SAFETY DATA SHEET

Based upon Regulation (EC) No 1907/2006, as amended by Regulation (EU) No 2020/878

Copper Chloride

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name : Copper Chloride
Synonyms : Copper cement with CuCl; CuCl containing copper cement; Chloride containing copper cement
Registration number REACH : 01-2119474447-29-0001 (Nyrstar Belgium NV/SA)
01-2119474447-29-0010 (Nyrstar Budel BV)
01-2119474447-29-0006 (Nyrstar France SAS)
Product type REACH : Substance/UVCB
: Transported isolated intermediate
: On-site isolated intermediate
CAS number : 67711-88-0
EC number : 266-964-1

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1 Relevant identified uses

The substance is defined as intermediate under Regulation (EC) No 1907/2006, not fulfilling the definition of strictly controlled conditions for which consequently an Article 10 (full) registration is required

IU1: Manufacture; Intermediate

IU2: Use at industrial sites - Industrial use; Use of intermediate

For further details concerning the management measures: see the attached annex

1.2.2 Uses advised against

No uses advised against known

1.3. Details of the supplier of the safety data sheet

Supplier of the safety data sheet

Nyrstar Belgium N.V. on behalf of Nyrstar Sales & Marketing A.G.
Zinkstraat 1
B-2490 Balen
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Nyrstar France S.A.S. on behalf of Nyrstar Sales & Marketing A.G.
Rue Jean Jacques Rousseau
F-59950 Auby
☎ +32 14 44 96 80
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infoSDS@nyrstar.com

Manufacturer of the product

Nyrstar Sales & Marketing SA
1 Rue de Jargonnant
CH-1207 Geneva
infoSDS@nyrstar.com

1.4. Emergency telephone number

24h/24h (Telephone advice: English, French, German, Dutch) :
+32 14 58 45 45 (BIG)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classified as dangerous according to the criteria of Regulation (EC) No 1272/2008

Class	Category	Hazard statements
Carc.	category 1A	H350: May cause cancer.
Muta.	category 1B	H340: May cause genetic defects.
Repr.	category 1A	H360FD: May damage fertility. May damage the unborn child.
Acute Tox.	category 3	H331: Toxic if inhaled.
STOT RE	category 1	H372: Causes damage to organs through prolonged or repeated exposure.

Acute Tox.	category 4	H312: Harmful in contact with skin.
Acute Tox.	category 4	H302: Harmful if swallowed.
Eye Dam.	category 1	H318: Causes serious eye damage.
Skin Irrit.	category 2	H315: Causes skin irritation.
Aquatic Acute	category 1	H400: Very toxic to aquatic life.
Aquatic Chronic	category 1	H410: Very toxic to aquatic life with long lasting effects.

2.2. Label elements

Signal word Danger

H-statements

H350	May cause cancer.
H340	May cause genetic defects.
H360FD	May damage fertility. May damage the unborn child.
H331	Toxic if inhaled.
H372	Causes damage to organs through prolonged or repeated exposure.
H302 + H312	Harmful if swallowed or in contact with skin.
H318	Causes serious eye damage.
H315	Causes skin irritation.
H410	Very toxic to aquatic life with long lasting effects.

P-statements

P280	Wear protective gloves, protective clothing and eye protection/face protection.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P330	Rinse mouth.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.

Supplemental information

EUH208	Contains: nickel; nickel monoxide. May produce an allergic reaction.
	Restricted to professional users.

2.3. Other hazards

The criteria of PBT and vPvB as listed in Annex XIII of Regulation (EC) No 1907/2006 do not apply to inorganic substances
Caution! Substance is absorbed through the skin
Pulverization rapidly increases toxic concentration

SECTION 3: Composition/information on ingredients

3.1. Substances

Name REACH Registration No	CAS No EC No	Conc. (C)	Classification according to CLP	Note	Remark	M-factors and ATE
tricopper arsenide	12005-75-3 234-472-6	C<0.27%	Acute Tox. 3; H331 Acute Tox. 3; H301 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	(1)(2)(10)	Component UVCB	
calcium sulfate, dihydrate	10101-41-4 231-900-3	0%<C<6%		(2)	Component UVCB	
cadmium (non-pyrophoric)	7440-43-9 231-152-8	0%<C<9%	Carc. 1B; H350 Muta. 2; H341 Repr. 2; H361fd Acute Tox. 2; H330 STOT RE 1; H372 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	(1)(2)(4)(10)	Total Cd content < 10 %	M: 10 (Acute, ECHA) M: 10 (Chronic, ECHA)
cadmium oxide (non-pyrophoric)	1306-19-0 215-146-2	0%<C<3%	Carc. 1B; H350 Muta. 2; H341 Repr. 2; H361fd Acute Tox. 2; H330 STOT RE 1; H372 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	(1)(2)(4)(10)	Total Cd content < 10 %	M: 10 (Acute, ECHA (registration dossier)) M: 10 (Chronic, ECHA (registration dossier))

cadmium sulphate	10124-36-4 233-331-6	0%<C<3%	Carc. 1B; H350 Muta. 1B; H340 Repr. 1B; H360FD Acute Tox. 2; H330 Acute Tox. 3; H301 STOT RE 1; H372 Aquatic Acute 1; H400 Aquatic Chronic 1; H410 Carc. 1B; H350: C≥0,01%, (CLP Annex VI (ATP 0)) STOT RE 1; H372: C≥7%, (CLP Annex VI (ATP 0)) STOT RE 2; H373: 0,1%≤C<7%, (CLP Annex VI (ATP 0))	(1)(2)(4)(10)	Total Cd content < 10 %	M: 10 (Acute, ECHA) M: 10 (Chronic, ECHA)
cobalt	7440-48-4 231-158-0	0%<C<0.1%	Carc. 1B; H350 Muta. 2; H341 Repr. 1B; H360F Resp. Sens. 1; H334 Skin Sens. 1; H317 Aquatic Chronic 4; H413	(1)(2)(10)	Component UVCB	
cobalt oxide	1307-96-6 215-154-6	0%<C<0.1%	Acute Tox. 3; H301 Skin Sens. 1; H317 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	(1)(2)(10)	Component UVCB	M: 10
copper chloride	7758-89-6 231-842-9	0%<C<43.1 %	Acute Tox. 4; H312 Acute Tox. 4; H302 Eye Dam. 1; H318 Skin Irrit. 2; H315 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	(1)(2)	Total Cu content: 40 % < C < 80 %	M: 10 (Acute, BIG) M: 1 (Chronic, BIG) M: 10 (Acute, ECHA)
copper	7440-50-8 231-159-6	28% <C<56%		(2)(10)	Total Cu content: 40 % < C < 80 %	
copper(II) oxide	1317-38-0 215-269-1	0%<C<15%	Aquatic Acute 1; H400 Aquatic Chronic 1; H410	(1)(2)	Total Cu content: 40 % < C < 80 %	M: 100 (Acute, CLP Annex VI (ATP 17)) M: 10 (Chronic, CLP Annex VI (ATP 17))
copper sulphate	7758-98-7 231-847-6	0% <C<30.5%	Acute Tox. 4; H302 Eye Dam. 1; H318 Skin Irrit. 2; H315 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	(1)(2)(6)(10)	Total Cu content: 40 % < C < 80 %	M: 10 (Acute, ECHA (registration dossier)) M: 1 (Chronic, ECHA (registration dossier))
nickel	7440-02-0 231-111-4	0%<C<0.4%	Carc. 2; H351 Skin Sens. 1; H317 STOT RE 1; H372	(1)(2)(10)	Component UVCB	
nickel monoxide	1313-99-1 215-215-7	0%<C<0.5%	Carc. 1A; H350i Skin Sens. 1; H317 STOT RE 1; H372 Aquatic Chronic 4; H413	(1)(2)(10)	Component UVCB	
lead(II)sulphate	7446-14-2 231-198-9	0% <C<14.7%	Repr. 1A; H360Df Acute Tox. 4; H332 Acute Tox. 4; H302 STOT RE 2; H373 Aquatic Acute 1; H400 Aquatic Chronic 1; H410 Repr. 2; H361f: C≥2,5%, (CLP Annex VI (ATP 0)) STOT RE 2; H373: C≥0,5%, (CLP Annex VI (ATP 0))	(1)(2)(10)	Component UVCB	M: 1 (Acute, BIG)
antimony trioxide	1309-64-4 215-175-0	0%<C<0.1%	Carc. 2; H351	(1)(2)	Component UVCB	
zinc	7440-66-6 231-175-3	0.5% <C<10%		(2)(10)	Component UVCB	
zinc oxide	1314-13-2 215-222-5	0.1% <C<2.5%	Aquatic Acute 1; H400 Aquatic Chronic 1; H410	(1)(2)	Component UVCB	M: 1 (Acute, ECHA) M: 1 (Chronic, ECHA)

zinc sulphate (anhydrous)	7733-02-0 231-793-3	1%<C<20%	Acute Tox. 4; H302 Eye Dam. 1; H318 Aquatic Acute 1; H400 Aquatic Chronic 1; H410	(1)(10)	Component UVCB	M: 1 (Acute, ECHA (registration dossier)) M: 1 (Chronic, ECHA (registration dossier))

(1) For H- and EUH-statements in full: see section 16
(2) Substance with a Community workplace exposure limit
(4) Enumerated in candidate list of substances of very high concern (SVHC) for authorisation (Article 59 of Regulation (EC) No. 1907/2006)
(6) Enumerated in Annex VI of Regulation (EC) No. 1272/2008 but the classification has been adapted after evaluation of available test data
(10) Subject to restrictions of Annex XVII of Regulation (EC) No. 1907/2006

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

General:
Observe (own) safety. If possible, approach victim and check vital functions. In case of injury and/or intoxication, call the European emergency number 112. Treat symptoms starting with most life-threatening injuries and disorders. Keep victim under observation, possibility of delayed symptoms.

