatment of articles by dipping and pouring; Liquid	PROC 13

Further description of the use:

The OECD Emission Scenario Document on the Textile Finishing Industry [OECD, 2004A] describes the textile industry as “one of the largest and most complicated industrial chains in manufacturing industry”. The industry is dominated by small and medium-sized companies, working in three main sectors: clothing, home furnishings and industrial. Activity in the textile finishing industry is distributed across the EU, but (within the EU-15) the dominant Member State is Italy, accounting for around 36% of production, followed by German (approx. 13%), France (approx. 12%), the UK and Spain (approx. 10% each). The overall market for textiles, including yarn production and carpets, is also dominated by Italy, with around a 30% market share (EC, 2002). Similarly, for leather, the most important producer and transformer in Europe is Italy (84% of all companies), followed by Spain [OECD, 2004B].Within the textile and leather finishing industries, citric acid and related salts may be used in a wide variety of applications. However, these uses may be summarized (albeit with some overlap) as being based on either acidity (and pH regulation) or the ability to complex metal ions. Examples of applications where these are important are:• Acidification of flame-retardant treating baths• Curing catalyst for treatments such as easy-care resins • Sequestering of alkaline earth or transition metal ions to prevent interference in dyeing and other processes. Potential exposure to humans and especially the environment is dependent on the intended function of the substance, as well as the substrates and processes used. Functional finishing agents and other chemically reactive substances are intended to be consumed during use; therefore the amount released is related to the efficiency of the process. On the other hand, non-reacting substances (e.g. processing aids) are not consumed and will ultimately be lost to air or waste water, depending on their function and physicochemical properties. In virtually all cases, it is expected that citric acid or citrate salts, as process aids, will be lost to waste water. The following applications should be taken as representative rather than exhaustive examples of where and why citric acid or citrates may be used within the textile and leather finishing industries. Further details of these examples may be found in European Commission Reference Document on Best Available Techniques for the Textiles Industry [BREF, 2003].Flame Retardants: Potassium salts of fluoro complexes of zirconium (potassium hexafluorozirconate) are typically used as flame retardants for wool and wool-blend fibres. Typical

application conditions for carpet wool yarn are as follows:• Rinse to remove unwanted salts / anions.• Bath set up at 20 – 30ºC and pH 3: citric acid (4 % on weight of fabric) may be used.• Addition of potassium hexafluorozirconate dissolved in hot water.• Temperature raised at 1 – 2 K per minute to 60ºC and held at this temperature for 30 minutes• Rinse in cold water for 10 - 20 minutes. Durable Press Resins: Cellulosic fabrics such as cotton or its blends are often treated with a finish which prevents wrinkling and shrinkage during laundering and drying. These finishes are known by a variety of names: easy-care, wash-and-wear finishing, no-iron, wrinkle resistant etc. Recipes for resin-finishing liquors are in general aqueous solutions or dispersions which consist of a cross-linking resin, a catalyst, a wetting agent/emulsifier (mainly a non-ionic surfactant) plus a number of additives. Cross-linking resin systems are often based on urea-formaldehyde or melamine-formaldehyde. The most commonly used catalyst is magnesium chloride. In many cases liquid mixtures are used, which are based on magnesium chloride plus an organic acid such as citric acid. Catalyst is used at 10 – 30 % of the weight of the cross-linking resin, which is itself used in the range of 5% (for blends) up to 12% (for 100% cotton) on the weight of the fabric. A typical bath may contain: cross-linking resin, 50 g/l; catalyst (MgCl2), 7 g/l; and acid, 0.5 g/l.Pre-treatment and Dyeing: The presence of ions of alkaline earth metals (calcium and magnesium) and/or other metals (especially iron) may have negative effects on various wet processes not only in pre-treatment (e.g. catalytic destruction of hydrogen peroxide) but also in dyeing. Purified and softened water is used in textile finishing mills but often this is not enough and specific auxiliary formulations containing metal complexing agents need to be added to the baths. Typical sequestering agents which have been used are polyphosphates, phosphonates, and amino carboxylic acids (e.g., EDTA). The main concerns associated with the use of these substances arise from their N- and P-content, their often-low biodegradability/bio-eliminability, and their ability to form stable complexes with metals (the very reason they are used in the first place!), which may lead to remobilisation of heavy metals in effluent or downstream sediments. Hydroxy-carboxylic acids (e.g., gluconates, citrates) are convenient alternatives to the above named conventional sequestering agents. None of these substances contains N or P in their molecular structure. In addition, hydroxy-carboxylic acids are readily biodegradable. A typical hydrogen peroxide-based bleaching formulation for cotton (or its blends) will use 0 – 20 g sequestering agent per kg of textile being treated. For bleaching of wool, 5 – 30 g/kg may be used. For dyeing of cellulosic fabrics, 1 – 3 g/litre of sequestering agent may be used.

9.17.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.17.2 Worker CS 2: Industrial spraying; Liquid (PROC 7)

9.17.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.17.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.3 Worker CS 3: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.17.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.17.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.17.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.17.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.44 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.5 Worker CS 5: Roller application or brushing; Liquid (PROC 10)

9.17.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.6 Worker CS 6: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.17.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.18 Exposure scenario 19: Use at industrial sites - Industrial use of coatings and paints

Market sector: Use in coatings and paints
Product category used: PC 9a: Coatings and Paints, Thinners, paint removers

Environment contributing scenario(s):		
CS 1	Use at industrial site leading to inclusion into/onto article	ERC 5
Worker contributing scenario(s):		
CS 2	Industrial spraying; Liquid	PROC 7
CS 3	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 4	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 5	Roller application or brushing; Liquid	PROC 10
CS 6	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 7	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Subsequent service life exposure scenario(s):
ES22: Service life (worker at industrial site) - Service life of articles; coatings and paints; industrial use

Further description of the use:

The term “coatings” as used in this document describes any material that can be applied to a surface as a thin continuous, layer (film). This includes paints, lacquers or varnishes. Such coatings are used in a wide range of application to protect surfaces from corrosion and other environmental effects, provide decorative effects and improve inherent performance properties. Film formation can be a physical process, where solvents evaporate from solutions or melted substances solidify, or a chemical process involving reactions between reactive groups in binders [OECD, 2007].
The application of a coating to a surface can be by manual use of brush/roller, spraying systems, and dip or roll coating systems [OECD, 2007]. The type and constituent composition of the coating product are based on the substrate, intended use, service environment and the desired role of coating. Decorative coatings cover the use of paints applied to buildings, their trim and fittings and for decorative and protective purposes by both professionals and the general public. All decorative coatings are supplied as liquid materials [OECD, 2007].
Titanium dioxide (TiO2) is the most important inorganic pigment in terms of quantity. The world production in 2000 amounted to nearly 4 million tonnes per year. Titanium dioxide white inorganic pigments are used primarily in the production of paints, printing inks, paper and plastic products. Titanium dioxide is of outstanding importance as a white pigment because of its scattering properties, its chemical stability, and lack of toxicity [BREF, 2007]. Citrates may be used to retard the settling of titanium dioxide in aqueous dispersions.
The following application should be taken as representative rather than the sole example of where and why citric acid or citrates may be used within the coatings industry.
Anti-settling of Pigment: In the paint industry citric acid and citrate salts are used to retard the settling of titanium dioxide, the most common pigment used in paints and other coatings [APAC, 2009]. Shipping of titanium dioxide as an aqueous slurry has advantages in handling and storage space versus shipping as a fine solid. Although titanium dioxide particles will initially disperse in water, they separate rapidly and in a short time will form a hard-packed sediment which is virtually

impossible to re-disperse. The presence of ions such as calcium or iron causes flocculation, which exacerbates the problem. In the early 1970s, it was discovered that addition of 0.04 – 0.4% citric acid or tartaric acid or their simple salts (sodium, potassium, ammonium) substantially retarded the settling and packing of titanium dioxide particles in aqueous dispersions [US 3 663 284].
At least a portion of the citric acid added to aid shipment of the pigment is likely to still be present during formulation of the paint. Indeed, it is possible that further additions are made to allow re-dispersion of pigment in the final paint formulation.