After inhalation:
Remove victim into fresh air. Immediately consult a doctor/medical service.

After skin contact:
If possible, wipe up/dry remove chemical. Then rinse/shower immediately with (lukewarm) water. If irritation persists, consult a doctor/medical service.

After eye contact:
Rinse immediately with plenty of water for 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Consult a doctor/medical service.

After ingestion:
Rinse mouth with water. Immediately consult a doctor/medical service. Do not wait for symptoms to occur to consult Poison Center.

4.2. Most important symptoms and effects, both acute and delayed

4.2.1 Acute symptoms

After inhalation:
AFTER INHALATION OF DUST: Dry/sore throat. Coughing. Metal taste. Nausea. Vomiting. Feeling of weakness. Headache. FOLLOWING SYMPTOMS MAY APPEAR LATER: Possible inflammation of the respiratory tract. Risk of lung oedema. Risk of pneumonia. Decreased renal function.

After skin contact:
Tingling/irritation of the skin.

After eye contact:
Corrosion of the eye tissue. Inflammation/damage of the eye tissue.

After ingestion:
Nausea. Vomiting. Abdominal pain. Diarrhoea. Headache. AFTER INGESTION OF HIGH QUANTITIES: Increased salivation. Decreased renal function. Cramps/uncontrolled muscular contractions. Enlargement/affection of the liver.

4.2.2 Delayed symptoms
No effects known.

4.3. Indication of any immediate medical attention and special treatment needed

If applicable and available it will be listed below.

SECTION 5: Firefighting measures

5.1. Extinguishing media

5.1.1 Suitable extinguishing media:
Adapt extinguishing media to the environment for surrounding fires.

5.1.2 Unsuitable extinguishing media:
Not applicable.

5.2. Special hazards arising from the substance or mixture

On burning: release of toxic and corrosive gases/vapours (sulphur oxides) and formation of metal oxides.

5.3. Advice for firefighters

5.3.1 Instructions:
Dilute toxic gases with water spray. Take account of toxic/corrosive precipitation water. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.

5.3.2 Special protective equipment for fire-fighters:
Gloves (EN 374). Face shield (EN 166). Protective clothing (EN 14605 or EN 13034). Dust cloud production: self-contained breathing apparatus (EN 136 + EN 137). Heat/fire exposure: self-contained breathing apparatus (EN 136 + EN 137).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Prevent dust cloud formation. No naked flames.

6.1.1 Protective equipment for non-emergency personnel

See section 8.2

6.1.2 Protective equipment for emergency responders

Gloves (EN 374). Face shield (EN 166). Protective clothing (EN 14605 or EN 13034). Dust cloud production: self-contained breathing apparatus (EN 136 + EN 137).

Suitable protective clothing

See section 8.2

6.2. Environmental precautions

Contain released product, collect/pump into suitable containers. Plug the leak, cut off the supply. Dam up the solid spill. Knock down/dilute dust cloud with water spray. Take account of toxic/corrosive precipitation water. Prevent soil and water pollution. Prevent spreading in sewers.

6.3. Methods and material for containment and cleaning up

Stop dust cloud by covering with sand/earth. Scoop solid spill into closing containers. Carefully collect the spill/leftovers. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

6.4. Reference to other sections

See section 13.

SECTION 7: Handling and storage

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

7.1. Precautions for safe handling

Avoid raising dust. Keep away from naked flames/heat. Observe very strict hygiene - avoid contact. Do not discharge the waste into the drain. Keep container tightly closed.

7.2. Conditions for safe storage, including any incompatibilities

7.2.1 Safe storage requirements:

Store in a dry area. Store at ambient temperature. Keep out of direct sunlight. Keep locked up. Unauthorized persons are not admitted. Meet the legal requirements.

7.2.2 Keep away from:

Heat sources, oxidizing agents, (strong) acids.

7.2.3 Suitable packaging material:

Synthetic material, stoneware/porcelain, steel, tin.

7.2.4 Non suitable packaging material:

No data available

7.3. Specific end use(s)

If applicable and available, exposure scenarios are attached in annex. See information supplied by the manufacturer.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 Occupational exposure

a) Occupational exposure limit values

If limit values are applicable and available these will be listed below.

EU

Arsenic acid and its salts, as well as inorganic arsenic compounds	Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value)	0.01 mg/m³ (12)
Cadmium and its inorganic compounds	Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value)	0.001 mg/m³ (10)
Inorganic lead and its compounds	Time-weighted average exposure limit 8 h (Limit value for occupational exposure)	0.15 mg/m³
Nickel compounds *shall apply from 2025-01-18*	Time-weighted average exposure limit 8 h (Limit value for occupational exposure)	0.01 mg/m³ (2)
	Time-weighted average exposure limit 8 h (Limit value for occupational exposure)	0.05 mg/m³ (1)
Nickel compounds *shall apply until 2025-01-17*	Time-weighted average exposure limit 8 h (Limit value for occupational exposure)	0.1 mg/m³ (1)

(12): Inhalable fraction. For the copper smelting sector, the limit value shall apply from 11 July 2023

(10): Inhalable fraction. Limit value 0,004 mg/m3 until 11 July 2027. Respirable fraction in those Member States that implement, on the date of the entry into force of this Directive, a biomonitoring system with a biological limit value not exceeding 0,002 mg Cd/g creatinine in urine.

(2): Respirable fraction

(1): Inhalable fraction

Belgium

Antimoine et ses composés (en Sb)	Time-weighted average exposure limit 8 h	0.5 mg/m³
Arsenic, acide arsénique et ses sels, ainsi que ses composés inorganiques (en As)	Time-weighted average exposure limit 8 h	0.01 mg/m³
Cadmium et ses composés (particules alvéolaires) (en Cd)	Time-weighted average exposure limit 8 h	0.002 mg/m³
Cadmium et ses composés (particules inhalables) (en Cd) *shall apply from 2027-07-12*	Time-weighted average exposure limit 8 h	0.001 mg/m³
Cadmium et ses composés (particules inhalables) (en Cd) *shall apply until 2027-07-11*	Time-weighted average exposure limit 8 h	0.004 mg/m³
Calcium (sulfate de) (anhydrate, hemihydrate, dihydrate, gypse)	Time-weighted average exposure limit 8 h	10 mg/m³
Cobalt métal (fumées et poussières) (en Co)	Time-weighted average exposure limit 8 h	0.02 mg/m³
Cuivre (fumées) (en Cu)	Time-weighted average exposure limit 8 h	0.2 mg/m³
Cuivre (poussières et brouillards de) (en Cu)	Time-weighted average exposure limit 8 h	1 mg/m³
Nickel (composés insolubles inorganiques) (en Ni)	Time-weighted average exposure limit 8 h	0.2 mg/m³
Nickel (métal)	Time-weighted average exposure limit 8 h	1 mg/m³
Plomb inorg. (poussières et fumées) (en Pb)	Time-weighted average exposure limit 8 h	0.15 mg/m³
Zinc (oxyde de) (fraction alvéolaire)	Time-weighted average exposure limit 8 h	2 mg/m³
	Short time value	10 mg/m³

The Netherlands

Antimoon en -verbindingen (als Sb)	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.5 mg/m³
Cadmium en anorganische cadmiumverbindingen (als Cd) *shall apply from 2027-07-11*	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.00021 ppm
Cadmium en anorganische cadmiumverbindingen (als Cd) *shall apply until 2027-07-10*	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.00086 ppm
Cadmium en anorganische cadmiumverbindingen (als Cd) *shall apply from 2027-07-11*	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.001 mg/m³
Cadmium en anorganische cadmiumverbindingen (als Cd) *shall apply until 2027-07-10*	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.004 mg/m³
Kobalt (stof en rook) (als Co)	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.0082 ppm
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.02 mg/m³
Koper en anorganische koperverbindingen (inhaleerbaar)	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.038 ppm
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.1 mg/m³
Lood en anorganische loodverbindingen	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.15 mg/m³
Overige anorganische arseenverbindingen	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.0028 mg/m³

France

Antimoine et ses composés, en Sb	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	0.5 mg/m³
Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire) *shall apply from 2027-12-07*	Time-weighted average exposure limit 8 h (VRC: Valeur réglementaire contraignante)	0.001 mg/m³
Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire) *shall apply until 2027-11-07*	Time-weighted average exposure limit 8 h (VRC: Valeur réglementaire contraignante)	0.004 mg/m³
Calcium (sulfate de)	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	10 mg/m³
Cuivre (fumées)	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	0.2 mg/m³
Cuivre (poussières), en Cu	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	1 mg/m³
	Short time value (VL: Valeur non réglementaire indicative)	2 mg/m³
Nickel (métal)	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	1 mg/m³
Nickel (oxyde de), en Ni	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	1 mg/m³

Plomb métallique et composés, en Pb	Time-weighted average exposure limit 8 h (VRC: Valeur réglementaire contraignante)	0.1 mg/m³
Zinc (oxyde de, fumées)	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	5 mg/m³
Zinc (oxyde de, poussières)	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	10 mg/m³

Germany

Blei und anorganischen Bleiverbindungen	Time-weighted average exposure limit 8 h (TRGS 505)	0.1 mg/m³
Cadmium und anorganische Cadmium Verbindungen	Time-weighted average exposure limit 8 h (TRGS 900)	0.002 mg/m³
Calciumsulfat	Time-weighted average exposure limit 8 h (TRGS 900)	6 mg/m³
Diantimontrioxid	Time-weighted average exposure limit 8 h (TRGS 900)	0.006 mg/m³
Nickel und Nickelverbindungen	Time-weighted average exposure limit 8 h (TRGS 900)	0.030 mg/m³
Nickelmetall	Time-weighted average exposure limit 8 h (TRGS 900)	0.006 mg/m³

Austria

Antimontrioxid– Herstellung von Antimon- trioxid, Herstellung von Antimontrioxid-Masterbatches und -pasten (Wiegen und Mischen von Antimontrioxid- Pulver) – im übrigen	Tagesmittelwert (TRK)	0.1 mg/m³
	Tagesmittelwert (TRK)	0.3 mg/m³
	Kurzzeitwert 15(Miw) 4x (TRK)	0.4 mg/m³
	Kurzzeitwert 15(Miw) 4x (TRK)	1.2 mg/m³
Cadmium und seine Verbindungen	Tagesmittelwert (TRK)	0.001 mg/m³
	Tagesmittelwert (TRK)	0.004 mg/m³
	Kurzzeitwert 15(Miw) 4x (TRK)	0.004 mg/m³
	Kurzzeitwert 15(Miw) 4x (TRK)	0.016 mg/m³
Cobalt und seine Verbindungen (Cobalt als Cobaltmetall, Cobaltoxid, Cobaltsulfid und Cobaltsulfat, Staub von Cobaltlegierungen)– Herstellung von Cobaltpulver und Katalysatoren, Hartmetall- und Magnetherstellung (Pulveraufarbeitung, Pressenund mechanische Bearbeitung nicht gesinterter Werkstücke) – im übrigen	Tagesmittelwert (TRK)	0.1 mg/m³
	Tagesmittelwert (TRK)	0.5 mg/m³
	Kurzzeitwert 15(Miw) 4x (TRK)	0.4 mg/m³
	Kurzzeitwert 15(Miw) 4x (TRK)	2 mg/m³
Kupfer und seine Verbindungen(als Rauch)	Tagesmittelwert (MAK)	0.1 mg/m³
	Kurzzeitwert 15(Miw) 4x (MAK)	0.4 mg/m³
Kupfer und seine Verbindungen	Tagesmittelwert (MAK)	1 mg/m³
	Kurzzeitwert 15(Miw) 4x (MAK)	4 mg/m³

Nickel (Stäube von Nickelmetall, Nickelsulfid und sulfidischen Erzen, Nickeloxide, Nickelchromat und Nickel- carbonat) und Stäube von Nickelverbindungen und Nickellegierungen	Tagesmittelwert (TRK)	0.5 mg/m³
	Kurzzeitwert 15(Miw) 4x (TRK)	2 mg/m³
Nickelverbindungen in Form einatembarer Tröpfchen	Tagesmittelwert (TRK)	0.05 mg/m³
	Kurzzeitwert 15(Miw) 4x (TRK)	0.2 mg/m³

UK

Antimony and compounds except stibine (as Sb)	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.5 mg/m³
Arsenic and compounds except arsine (as As)	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.1 mg/m³
Cadmium compounds except cadmium oxide fume, cadmium sulphide and cadmium sulphide pigments (as Cd)	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.025 mg/m³
Cadmium oxide fume (as Cd)	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.025 mg/m³
	Short time value (Workplace exposure limit (EH40/2005))	0.05 mg/m³
Cadmium	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.025 mg/m³
Cobalt compounds (as Co)	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.1 mg/m³
Cobalt	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.1 mg/m³
Copper and compounds: dusts and mists (as Cu)	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	1 mg/m³
	Short time value (Workplace exposure limit (EH40/2005))	2 mg/m³
Copper fume	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.2 mg/m³
Gypsum inhalable dust	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	10 mg/m³
Gypsum respirable dust	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	4 mg/m³
Lead other than lead alkyls	Time-weighted average exposure limit 8 h (Occupational exposure limit (Control of lead at work))	0.15 mg/m³
Nickel metal	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.5 mg/m³
Nickel, insoluble inorganic compounds (as Ni)(except nickel tetracarbonyl)	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.5 mg/m³

USA (TLV-ACGIH)

Antimony trioxide	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.02 mg/m³ (I)
Arsenic and inorganic compounds, as As	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.01 mg/m³
Cadmium and compounds, as Cd	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.002 mg/m³ (R)
	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.01 mg/m³
Calcium sulfate	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	10 mg/m³ (I)
Cobalt and inorganic compounds, as Co	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.02 mg/m³ (I)
Copper dusts and mists, as Cu	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	1 mg/m³
Copper fume, as Cu	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.2 mg/m³
Lead and inorganic compounds, as Pb	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.05 mg/m³
Nickel and inorganic compounds including Nickel subsulfide, as Ni: Elemental	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	1.5 mg/m³ (I)
Nickel and inorganic compounds including Nickel subsulfide, as Ni: Insoluble inorganic compounds (NOS)	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.2 mg/m³ (I)
Zinc oxide	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	2 mg/m³ (R)
	Short time value (TLV - Adopted Value)	10 mg/m³ (R)

(I): Inhalable fraction
(R): Respirable fraction

b) National biological limit values

If limit values are applicable and available these will be listed below.

Belgium

Plomb et ses composés ioniques (Lood)	sang	70 µg/100ml	

Germany

Blei, anorganischen Bleiverbindungen und bleihaltigen Gemischen (Blei)	Vollblut: keine beschränkung	150 µg/l	Dieser Wert gilt nicht für Beschäftigte im gebärfähigen Alter. Die Regelungen des Mutterschutzgesetzes bleiben unberührt. Beschäftigungsbeschränkungen sind in Abschnitt 7, Verwendungsverbote in Abschnitt 6 aufgeführt.

USA (BEI-ACGIH)

Cadmium and inorganic compounds (cadmium)	Blood: not critical	5 µg/L	Background
Cadmium and inorganic compounds (Cadmium)	Blood: not critical	5 µg/L	Background
Cadmium and inorganic compounds (cadmium)	urine: not critical	5 µg/g creatinine	Background
Cadmium and inorganic compounds (Cadmium)	urine: not critical	5 µg/g creatinine	Background
Cobalt and inorganic compounds; Cobalt with Tungsten carbide (Cobalt)	Urine: end of shift at end of workweek	-	Nonspecific, Nonquantitative
Cobalt and inorganic compounds; including Cobalt oxides but not combined with Tungsten carbide (cobalt)	Urine: end of shift at end of workweek	15 µg/L	Nonspecific
Cobalt and inorganic compounds; including Cobalt oxides but not combined with Tungsten carbide (Cobalt)	Urine: end of shift at end of workweek	15 µg/L	Nonspecific
Lead and inorganic compounds (Lead)	Blood: not critical	200 µg/L	Persons applying this BEI® are encouraged to counsel female workers of child-bearing age about the risk of delivering a child with a PbB over the current CDC reference value.
Nickel and inorganic compounds; after exposure to elemental Nickel and poorly soluble compounds (Nickel)	Urine: post-shift at end of workweek	5 µg/L	Background
Nickel and inorganic compounds; after exposure to soluble compounds (Nickel)	Urine: post-shift at end of workweek	30 µg/L	

c) Nationale Akzeptanz- und Toleranzkonzentrationen

Germany

Cadmium und CdVerbindungen, als Carc.1A, Carc.1B eingestuft	Akzeptanzkonzentration (Risiko 4:100.000) (TRGS 910)	0.9 µg/m³ (A)
	Toleranzkonzentration (Risiko 4:1.000) (TRGS 910)	2 µg/m³ (A) (ÜF: 8)
Cobalt und Cobaltverbindungen, als Carc.1A, Carc.1B eingestuft	Akzeptanzkonzentration (Risiko 4:100.000) (TRGS 910)	0.5 µg/m³ (A)
	Toleranzkonzentration (Risiko 4:1.000) (TRGS 910)	5 µg/m³ (A) (ÜF: 8)
Nickelverbindungen, als Carc. 1A, Carc. 1B eingestuft	Akzeptanzkonzentration (Risiko 4:100.000) (TRGS 910)	6 µg/m³ (A)
	Toleranzkonzentration (Risiko 4:1.000) (TRGS 910)	6 µg/m³ (A) (ÜF: 8)

A: Alveolengängige Fraktion
ÜF: Überschreitungsfaktor

8.1.2 Sampling methods

Product name	Test	Number
Antimony	OSHA	ID 121
Antimony	OSHA	ID 125G
Arsenic & Compounds (as As)	NIOSH	7900
Arsenic Trioxide (as As)	NIOSH	7901
Arsenic	OSHA	ID 105
Cadmium & Cpds (as Cd)	NIOSH	7048
Cadmium (Cd)	NIOSH	7302
Cadmium (Cd)	NIOSH	7304
Cadmium (Cd)	NIOSH	7306
Cadmium (Cd)	NIOSH	8005
Cadmium (Cd)	NIOSH	8310
Cadmium (Elements on wipes)	NIOSH	9102
Cadmium (Elements)	NIOSH	7300
Cadmium (Elements, aqua regia ashing)	NIOSH	7301