9.18.1 Env CS 1: Use at industrial site leading to inclusion into/onto article (ERC 5)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.18.2 Worker CS 2: Industrial spraying; Liquid (PROC 7)

9.18.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.18.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.3 Worker CS 3: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.18.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation

(EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.18.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.5 Worker CS 5: Roller application or brushing; Liquid (PROC 10)

9.18.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.18.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.18.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.7 Worker CS 7: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.18.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.18.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19 Exposure scenario 20: Widespread use by professional workers - Professional use in paints and coatings

Market sector: Use in coatings and paints
Product category used: PC 9a: Coatings and Paints, Thinners, paint removers
Sector of use: SU 18: Manufacture of furniture; SU 19: Building and construction work

Environment contributing scenario(s):		
CS 1	Widespread use leading to inclusion into/onto article (indoor)	ERC 8c
CS 2	Widespread use leading to inclusion into/onto article (outdoor)	ERC 8f
Worker contributing scenario(s):		
CS 3	Roller application or brushing; Liquid	PROC 10
CS 4	Non-industrial spraying; Liquid	PROC 11
CS 5	Manual activities involving hand contact; Liquid	PROC 19
CS 6	Manual activities involving hand contact; Solid, medium dustiness	PROC 19

Subsequent service life exposure scenario(s):
ES23: Service life (professional worker) - Service life of articles; coatings and paints; professional use

Further description of the use:

This scenario covers professional use in paints and coatings.

9.19.1 Env CS 1: Widespread use leading to inclusion into/onto article (indoor) (ERC 8c)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.19.2 Env CS 2: Widespread use leading to inclusion into/onto article (outdoor) (ERC 8f)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.19.3 Worker CS 3: Roller application or brushing; Liquid (PROC 10)

9.19.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.19.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19.4 Worker CS 4: Non-industrial spraying; Liquid (PROC 11)

9.19.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.19.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.19.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19.5 Worker CS 5: Manual activities involving hand contact; Liquid (PROC 19)

9.19.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.19.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19.6 Worker CS 6: Manual activities involving hand contact; Solid, medium dustiness (PROC 19)

9.19.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.19.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.19.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.20 Exposure scenario 21: Consumer use - Consumer use in paints and coatings

Market sector: Use in coatings and paints

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
CS 2	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8 d
Consumer contributing scenario(s):		
CS 3	Coatings and paints, thinners, paint removers; Liquid	PC 9a
CS 4	Coatings and paints, thinners, paint removers; Solid, medium dustiness	PC 9a

Subsequent service life exposure scenario(s):
ES24: Service life (consumers) - Service life of articles; coatings and paints; consumer use

Further description of the use:

This scenario covers consumer use in paints and coatings.

9.20.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.20.2 Env CS 2: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.20.3 Cons CS 3: Coatings and paints, thinners, paint removers; Liquid (PC 9a)

9.20.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	

9.20.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of

ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.20.4 Cons CS 4: Coatings and paints, thinners, paint removers; Solid, medium dustiness (PC 9a)

9.20.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	

9.20.4.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21 Exposure scenario 22: Service life (worker at industrial site) - Service life of articles; coatings and paints; industrial use

Market sector: Use in coatings and paints
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Industrial	ERC 12b, ERC 12a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES19: Use at industrial sites - Industrial use of coatings and paints

Further description of the use:

This scenario covers the industrial service life of articles that may contain residual registration substance in coatings or paints.

9.21.1 Env CS 1: Service life - workers; Industrial ERC 12b, ERC 12a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.21.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.21.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.21.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.21.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.21.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.21.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.21.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.21.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.21.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22 Exposure scenario 23: Service life (professional worker) - Service life of articles; coatings and paints; professional use

Market sector: Use in coatings and paints
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Professional	ERC 10a, ERC 11a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES20: Widespread use by professional workers - Professional use in paints and coatings

Further description of the use:

This scenario covers the professional service life of articles that may contain residual registration substance in coatings or paints.