Product name	Test	Number
Cadmium (Elements, hot block/HCl/HNO3 digestion)	NIOSH	7303
Cadmium Oxide	NIOSH	7048
Cadmium	NIOSH	7048
Cadmium	OSHA	1006
Cadmium	OSHA	ID 105
Cadmium	OSHA	ID 121
Cadmium	OSHA	ID 125G
Cadmium	OSHA	ID 189
Cadmium	OSHA	ID 206
Cobalt & Cpds (as Co)	NIOSH	7027
Cobalt (Co)	NIOSH	7302
Cobalt (Co)	NIOSH	7304
Cobalt (Co)	NIOSH	7306
Cobalt (Co)	NIOSH	8005
Cobalt (Elements on wipes)	NIOSH	9102
Cobalt (Elements)	NIOSH	7300
Cobalt (Elements, aqua regia ashing)	NIOSH	7301
Cobalt (Elements, hot block/HCl/HNO3 digestion)	NIOSH	7303
Cobalt	OSHA	1006
Cobalt	OSHA	ID 121
Cobalt	OSHA	ID 125G
Cobalt	OSHA	ID 213
Copper (Cu)	NIOSH	7302
Copper (Cu)	NIOSH	7304
Copper (Cu)	NIOSH	7306
Copper (Cu)	NIOSH	8005
Copper (Cu)	NIOSH	8310
Copper (Elements on wipes)	NIOSH	9102
Copper (Elements)	NIOSH	7300
Copper (Elements, aqua regia ashing)	NIOSH	7301
Copper (Elements, hot block/HCl/HNO3 digestion)	NIOSH	7303
Copper Dust and fume	NIOSH	7029
Copper	OSHA	1006
Copper	OSHA	ID 105
Copper	OSHA	ID 121
Copper	OSHA	ID 125G
Copper	OSHA	ID 206
Lead	OSHA	ID 121
Lead	OSHA	ID 125G
Nickel (Elements on wipes)	NIOSH	9102
Nickel (Elements)	NIOSH	7300
Nickel (Elements, aqua regia ashing)	NIOSH	7301
Nickel (Elements, hot block/HCl/HNO3 digestion)	NIOSH	7303
Nickel (Ni)	NIOSH	7302
Nickel (Ni)	NIOSH	7304
Nickel (Ni)	NIOSH	7306
Nickel (Ni)	NIOSH	8005
Nickel (Ni)	NIOSH	8310
Nickel	OSHA	1006
Nickel	OSHA	ID 121
Nickel	OSHA	ID 125G
Sulfites, & Sulfates	NIOSH	6004
Sulfur Dioxide (organic and inorganic gases by Extractive FTIR)	NIOSH	3800
Tungsten & Cpds (Insol and sol) (as W)	OSHA	ID 213
vary depending upon the compound: Cu2O	NIOSH	7029
Zinc & Cpds (as Zn)	NIOSH	7030
Zinc (Elements on wipes)	NIOSH	9102
Zinc (Elements)	NIOSH	7300
Zinc (Elements, aqua regia ashing)	NIOSH	7301
Zinc (Elements, hot block/HCl/HNO3 digestion)	NIOSH	7303
Zinc (Zn)	NIOSH	7302
Zinc (Zn)	NIOSH	7304
Zinc (Zn)	NIOSH	8005
Zinc (Zn)	NIOSH	8310
Zinc Oxide	NIOSH	7030
Zinc Oxide	NIOSH	7502
Zinc Oxide	OSHA	ID 121

Product name	Test	Number
Zinc Oxide	OSHA	ID 143
Zinc	NIOSH	7030
Zinc	OSHA	1006
Zinc	OSHA	ID 105
Zinc	OSHA	ID 121
Zinc	OSHA	ID 125G

8.1.3 Applicable limit values when using the substance or mixture as intended

If limit values are applicable and available these will be listed below.

8.1.4 Threshold values

DNEL/DMEL - Workers

calcium sulfate, dihydrate

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Acute systemic effects inhalation	5082 mg/m³	
	Long-term systemic effects inhalation	21.17 mg/m³	

cadmium (non-pyrophoric)

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term local effects inhalation	4 µg/m³	

cadmium oxide (non-pyrophoric)

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term local effects inhalation	4 µg/m³	

cadmium sulphate

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term local effects inhalation	4 µg/m³	

cobalt

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	54.1 µg/m³	
	Long-term local effects inhalation	40 µg/m³	
	Long-term systemic effects dermal	7228.9 µg/kg bw/day	

cobalt oxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term local effects inhalation	50.9 µg/m³	

copper chloride

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	1 mg/m³	
	Long-term local effects inhalation	1 mg/m³	
	Long-term systemic effects dermal	137 mg/kg bw/day	

copper

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects dermal	137 mg/kg bw/day	
	Acute systemic effects dermal	237 mg/m³	

copper(II) oxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	1 mg/m³	
	Long-term local effects inhalation	1 mg/m³	
	Long-term systemic effects dermal	137 mg/kg bw/day	

copper sulphate

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	1 mg/m³	
	Long-term local effects inhalation	1 mg/m³	
	Long-term systemic effects dermal	137 mg/kg bw/day	

nickel

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	0.05 mg/m³	
	Long-term local effects inhalation	0.05 mg/m³	
	Acute local effects inhalation	11.9 mg/m³	
	Long-term local effects dermal	0.035 mg/cm²	

nickel monoxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	0.05 mg/m³	
	Long-term local effects inhalation	0.05 mg/m³	
	Acute local effects inhalation	18.9 mg/m³	
	Long-term local effects dermal	0.012 mg/cm²	

antimony trioxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term local effects inhalation	0.315 mg/m³	
	Long-term systemic effects dermal	67 mg/kg bw/day	

zinc

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects dermal	83 mg/kg bw/day	
	Long-term systemic effects inhalation	5 mg/m³	

zinc oxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	5 mg/m³	
	Long-term local effects inhalation	0.5 mg/m³	
	Long-term systemic effects dermal	83 mg/kg bw/day	

zinc sulphate (anhydrous)

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	1 mg/m³	
	Long-term systemic effects dermal	8.3 mg/kg bw/day	

DNEL/DMEL - General population

calcium sulfate, dihydrate

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Acute systemic effects inhalation	3811 mg/m³	
	Acute systemic effects oral	11.4 mg/kg bw/day	
	Long-term systemic effects inhalation	5.29 mg/m³	
	Long-term systemic effects oral	1.52 mg/kg bw/day	

cadmium (non-pyrophoric)

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects oral	1 µg/kg bw/day	

cadmium oxide (non-pyrophoric)

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects oral	1 µg/kg bw/day	

cadmium sulphate

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects oral	1 µg/kg bw/day	

cobalt

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	8.1 µg/m³	
	Long-term local effects inhalation	6.3 µg/m³	
	Long-term systemic effects dermal	3265.2 µg/kg bw/day	
	Long-term systemic effects oral	8.9 µg/kg bw/day	

cobalt oxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term local effects inhalation	8 µg/m³	
	Long-term systemic effects oral	38 µg/kg bw/day	

copper chloride

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects oral	0.041 mg/kg bw/day	
	Acute systemic effects oral	0.082 mg/kg bw/day	

copper

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term local effects inhalation	1 mg/m³	
	Acute local effects inhalation	1 mg/m³	
	Long-term systemic effects dermal	137 mg/m³	
	Acute systemic effects dermal	273 mg/m³	
	Long-term systemic effects oral	0.041 mg/kg bw/day	

copper(II) oxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects oral	0.041 mg/kg bw/day	
	Acute systemic effects oral	0.082 mg/kg bw/day	

copper sulphate

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects oral	0.041 mg/kg bw/day	
	Acute systemic effects oral	0.082 mg/kg bw/day	

nickel

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	60 ng/m³	
	Long-term local effects inhalation	60 ng/m³	
	Acute local effects inhalation	0.8 mg/m³	
	Long-term local effects dermal	0.035 mg/cm²	
	Long-term systemic effects oral	0.011 mg/kg bw/day	
	Acute systemic effects oral	0.37 mg/kg bw/day	

nickel monoxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	60 ng/m³	
	Long-term local effects inhalation	60 ng/m³	
	Acute local effects inhalation	1.8 mg/m³	
	Long-term systemic effects oral	0.011 mg/kg bw/day	
	Acute systemic effects oral	0.37 mg/kg bw/day	

antimony trioxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term local effects inhalation	0.095 mg/m³	
	Long-term systemic effects dermal	33.5 mg/kg bw/day	
	Long-term systemic effects oral	33.5 mg/kg bw/day	

zinc

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects oral	0.83 mg/kg bw/day	
	Long-term systemic effects dermal	83 mg/kg bw/day	
	Long-term systemic effects inhalation	2.5 mg/m³	

zinc oxide

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	2.5 mg/m³	
	Long-term systemic effects dermal	83 mg/kg bw/day	
	Long-term systemic effects oral	0.83 mg/kg bw/day	

zinc sulphate (anhydrous)

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	1.25 mg/m³	
	Long-term systemic effects dermal	8.3 mg/kg bw/day	
	Long-term systemic effects oral	0.83 mg/kg bw/day	

PNEC

cadmium (non-pyrophoric)

Compartments	Value	Remark
Fresh water	0.19 µg/l	
Marine water	1.14 µg/l	
Fresh water sediment	1.8 mg/kg sediment dw	
Marine water sediment	0.64 mg/kg sediment dw	
STP	20 µg/l	
Soil	0.9 mg/kg soil dw	
Oral	0.16 mg/kg food	

cadmium oxide (non-pyrophoric)