9.22.1 Env CS 1: Service life - workers; Professional ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.22.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.22.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.22.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.22.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.22.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.22.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.22.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.22.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.22.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.23 Exposure scenario 24: Service life (consumers) - Service life of articles; coatings and paints; consumer use

Market sector: Use in coatings and paints

Environment contributing scenario(s):		
CS 1	Service life - consumers	ERC 10a, ERC 11a
Consumer contributing scenario(s):		
CS 2	Paints and coatings	AC 0

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES21: Consumer use - Consumer use in paints and coatings

Further description of the use:

This scenario covers the consumer service life of articles which may contain residual registration substance in coatings or paints.

9.23.1 Env CS 1: Service life - consumers ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.23.2 Cons CS 2: Paints and coatings (AC 0)

9.23.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	

9.23.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.24 Exposure scenario 25: Use at industrial sites - Industrial use in photographic processing

Market sector: Use in photographic processing
Product category used: PC 30: Photo-chemicals

Environment contributing scenario(s):		
CS 1	Use of reactive processing aid at industrial site (no inclusion into or onto article)	ERC 6b
Worker contributing scenario(s):		
CS 2	Mixing or blending in batch processes; Liquid	PROC 5
CS 3	Treatment of articles by dipping and pouring; Liquid	PROC 13
CS 4	Mixing or blending in batch processes; Solid, medium dustiness	PROC 5
CS 5	Treatment of articles by dipping and pouring; Solid, medium dustiness	PROC 13

Further description of the use:

Citric acid is one of a range of complexing agents used in photography to control the effects of calcium and magnesium hardness, and to keep iron soluble in solution as part of redox processes.
Due to the rapid growth of digital photography, use of chemicals in film processing is now limited almost entirely to a small number of professional providers. The chemicals used are collected by photochemical companies in order to recover silver and disposal to drain does not take place.
Citrate may also be used as a stop bath in professional or consumer settings as part of the process for the manual development of photographic film.
The film is removed from the camera and wound onto a reel in darkroom or a lightproof bag. The reel is placed in a light-proof tank and a succession of aqueous solutions is added. Sheet film may be processed by placing the film in a succession of trays containing the appropriate solutions.
The film is pre-soaked in water and then soaked in the developer to convert the latent image to a visible image. The developer is normally alkaline, so a mild acid such as citric acid will neutralize it; this is called a stop bath. The image is then fixed and the film is washed and dried.
The citric acid stop batch may be purchased pre-formulated or mixed from citric acid powder and other ingredients.

9.24.1 Env CS 1: Use of reactive processing aid at industrial site (no inclusion into or onto article) (ERC 6b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.24.2 Worker CS 2: Mixing or blending in batch processes; Liquid (PROC 5)

9.24.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.24.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.24.3 Worker CS 3: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.24.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.24.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.24.4 Worker CS 4: Mixing or blending in batch processes; Solid, medium dustiness (PROC 5)

9.24.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.24.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.24.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.24.5 Worker CS 5: Treatment of articles by dipping and pouring; Solid, medium dustiness (PROC 13)

9.24.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.24.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.24.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.25 Exposure scenario 26: Consumer use - Consumer use in photographic processing

Market sector: Use in photographic processing

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Consumer contributing scenario(s):		
CS 2	Photo-chemicals	PC 30

Further description of the use:

This scenario covers consumer use in photographic processing.

9.25.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.25.2 Cons CS 2: Photo-chemicals (PC 30)

9.25.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.25.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.26 Exposure scenario 21: Use at industrial sites - Industrial use as an anti-scalant, complexing agent in water treatment systems

Market sector: Use as an anti-scalant, complexing agent in water treatment systems
Product category used: PC 20: Products such as ph-regulators, flocculants, precipitants, neutralization agents; PC 36: Water softeners; PC 37: Water treatment chemicals

Environment contributing scenario(s):		
CS 1	Industrial use as an anti-scalant, complexing agent in water treatment systems	ERC 4
CS 2	Use of functional fluid at industrial site	ERC 7
Worker contributing scenario(s):		
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid	PROC 1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 5	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 6	Industrial spraying; Liquid	PROC 7
CS 7	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 8	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 9	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9

Further description of the use:

Citric acid may be used as a complexing agent to decrease scale formation and inhibit corrosion of metal equipment and pipelines.This includes, for example, cleaning of (steam) boilers or reheaters, removal of calcium and rust layers from steam blocks and hot water systems, removal of rust in cleaning bilges and desalination units aboard ships, removal of mill scale from welding operations in nuclear reactors. It may also be used as an additive in circulating cooling water systems. These systems typically use high substance concentration at low discharges and would usually have a waste water treatment plant (WWTP) in place.Citric acid would generally be formulated in an additive package prior to use, and typically supplied in aqueous solution form with active ingredient content of 25 – 65%.

9.26.1 Env CS 1: Industrial use as an anti-scalant, complexing agent in water treatment systems (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.26.2 Env CS 2: Use of functional fluid at industrial site (ERC 7)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.26.3 Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid (PROC 1)

9.26.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.4 Worker CS 4: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.26.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.5 Worker CS 5: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.26.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.6 Worker CS 6: Industrial spraying; Liquid (PROC 7)

9.26.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.26.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.7 Worker CS 7: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.26.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.26.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.8 Worker CS 8: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.26.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.26.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.9 Worker CS 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.26.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27 Exposure scenario 28: Use at industrial sites - Industrial use of treatment of metal surfaces

Market sector: Treatment of metal surfaces
Product category used: PC 7: Base metals and alloys; PC 14: Metal surface treatment products

Environment contributing scenario(s):		
CS 1	Use at industrial site leading to inclusion into/onto article	ERC 5
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 4	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 5	Industrial spraying; Liquid	PROC 7
CS 6	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 7	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 8	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9
CS 9	Roller application or brushing; Liquid	PROC 10
CS 10	Treatment of articles by dipping and pouring; Liquid	PROC 13

Subsequent service life exposure scenario(s):
ES29: Service life (worker at industrial site) - Service life of articles; treatment of metal surfaces; industrial use

Further description of the use:

Citric acid may be used as a complexing agent during metal surface treatment operations. The following applications should be taken as representative rather than the sole example of where and why citric acid or citrates may be used in the treatment of metal surfaces. Some industries using citric acid include fasteners, medical devices, semi-conductors, automotive and aerospace.

Passivation: Citric acid may be used in stainless steel passivation to assist oxidation of the surface of the stainless steel and prevent later corrosion. After thorough cleaning, the stainless steel part is immersed in a passivating acid bath. Any one of three approaches can be used: nitric acid passivation, nitric acid with sodium dichromate passivation and citric acid passivation. Which approach to use depends on the grade of stainless steel and prescribed acceptance criteria. When citric acid passivation is used, typical solutions range from 4 to 10% citric acid by weight.

Electroless plating: Plating describes the coating of surfaces with metals, either through an electrolysis or electroless plating processes. Electroless plating is also known as ‘autocatalytic’ plating; deposition of the metal starts on metal nuclei such as palladium and continues autocatalytically. Electroless plating is favoured over electrolysis for most component production (EA 2009).

There are usually three stages in the electroless plating process: de-smearing, activation and electroless copper plating. The plating solution has a copper content of 2 – 5 g/l, with sodium hydroxide (15 – 20 g/l), complexing agents (10 – 15 g/l) or tartrates (5 – 10 g/l) and reducing agents, such as formaldehyde (3 – 5 g/l). The process solution lifetime is limited by the build-up of reaction products and is proportional to the rate of throughput of components (EA 2009). Citrate may be used as a complexing agent.
Electroless plating involves the large-scale use of water in both providing the medium for the process itself and for the subsequent rinsing and washing of components. There is a degree of recycling of rinse water through use to top-up the plating tanks, but there is ultimately loss through carry-over on components. Spent fluids can only be topped up a limited number of times before the media needs replacing. Water-soluble waste is discharged in waste water for basic on-site treatment (settling and pH adjustment) before discharge to municipal treatment works, controlled by local discharge consent agreements (EA 2009).