Compartments	Value	Remark
Fresh water	0.19 µg/l	
Marine water	1.14 µg/l	
STP	20 µg/l	
Fresh water sediment	1.8 mg/kg sediment dw	
Marine water sediment	0.64 mg/kg sediment dw	
Soil	0.9 mg/kg soil dw	
Oral	0.16 mg/kg food	

cadmium sulphate

Compartments	Value	Remark
Fresh water	0.19 µg/l	
Marine water	1.14 µg/l	
STP	20 µg/l	
Fresh water sediment	1.8 mg/kg sediment dw	
Marine water sediment	0.64 mg/kg sediment dw	
Soil	0.9 mg/kg soil dw	
Oral	0.16 mg/kg food	

cobalt

Compartments	Value	Remark
Fresh water	1.06 µg/l	
Marine water	2.36 µg/l	
STP	0.37 mg/l	
Fresh water sediment	53.8 mg/kg sediment dw	
Marine water sediment	69.8 mg/kg sediment dw	
Soil	10.9 mg/kg soil dw	

cobalt oxide

Compartments	Value	Remark
Fresh water	0.62 µg/l	
Marine water	2.36 µg/l	
STP	0.37 mg/l	
Fresh water sediment	53.8 mg/kg sediment dw	
Marine water sediment	69.8 mg/kg sediment dw	
Soil	10.9 mg/kg soil dw	

copper chloride

Compartments	Value	Remark
Fresh water	7.8 µg/l	
Marine water	5.2 µg/l	
STP	230 µg/l	
Fresh water sediment	87 mg/kg sediment dw	
Marine water sediment	676 mg/kg sediment dw	
Soil	65 mg/kg soil dw	

copper

Compartments	Value	Remark
Fresh water	7.8 µg/l	
Marine water	5.2 µg/l	
Fresh water sediment	87 mg/kg sediment dw	
Marine water sediment	676 mg/kg sediment dw	
STP	230 µg/l	
Soil	65 mg/kg soil dw	

copper(II) oxide

Compartments	Value	Remark
Fresh water	7.8 µg/l	
Marine water	5.2 µg/l	
STP	230 µg/l	
Fresh water sediment	87 mg/kg sediment dw	
Marine water sediment	676 mg/kg sediment dw	
Soil	65 mg/kg soil dw	

copper sulphate

Compartments	Value	Remark
Fresh water	7.8 µg/l	
Marine water	5.2 µg/l	
STP	230 µg/l	
Fresh water sediment	87 mg/kg sediment dw	
Marine water sediment	676 mg/kg sediment dw	
Soil	65 mg/kg soil dw	

nickel

Compartments	Value	Remark
Fresh water	7.1 µg/l	
Marine water	8.6 µg/l	
Fresh water (intermittent releases)	< 0.01 µg/l	
Marine water (intermittent releases)	< 0.01 µg/l	
STP	0.33 mg/l	
Fresh water sediment	109 mg/kg sediment dw	
Marine water sediment	109 mg/kg sediment dw	
Soil	29.9 mg/kg soil dw	
Oral	0.12 mg/kg food	

nickel monoxide

Compartments	Value	Remark
Fresh water	7.1 µg/l	
Fresh water (intermittent releases)	< 0.01 µg/l	
Marine water	8.6 µg/l	
Marine water (intermittent releases)	< 0.01 µg/l	
STP	0.33 mg/l	
Fresh water sediment	109 mg/kg sediment dw	
Marine water sediment	109 mg/kg sediment dw	
Soil	29.9 mg/kg soil dw	
Oral	0.12 mg/kg food	

antimony trioxide

Compartments	Value	Remark
Fresh water	0.135 mg/l	
Marine water	0.013 mg/l	
STP	3.05 mg/l	
Fresh water sediment	13.4 mg/kg sediment dw	
Marine water sediment	2.68 mg/kg sediment dw	
Soil	44.3 mg/kg soil dw	

zinc

Compartments	Value	Remark
Fresh water	20.6 µg/l	
Marine water	6.1 µg/l	
STP	100 µg/l	
Fresh water sediment	117.8 mg/kg sediment dw	
Marine water sediment	56.5 mg/kg sediment dw	
Soil	35.6 mg/kg soil dw	

zinc oxide

Compartments	Value	Remark
Fresh water	20.6 µg/l	
Marine water	6.1 µg/l	
STP	100 µg/l	
Fresh water sediment	117.8 mg/kg sediment dw	
Marine water sediment	56.5 mg/kg sediment dw	
Soil	35.6 mg/kg soil dw	

zinc sulphate (anhydrous)

Compartments	Value	Remark
Fresh water	20.6 µg/l	
Marine water	6.1 µg/l	
STP	100 µg/l	
Fresh water sediment	117.8 mg/kg sediment dw	
Marine water sediment	56.5 mg/kg sediment dw	
Soil	35.6 mg/kg soil dw	

8.1.5 Control banding

If applicable and available it will be listed below.

8.2. Exposure controls

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

8.2.1 Appropriate engineering controls

Avoid raising dust. Keep away from naked flames/heat. Measure the concentration in the air regularly. Carry operations in the open/under local exhaust/ventilation or with respiratory protection.

8.2.2 Individual protection measures, such as personal protective equipment

Observe very strict hygiene - avoid contact. Do not eat, drink or smoke during work.

a) Respiratory protection:

Dust production: dust mask with filter type P3. High dust production: self-contained breathing apparatus (EN 136 + EN 137).

b) Hand protection:

Protective gloves against chemicals (EN 374).

Materials	Remark
butyl rubber	Good resistance
PVC	Good resistance
nitrile rubber	Good resistance
neoprene (chloroprene rubber)	Good resistance

c) Eye protection:

Face shield (EN 166). In case of dust production: protective goggles (EN 166).

d) Skin protection:

Protective clothing (EN 14605 or EN 13034). In case of dust production: head/neck protection. In case of dust production: dustproof clothing (EN 13982).

8.2.3 Environmental exposure controls:

See sections 6.2, 6.3 and 13

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical form	Solid
	Powder
Odour	Odourless
Odour threshold	No data available (test not performed)
Colour	Dark brown
Particle size	No data available (test not performed)
Explosion limits	Not applicable

Flammability	Not classified as flammable
Log Kow	Not applicable (mixture)
Dynamic viscosity	Not applicable (solid)
Kinematic viscosity	Not applicable (solid)
Melting point	150 °C ; 1013 hPa
Boiling point	No data available (test not performed)
Relative vapour density	Not applicable (solid)
Vapour pressure	Not applicable (solid)
Solubility	Water ; insoluble
Relative density	3.91 ; 20 °C
Absolute density	3910 kg/m³
Decomposition temperature	> 150 °C
Auto-ignition temperature	Not applicable
Flash point	Not applicable (solid)
pH	No data available (test not performed)

9.2. Other information

No data available

SECTION 10: Stability and reactivity

10.1. Reactivity

No data available.

10.2. Chemical stability

No data available.

10.3. Possibility of hazardous reactions

No data available.

10.4. Conditions to avoid

Precautionary measures

Avoid raising dust. Keep away from naked flames/heat.

10.5. Incompatible materials

Oxidizing agents, (strong) acids.

10.6. Hazardous decomposition products

On burning: release of toxic and corrosive gases/vapours (sulphur oxides) and formation of metal oxides.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

11.1.1 Test results

- Toxicokinetics: summary

Animal testing on UVCB with variable composition is not relevant. The toxicokinetics, metabolism and distribution are driven by the characteristics of the individual UVCB constituents

Acute toxicity

Copper Chloride

No (test)data available

tricopper arsenide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral			category 3			Annex VI	
Inhalation			category 3			Annex VI	

calcium sulfate, dihydrate

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	OECD 420	> 2000 mg/kg bw		Rat (female)	Experimental value	
Inhalation (dust)	LC50	OECD 403	> 3.26 mg/l air	4 h	Rat (male / female)	Experimental value	

cadmium (non-pyrophoric)

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50		2330 mg/kg		Rat	Experimental value	
Dermal						Data waiving	
Inhalation (aerosol)	LC50		0.056 mg/l	4 h	Rat (male / female)	Read-across	

cadmium oxide (non-pyrophoric)

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50		2330 mg/kg bw		Rat	Read-across	
Dermal						Data waiving	
Inhalation (aerosol)	LC50		0.056 mg/l(Cd 2+)	4 h	Rat (male / female)	Read-across	

cadmium sulphate

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50		225 mg/kg bw(Cd 2+)		Rat (male)	Read-across	
Dermal						Data waiving	
Inhalation (aerosol)	LC50		0.056 mg/l(Cd 2+)	4 h	Rat (male / female)	Read-across	

cobalt

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	OECD 425	550 mg/kg bw		Rat (female)	Experimental value	
Dermal	LD50	OECD 402	> 2000 mg/kg bw	24 h	Rat (male / female)	Experimental value of similar product	
Inhalation (dust)	LC50	OECD 436	≤ 0.05 mg/l	4 h	Rat (male / female)	Experimental value	

Classification of this substance according to Annex VI is debatable as it does not correspond to the conclusion from the test

cobalt oxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	Equivalent to OECD 401	202 mg/kg		Rat (male / female)	Experimental value	
Dermal	LD50	OECD 402	> 2000 mg/kg bw	24 h	Rat (male / female)	Experimental value of similar product	
Inhalation (dust)	LC50	OECD 436	0.06 mg/l	4 h	Rat (male / female)	Experimental value	

Classification of this substance according to Annex VI is debatable as it does not correspond to the conclusion from the test

copper chloride

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	BASF test	336 mg/kg bw		Rat (male / female)	Experimental value	
Skin	LD50	OECD 402	1224 mg/kg bw	24 h	Rat (female)	Experimental value	
Inhalation						Data waiving	

copper

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	OECD 401	481 mg/kg bw		Rat (male / female)	Experimental value	
Dermal	LD50	OECD 402	> 2000 mg/kg bw	24 h	Rat (male / female)	Experimental value	
Inhalation (dust)	LD50	OECD 436	> 5.11 mg/l	4 h	Rat (male / female)	Experimental value	

copper(II) oxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	OECD 423	> 2500 mg/kg		Rat (male)	Experimental value	
Dermal	LD50	OECD 402	> 2000 mg/kg bw	24 h	Rat (male / female)	Experimental value	

copper sulphate

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	OECD 401	481 mg/kg		Rat (male / female)	Experimental value	
Dermal	LD50	OECD 402	> 2000 mg/kg	24 h	Rat (male / female)	Experimental value	
Inhalation						Data waiving	

nickel

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	Equivalent to OECD 401	> 9000 mg/kg		Rat (male / female)	Experimental value	
Dermal						Data waiving	
Inhalation (aerosol)	NOAEC		≥ 10.2 mg/l	1 h	Rat (male / female)	Experimental value	

nickel monoxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	Equivalent to OECD 425	9990 mg/kg bw		Rat (female)	Experimental value	
Dermal						Data waiving	
Inhalation (aerosol)	LC50	OECD 403	> 5.08 mg/l	4 h	Rat (male / female)	Experimental value	

lead(II)sulphate

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral			category 4			Annex VI	
Inhalation (dust)			category 4			Annex VI	

antimony trioxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50		> 20000 mg/kg		Rat	Experimental value	
Dermal	LD50		> 8300 mg/kg bw		Rabbit	Experimental value	
Inhalation (aerosol)	LC50	OECD 403	> 5.2 mg/l air	4 h	Rat (male / female)	Experimental value	

zinc

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	Equivalent to OECD 401	> 2000 mg/kg bw		Rat	Experimental value	
Dermal	LD50	Equivalent to OECD 402	> 2000 mg/kg bw	24 weeks (daily, 5 days / week)	Rat	Read-across	
Inhalation	LC50	Equivalent to OECD 403	> 5.41 mg/l	4 weeks (daily, 5 days / week)	Rat	Experimental value	
Inhalation (ZnO, metal oxides)	LC50	Equivalent to OECD 403	> 5.7 mg/l	4 weeks (daily, 5 days / week)	Rat	Experimental value	

zinc oxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	Equivalent to OECD 401	> 5000 mg/kg		Rat (male / female)	Experimental value	
Dermal	LD50	OECD 402	> 2000 mg/kg bw	24 h	Rat (male / female)	Experimental value	
Inhalation (dust)	LC50	Equivalent to OECD 403	> 5.7 mg/l	4 h	Rat (male / female)	Experimental value	

zinc sulphate (anhydrous)

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	OECD 401	1710 mg/kg bw		Rat (male)	Experimental value	
Dermal	LD50	OECD 402	> 2000 mg/kg bw	24 h	Rat (male / female)	Experimental value	

Conclusion

Harmful if swallowed.
Harmful in contact with skin.
Toxic if inhaled.

Corrosion/irritation

Copper Chloride

No (test)data available

calcium sulfate, dihydrate

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Not irritating	OECD 405		72 hours	Rabbit	Experimental value	
Skin	Not irritating	OECD 404	4 h	72 hours	Rabbit	Experimental value	

cadmium (non-pyrophoric)

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Not applicable (in vitro test)	Not irritating	OECD 438	10 seconds		Isolated chicken eye	Experimental value	
Not applicable (in vitro test)	Not irritating	OECD 431			Reconstructed human epidermis	Experimental value	

cadmium oxide (non-pyrophoric)

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Not applicable (in vitro test)	Serious eye damage	OECD 438	10 seconds		Isolated chicken eye	Experimental value	
Not applicable (in vitro test)	Not irritating	OECD 431	4 h		SkinEthic™ reconstructed Human Corneal Epithelium model	Experimental value	

Classification of this substance according to Annex VI is debatable as it does not correspond to the conclusion from the test

cadmium sulphate

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Not applicable (in vitro test)	Not irritating	OECD 437			Bovine eye (in vitro)	Experimental value	
Not applicable (in vitro test)	Not irritating	OECD 439	15 minutes		Reconstructed human epidermis	Experimental value	

cobalt

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Irritating	OECD 405		24; 48; 72 hours	Rabbit	Experimental value	
Not applicable (in vitro test)	Not irritating	EU Method B.46	15 minutes	15 minutes	Reconstructed human epidermis	Experimental value	

Classification of this substance according to Annex VI is debatable as it does not correspond to the conclusion from the test

cobalt oxide

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Not applicable (in vitro test)	Slightly irritating	OECD 437		4 hours	Bovine eye (in vitro)	Experimental value	
Not applicable (in vitro test)	Not irritating	OECD 439			Reconstructed human epidermis	Experimental value	

copper chloride

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Serious eye damage	BASF test		24; 48 hours	Rabbit	Experimental value	
Skin	Irritating	BASF test		24; 72 hours	Rabbit	Experimental value	

copper

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Slightly irritating	OECD 405		24; 48; 72 hours	Rabbit	Experimental value	Single treatment
Skin	Not irritating	OECD 404	4 h	1; 24; 48; 72 hours	Rabbit	Experimental value	

copper(II) oxide

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Slightly irritating	OECD 405	72 h	24; 48; 72 hours	Rabbit	Experimental value	Single treatment without rinsing
Skin	Not irritating	OECD 404	4 h	24; 48; 72 hours	Rabbit	Experimental value	

copper sulphate

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Highly irritating	OECD 405		24; 48; 72 hours	Rabbit	Experimental value	Single treatment without rinsing
Skin	Not irritating	OECD 404	4 h	24; 48; 72 hours	Rabbit	Read-across	Hydrate form
Skin	Irritating; category 2					Annex VI	

Classification and labelling do not correspond to those of Annex VI

nickel

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Not irritating	OECD 405	168 h	48 hours	Rabbit	Experimental value	
Skin	Slightly irritating	OECD 404	4 h		Rabbit	Experimental value	

nickel monoxide

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Slightly irritating	OECD 405		1; 24; 48; 72; 168 hours	Rabbit	Experimental value	Single treatment without rinsing
Skin	Slightly irritating	OECD 404	4 h	30-60 minutes; 24; 48; 72 hrs	Rabbit	Experimental value	

antimony trioxide

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Not irritating	OECD 405		24; 48; 72 hours	Rabbit	Experimental value	Single treatment
Skin	Not irritating				Rabbit	Experimental value	

zinc

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Moderately irritating	Equivalent to OECD 405			Rabbit	Experimental value	
Eye	Not irritating	Equivalent to OECD 405			Rabbit	Experimental value	
Dermal	Not irritating	Equivalent to OECD 404			Rabbit	Weight of evidence	
Dermal (ZnO, metal oxides)	Not irritating	Equivalent to OECD 404			Guinea pig	Read-across	
Dermal	Not irritating	Human observation			Human	Read-across	
Dermal (ZnO, metal oxides)	Not irritating	Human observation			Human	Literature study	
Inhalation (ZnO, metal oxides)	Not irritating					Literature study	

zinc oxide

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Not irritating	OECD 405	24 h	24; 72 hours	Rabbit	Experimental value	
Skin	Not irritating	OECD 404	24 h	24 hours	Rabbit	Experimental value	
Not applicable (in vitro test)	Not corrosive	OECD 431	3 minutes	24; 72 hours	Reconstructed human epidermis	Experimental value	

zinc sulphate (anhydrous)

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Highly irritating	OECD 405		1; 24; 48; 72 hrs; 7; 14; 21 days	Rabbit	Experimental value of similar product	Single treatment without rinsing
Eye	Serious eye damage; category 1					Annex VI	
Skin	Not irritating	OECD 404	4 h	1; 24; 48; 72 hours	Rabbit	Experimental value	

Conclusion

Causes skin irritation.
Causes serious eye damage.
Not classified as irritating to the respiratory system

Respiratory or skin sensitisation

Copper Chloride

No (test)data available

calcium sulfate, dihydrate

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	OECD 406	6 h	24; 48 hours	Guinea pig (male)	Experimental value	

cadmium (non-pyrophoric)

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin						Data waiving	
Inhalation						Data waiving	

cadmium oxide (non-pyrophoric)

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	OECD 406			Guinea pig (male / female)	Experimental value of similar product	
Inhalation (dust)						Data waiving	

cadmium sulphate

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Not applicable (in vitro test)	Limited positive test result	OECD 442D				Experimental value	
Inhalation						Data waiving	

cobalt

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Sensitizing; category 1					Annex VI	
Inhalation	Sensitizing; category 1					Annex VI	

cobalt oxide

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Sensitizing	OECD 429			Mouse (female)	Experimental value	

copper chloride

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	OECD 406			Guinea pig (female)	Experimental value	

copper

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	OECD 406			Guinea pig (male)	Experimental value	

copper(II) oxide

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	OECD 406			Guinea pig (male / female)	Experimental value	

copper sulphate

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	OECD 406			Guinea pig (male / female)	Experimental value	

nickel

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Sensitizing	Patch test			Human	Experimental value	

nickel monoxide

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Intradermal	Not sensitizing	OECD 406			Guinea pig (female)	Experimental value	
Skin	Sensitizing	Patch test			Human	Experimental value	
Skin	category 1					Annex VI	

antimony trioxide

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	OECD 406			Guinea pig (female)	Experimental value	

zinc

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Dermal	Negative	Equivalent to OECD 429			Mouse	Read-across	
Dermal (ZnO, metal oxides)	Negative	Guinea pig maximisation test			Guinea pig	Experimental value	
Dermal (ZnO, metal oxides)	Negative	Human observation			Human		
Inhalation	Negative					Inconclusive, insufficient data	

zinc oxide

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	OECD 406			Guinea pig (female)	Experimental value	
Skin	Not sensitizing	Human observation	2 days (continuous)	72 hours	Human	Experimental value	

zinc sulphate (anhydrous)