9.27.1 Env CS 1: Use at industrial site leading to inclusion into/onto article (ERC 5)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.27.2 Worker CS 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.27.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no

unacceptable risk to human health from storage or handling of citric acid.

9.27.3 Worker CS 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.27.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.4 Worker CS 4: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.27.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.5 Worker CS 5: Industrial spraying; Liquid (PROC 7)

9.27.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.27.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.27.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.27.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.7 Worker CS 7: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.27.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.27.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.8 Worker CS 8: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.27.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.8.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.9 Worker CS 9: Roller application or brushing; Liquid (PROC 10)

9.27.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.10 Worker CS 10: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.27.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.28 Exposure scenario 29: Service life (worker at industrial site) - Service life of articles; treatment of metal surfaces; industrial use

Market sector: Treatment of metal surfaces
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Industrial	ERC 12b, ERC 12a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES28: Use at industrial sites - Industrial use of treatment of metal surfaces

Further description of the use:

This scenario covers the industrial service life of articles that may contain residual registration substance on treated metal surfaces.

9.28.1 Env CS 1: Service life - workers; Industrial ERC 12b, ERC 12a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.28.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.28.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *Assumed as a reasonable worst-case for residual citric acid on the metal surface.*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.28.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.28.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.28.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *Assumed as a reasonable worst-case for residual citric acid on the metal surface.*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.28.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.28.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.28.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *Assumed as a reasonable worst-case for residual citric acid on the metal surface.*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.28.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.28.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.28.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *Assumed as a reasonable worst-case for residual citric acid on the metal surface.*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.28.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.29 Exposure scenario 30: Use at industrial sites - Cleaning of metal surfaces

Market sector: Cleaning of metal surfaces
Product category used: PC 35: Washing and Cleaning Products

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Industrial spraying; Liquid	PROC 7
CS 3	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 4	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 5	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC 9
CS 6	Roller application or brushing; Liquid	PROC 10
CS 7	Treatment of articles by dipping and pouring; Liquid	PROC 13

Further description of the use:

Citric acid may be used as cleaning of circuit boards prior to soldering, and metal cleaning or chemical polishing for the surface treatment of aluminium, copper and other metals.

9.29.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.29.2 Worker CS 2: Industrial spraying; Liquid (PROC 7)

9.29.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.29.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.3 Worker CS 3: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.29.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.29.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.29.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.29.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.5 Worker CS 5: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC 9)

9.29.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.6 Worker CS 6: Roller application or brushing; Liquid (PROC 10)

9.29.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.7 Worker CS 7: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.29.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30 Exposure scenario 31: Use at industrial sites - Use in agricultural applications

Market sector: Use in agricultural applications
Product category used: PC 12: Fertilizers

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 3	Mixing or blending in batch processes; Liquid	PROC 5
CS 4	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 5	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 6	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness	PROC 3
CS 7	Mixing or blending in batch processes; Solid, medium dustiness	PROC 5
CS 8	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 9	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citrate complexes of iron, copper, magnesium, manganese and zinc are used to correct soil deficiencies of these minerals because they are soluble in water at normal soil pH. The soluble citrate complex promotes the transfer of the metal nutrient into the plant's root or leaf system. The biodegradability of citric acid is important for this application (APAC 2009).
One common method for making fertilisers involves dissolving metal sulfates in water and citric acid followed by neutralization with ammonia. This process may be carried out in an industrial setting as part of the formulation of solid or liquid fertilisers/plant feeds. In this case, citric acid is an intermediate and it is the metal-citrate or ammonium citrate that must be considered for the professional or consumer use of fertilisers/plant feeds. Magnesium citrate may be used in this context. Alternatively, mixing of fertilisers may take place on farms. In this case, exposure may be to solid or liquid citric acid or metal-citrate (including sodium citrate).
Citrates may also be present as dispersant/scale inhibiting agents, i.e. adjuvants in the preparation. Evidence from other applications in which citrate is acting as a scale control agent/dispersant suggests that citrate may be present at very low levels in the formulation, perhaps *approx.* 1-20 ppm.
In any of the above cases, marketed products may be solid (granules or pellets) or solution. Processes used may include transfer, loading, mixing, rolling/brushing and spraying.
Plant feeds containing citrates may also be used in professional or consumer settings. The products may be liquids or granules and may be sprayed or poured.
Citrates may also be used in plant protection products and in animal feed; however, these applications fall outside the scope of REACH.

9.30.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.30.2 Worker CS 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.30.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.3 Worker CS 3: Mixing or blending in batch processes; Liquid (PROC 5)

9.30.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.30.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.30.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.6 Worker CS 6: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness (PROC 3)

9.30.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.7 Worker CS 7: Mixing or blending in batch processes; Solid, medium dustiness (PROC 5)

9.30.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.8 Worker CS 8: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.30.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.9 Worker CS 9: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.30.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.9.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31 Exposure scenario 32: Widespread use by professional workers - Professional use in agricultural applications

Market sector: Use in agricultural applications
Product category used: PC 12: Fertilizers

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8 d
CS 2	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)	ERC 8b
Worker contributing scenario(s):		
CS 3	Roller application or brushing; Liquid	PROC 10
CS 4	Non-industrial spraying; Liquid	PROC 11
CS 5	Use as laboratory reagent; Liquid	PROC 15
CS 6	Tabletting, compression, extrusion, pelettisation, granulation; Solid, medium dustiness	PROC 14
CS 7	Use as laboratory reagent; Solid, medium dustiness	PROC 15
CS 8	Manual activities involving hand contact; Solid, medium dustiness	PROC 19

Further description of the use:

This scenario covers professional use in agricultural applications in liquid products.

9.31.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.31.2 Env CS 2: Widespread use of reactive processing aid (no inclusion into or onto article, indoor) (ERC 8b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.31.3 Worker CS 3: Roller application or brushing; Liquid (PROC 10)

9.31.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.4 Worker CS 4: Non-industrial spraying; Liquid (PROC 11)

9.31.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.5 Worker CS 5: Use as laboratory reagent; Liquid (PROC 15)

9.31.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.6 Worker CS 6: Tabletting, compression, extrusion, pelettisation, granulation; Solid, medium dustiness (PROC 14)

9.31.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.7 Worker CS 7: Use as laboratory reagent; Solid, medium dustiness (PROC 15)

9.31.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.8 Worker CS 8: Manual activities involving hand contact; Solid, medium dustiness (PROC 19)

9.31.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.32 Exposure scenario 33: Consumer use - Consumer use in agricultural applications

Market sector: Use in agricultural applications

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8 d
CS 2	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)	ERC 8b
Consumer contributing scenario(s):		
CS 3	Fertilizers	PC 12

Further description of the use:

This scenario covers consumer use in agricultural applications.

9.32.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.32.2 Env CS 2: Widespread use of reactive processing aid (no inclusion into or onto article, indoor) (ERC 8b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.32.3 Cons CS 3: Fertilizers (PC 12)

9.32.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.32.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.33 Exposure scenario 34: Use at industrial sites - Laboratory reagent

Market sector: Laboratory reagent
Product category used: PC 21: Laboratory Chemicals

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
CS 2	Use of functional fluid at industrial site	ERC 7
Worker contributing scenario(s):		
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 2
CS 5	Chemical production where opportunity for exposure arises; Solid, medium dustiness	PROC 4
CS 6	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 7	Use as laboratory reagent; Solid, medium dustiness	PROC 15

Further description of the use:

Citric acid may be used at low levels within laboratories.

9.33.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.33.2 Env CS 2: Use of functional fluid at industrial site (ERC 7)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.33.3 Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 1)

9.33.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.4 Worker CS 4: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 2)

9.33.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.5 Worker CS 5: Chemical production where opportunity for exposure arises; Solid, medium dustiness (PROC 4)

9.33.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.33.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.7 Worker CS 7: Use as laboratory reagent; Solid, medium dustiness (PROC 15)

9.33.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.