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	Equivalent to OECD 429			Mouse (female)	Experimental value	

Conclusion

Not classified as sensitizing for inhalation

Not classified as sensitizing for skin

Specific target organ toxicity

Copper Chloride

No (test)data available

calcium sulfate, dihydrate

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral	NOAEL	OECD 422	100 mg/kg bw/day	Blood	No effect	35 day(s)	Rat (male)	Experimental value
Oral	LOAEL	OECD 422	300 mg/kg bw/day	Blood	Change in the haemogramme/blood composition	35 day(s)	Guinea pig (male)	Experimental value

cadmium (non-pyrophoric)

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (diet)	NOAEL	Subchronic toxicity test	3 mg/kg bw/day		No effect	3 month(s)	Rat (male / female)	Experimental value
Dermal								Data waiving
Inhalation (aerosol)	NOAEL	Equivalent to OECD 413	0.025 mg/m³ air		No effect	13 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value of similar product
Inhalation (aerosol)	LOAEL	Equivalent to OECD 413	0.05 mg/m³ air	Respiratory tract	Impairment/degeneration	13 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value of similar product

cadmium oxide (non-pyrophoric)

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (diet)	NOAEL	Subchronic toxicity test	3 mg/kg bw/day		No effect	3 month(s)	Rat (male / female)	Experimental value of similar product
Dermal								Data waiving
Inhalation (aerosol)	NOAEL	Equivalent to OECD 413	0.025 mg/m³ air		No effect	13 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value
Inhalation (aerosol)	LOAEL	Equivalent to OECD 413	0.05 mg/m³ air	Lungs	Lung tissue affection/degeneration	13 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value

cadmium sulphate

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Unknown			STOT RE cat.1					Annex VI
Dermal								Data waiving

cobalt

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (stomach tube)	NOAEL	OECD 408	3 mg/kg bw/day		No effect	90 days (1x / day)	Rat (male / female)	Experimental value of similar product
Dermal								Data waiving
Inhalation (aerosol)	LOAEC		0.31 mg/m³ air	Larynx	Impairment/degeneration	105 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value

cobalt oxide

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (stomach tube)	NOAEL	OECD 408	3 mg/kg bw/day		No effect	90 day(s)	Rat (male / female)	Experimental value of similar product
Dermal								Data waiving
Inhalation (aerosol)	LOAEC	Equivalent to OECD 413	0.61 mg/m³ air	Respiratory tract	Inflammation of the respiratory tract	14 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value of similar product

copper chloride

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (diet)	LOAEL	Equivalent to EU Method B.26	2000 ppm	Stomach	Impairment/degeneration	13 weeks (7 days / week)	Rat (male / female)	Experimental value
Oral (diet)	LOAEL	Equivalent to EU Method B.26	2000 ppm - 4000 ppm	Liver	Enlargement/ affection of the liver	13 weeks (7 days / week)	Rat (male / female)	Experimental value
Oral (diet)	LOAEL	Equivalent to EU Method B.26	1000 ppm - 2000 ppm	Kidney	Affection of the renal tissue	13 weeks (7 days / week)	Rat (male / female)	Experimental value
Dermal								Data waiving
Inhalation	NOAEL	OECD 412	≥ 2 mg/m³ air		No effect	4 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value

copper

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (diet)	NOAEL	Equivalent to EU Method B.26	1000 ppm		No effect	92 day(s)	Rat (male / female)	Experimental value
Oral (diet)	LOAEL	Equivalent to EU Method B.26	2000 ppm	Liver	Enlargement/ affection of the liver	92 day(s)	Rat (male / female)	Experimental value
Dermal								Data waiving
Inhalation (dust)	NOAEL	OECD 412	≥ 2 mg/m³ air		No effect	4 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value

copper(II) oxide

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (diet)	NOAEL	Equivalent to EU Method B.26	1000 ppm		No effect	92 day(s)	Rat (male / female)	Experimental value
Oral (diet)	LOAEL	Equivalent to EU Method B.26	2000 ppm - 4000 ppm	Liver	Enlargement/ affection of the liver	92 day(s)	Rat (male / female)	Experimental value
Inhalation (aerosol)	NOAEL	OECD 412	≥ 2 mg/m³ air		No effect	4 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value

copper sulphate

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (diet)	NOAEL	Equivalent to EU Method B.26	1000 ppm		No effect	13 weeks (7 days / week)	Rat (male / female)	Experimental value
Oral (diet)	LOAEL	Equivalent to EU Method B.26	2000 ppm	Liver	Enlargement/ affection of the liver	13 weeks (7 days / week)	Rat (male / female)	Experimental value
Dermal								Data waiving
Inhalation (aerosol)	NOAEL	OECD 412	≥ 2 mg/m³ air	Lungs	No effect	4 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value

nickel

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (stomach tube)	NOAEL	OECD 451	2.2 mg/kg bw/day		No effect	104 weeks (daily)	Rat (male / female)	Experimental value of similar product
Oral (stomach tube)	LOAEL	OECD 451	6.7 mg/kg bw/day	General	Body weight reduction	104 weeks (daily)	Rat (male / female)	Experimental value of similar product
Dermal								Data waiving
Inhalation (aerosol)	LOAEC	Equivalent to OECD 451	0.1 mg/m³ air	Respiratory tract	Respiratory difficulties	2 year(s) (6h / day, 5 days / week)	Rat (male / female)	Experimental value

nickel monoxide

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (stomach tube)	NOAEL	OECD 451	2.2 mg/kg bw/day		No effect	104 weeks (daily)	Rat (male / female)	Experimental value
Oral (stomach tube)	LOAEL	OECD 451	6.7 mg/kg bw/day	General	Loss of weight	104 weeks (daily)	Rat (male / female)	Experimental value
Dermal								Data waiving
Inhalation (aerosol)	NOEC	Equivalent to OECD 413	2 mg/m³	Lungs	Pneumonia	13 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value

lead(II)sulphate

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Unknown			STOT RE cat.2					Annex VI
Oral (diet)	Dose level		500 ppm	Blood	Change in the haemogramme/blood composition	7 weeks (daily)	Bovine (male)	Experimental value

antimony trioxide

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (diet)	NOAEL	Equivalent to OECD 408	1879 mg/kg bw/day		No effect	90 day(s)	Rat (female)	Experimental value
Oral (diet)	NOAEL	Equivalent to OECD 408	1686 mg/kg bw/day		No effect	90 day(s)	Rat (male)	Experimental value
Dermal								Data waiving
Inhalation (aerosol)	NOAEL	Equivalent to OECD 453	< 3 mg/m³ air		No effect	104 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value
Inhalation (aerosol)	Dose level	Equivalent to OECD 453	3 mg/l	Lungs	Lung tissue affection/degeneration	104 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value

zinc

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral	NOAEL	Equivalent to OECD 408	13.3 mg/kg bw/day	Blood	No effect	90 weeks (daily, 5 days / week)	Rat (male / female)	Read-across
Oral	NOAEL	Human observation study	50 mg/kg bw/day		No effect		Human (male / female)	Weight of evidence
Inhalation (ZnO, metal oxides)	NOAEL	Equivalent to OECD 409	2.7 mg/m³	Lungs	No effect	5 day(s)	Guinea pig	Experimental value
Inhalation (ZnO, metal oxides)		Human observation		General	No effect		Human	Literature study

zinc oxide

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (diet)	NOEL	OECD 408	3000 ppm		No effect	13 weeks (daily)	Rat (male / female)	Read-across
Dermal	LOAEL	OECD 410	75 mg/kg bw/day		Systemic effects	4 weeks (6h / day, 5 days / week)	Rat (male / female)	Experimental value
Inhalation (aerosol)	NOAEL	OECD 413	1.5 mg/m³ air		No effect	13 weeks (6h / day, 5 days / week)	Rat (male)	Experimental value

zinc sulphate (anhydrous)

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (diet)	NOEL	OECD 408	234 mg/kg bw/day - 243 mg/kg bw/day		No effect	13 weeks (daily)	Rat (male / female)	Experimental value
Oral (diet)	LOEL	OECD 408	2486 mg/kg bw/day - 2514 mg/kg bw/day	Blood	Haematological changes	13 weeks (daily)	Rat (male / female)	Experimental value
Dermal								Data waiving
Inhalation (aerosol)	NOAEL	Subchronic toxicity test			No effect	16 weeks (6h / day, 3 days / week)	Rat (male)	Experimental value

Conclusion

Causes damage to organs through prolonged or repeated exposure.

Mutagenicity (in vitro)

Copper Chloride

No (test)data available

calcium sulfate, dihydrate

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S.typhimurium)	No effect	Experimental value	
Negative with metabolic activation, negative without metabolic activation	OECD 471	Escherichia coli	No effect	Experimental value	
Negative with metabolic activation, negative without metabolic activation	OECD 476	Mouse (lymphoma L5178Y cells)	No effect	Experimental value	

cadmium (non-pyrophoric)

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	Equivalent to OECD 471	Bacteria (S.typhimurium)		Read-across	
Positive	Equivalent to OECD 473	Chinese hamster ovary (CHO)	Chromosome aberrations	Read-across	

cadmium oxide (non-pyrophoric)

Result	Method	Test substrate	Effect	Value determination	Remark
Positive	Equivalent to OECD 473	Chinese hamster lung fibroblasts (V79)	Chromosome aberrations	Experimental value	
Negative with metabolic activation, negative without metabolic activation	Equivalent to OECD 471	Bacteria (S.typhimurium)		Experimental value	

cadmium sulphate

Result	Method	Test substrate	Effect	Value determination	Remark
Positive		Human lung fibroblasts		Experimental value	
Negative with metabolic activation, negative without metabolic activation	Equivalent to OECD 471	Bacteria (S.typhimurium)		Read-across	

cobalt

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S.typhimurium)		Experimental value	
Positive with metabolic activation, positive without metabolic activation	OECD 476	Mouse (lymphoma L5178Y cells)		Experimental value	

cobalt oxide

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S.typhimurium)		Experimental value of similar product	
Negative with metabolic activation, negative without metabolic activation	OECD 476	Mouse (lymphoma L5178Y cells)		Experimental value of similar product	

copper chloride

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S.typhimurium)		Experimental value	

copper

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S.typhimurium)		Experimental value	

copper(II) oxide

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S.typhimurium)		Read-across	

copper sulphate

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S.typhimurium)		Experimental value	

nickel

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 476	Chinese hamster lung fibroblasts (V79)		Experimental value	
Negative with metabolic activation, negative without metabolic activation	OECD 487	Chinese hamster lung fibroblasts (V79)		Experimental value	

nickel monoxide

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 476	Mouse (lymphoma L5178Y cells)	No effect	Experimental value	

lead(II)sulphate

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	Equivalent to OECD 471	Bacteria (S.typhimurium)		Experimental value	

antimony trioxide

Result	Method	Test substrate	Effect	Value determination	Remark
Positive with metabolic activation, positive without metabolic activation	OECD 473	Human lymphocytes		Experimental value	
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S. typhimurium and E. coli)	No effect	Experimental value	
Negative with metabolic activation, negative without metabolic activation	OECD 476	Mouse (lymphoma L5178Y cells)	No effect	Experimental value	

zinc

Result	Method	Test substrate	Effect	Value determination	Remark
Negative	OECD 471	Bacteria (S.typhimurium)		Read-across	

zinc oxide

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S.typhimurium)	No effect	Experimental value	
Ambiguous	OECD 476	Mouse (lymphoma L5178Y cells)		Experimental value	

zinc sulphate (anhydrous)

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	Equivalent to OECD 471	Bacteria (S.typhimurium)		Experimental value	

Mutagenicity (in vivo)

Copper Chloride

No (test)data available

calcium sulfate, dihydrate

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative	OECD 474		Mouse (male)	Blood	Experimental value

cadmium (non-pyrophoric)

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Inhalation (aerosol))	Equivalent to OECD 474	13 weeks (6h / day, 5 days / week)	Mouse (male / female)		Experimental value of similar product
category 2					Annex VI

cadmium oxide (non-pyrophoric)

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Inhalation (aerosol))	Equivalent to OECD 474	13 weeks (6h / day, 5 days / week)	Mouse (male / female)		Experimental value

cadmium sulphate

Result	Method	Exposure time	Test substrate	Organ	Value determination
Positive					Annex VI

cobalt

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Inhalation (dust))	Equivalent to OECD 474	13 weeks (6h / day, 5 days / week)	Mouse (male / female)		Experimental value

cobalt oxide

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Inhalation (dust))	Equivalent to OECD 474	13 weeks (6h / day, 5 days / week)	Mouse (male / female)		Experimental value of similar product

copper chloride

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Oral (stomach tube))	EU Method B.12	2 dose(s)/24-hour interval	Mouse (male / female)	Bone marrow	Experimental value

copper

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Oral (stomach tube))	EU Method B.12	2 dose(s)/24-hour interval	Mouse (male / female)		Experimental value

copper(II) oxide

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Oral (stomach tube))	EU Method B.12	2 dose(s)/24-hour interval	Mouse (male / female)	Bone marrow	Read-across

copper sulphate

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Oral (stomach tube))	EU Method B.12	2 dose(s)/24-hour interval	Mouse (male / female)		Experimental value

nickel monoxide

Result	Method	Exposure time	Test substrate	Organ	Value determination
Positive (Inhalation)			Rat	Lungs	Experimental value

antimony trioxide

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Oral (stomach tube))	OECD 483		Rat (male / female)		Experimental value

zinc

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative	Equivalent to OECD 474		Rat		Read-across

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

zinc oxide

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Intraperitoneal)	OECD 474		Mouse (male)	Bone marrow	Experimental value

zinc sulphate (anhydrous)

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative (Intraperitoneal)	Micronucleus test	2 dose(s)/24-hour interval	Mouse (male / female)		Experimental value

Conclusion

May cause genetic defects.

Carcinogenicity

Copper Chloride

No (test)data available

calcium sulfate, dihydrate

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Oral	NOAEL	Other	256 mg/kg bw/day	104 week(s)	Rat (male)	No effect		Experimental value
Oral	NOAEL	Other	284 mg/kg bw/day	104 week(s)	Rat (female)	No effect		Experimental value

cadmium (non-pyrophoric)

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Unknown			category 1B					Annex VI

cadmium oxide (non-pyrophoric)

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation (aerosol)	LOAEL	Carcinogenic toxicity study	0.03 mg/m³ air	18 month(s)	Rat (male / female)	Tumor formation	Lungs	Experimental value

cadmium sulphate

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation (aerosol)	LOAEL	Carcinogenic toxicity study	0.09 mg/m³ air	18 months (daily, 22h / day)	Rat (male / female)	Tumor formation	Lungs	Experimental value

cobalt

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation (aerosol)	LOAEC	Equivalent to OECD 451	1.24 mg/m³ air	105 weeks (6h / day, 5 days / week)	Rat (male / female)	Carcinogenicity		Experimental value

cobalt oxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation (aerosol)	LOAEC	Equivalent to OECD 451	1.24 mg/m³ air	105 weeks (6h / day, 5 days / week)	Rat (male / female)	Carcinogenicity		Experimental value of similar product

nickel

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation (aerosol)	NOAEC	OECD 451	0.4 mg/m³ air	2 year(s) (6h / day, 5 days / week)	Rat (male / female)	No carcinogenic effect	Respiratory tract	Experimental value
Oral (stomach tube)	NOAEL	OECD 451	11 mg/kg bw/day	104 weeks (daily)	Rat (male / female)	No carcinogenic effect		Read-across

nickel monoxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation (aerosol)	Dose level	Equivalent to OECD 453	0.62 mg/m³ air	104 weeks (6h / day, 5 days / week)	Rat (male / female)	Neoplastic effects	Lungs	Experimental value
Oral (stomach tube)	NOAEL	OECD 451	11 mg/kg bw/day	104 week(s)	Rat (male / female)	No carcinogenic effect		Experimental value

antimony trioxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation (dust)	NOAEC	Carcinogenic toxicity study	1.9 mg/m³ air	52 weeks (6h / day, 5 days / week)	Rat (female)	No carcinogenic effect		Experimental value
Inhalation (dust)	LOAEC	Carcinogenic toxicity study	5 mg/m³ air	52 weeks (6h / day, 5 days / week)	Rat (female)	Carcinogenicity		Experimental value
		Carcinogenic toxicity study						

zinc

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Oral		Other		51 weeks (daily, 5 days / week)	Rat	No neoplastic effects	General	Literature study
Oral		Human observation study		204 weeks (daily, 5 days / week)	Human	No neoplastic effects	General	Literature study

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

zinc oxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Oral (drinking water)	NOAEL	Carcinogenic toxicity study	> 22000 mg/l	52 week(s)	Mouse (male / female)	No carcinogenic effect		Read-across

zinc sulphate (anhydrous)

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Oral (drinking water)	NOAEL	Carcinogenic toxicity study	> 22000 mg/l	52 weeks (daily)	Mouse (male / female)	No carcinogenic effect		Experimental value

Conclusion

May cause cancer.

Reproductive toxicity

Copper Chloride

No (test)data available

calcium sulfate, dihydrate

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity	NOAEL	Equivalent to OECD 414	1600 mg/kg bw/day	10 day(s)	Mouse	No effect	General	Experimental value
	NOAEL	Equivalent to OECD 414	1600 mg/kg bw/day	10 day(s)	Rat	No effect	General	Experimental value
	NOAEL	Equivalent to OECD 414	1600 mg/kg bw/day	13 day(s)	Rabbit	No effect	General	Experimental value
Effects on fertility	NOAEL	OECD 422	1000 mg/kg bw/day	2 week(s)	Rat (male / female)	No effect		Experimental value

cadmium (non-pyrophoric)

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Inhalation (dust))	NOAEL	OECD 414	0.5 mg/m³ air	16 days (gestation, daily)	Rat (male / female)			Read-across
	LOAEL	OECD 414	2 mg/m³ air	16 days (gestation, daily)	Rat (male / female)	Minor skeletal variations	Foetus	Read-across
Maternal toxicity (Inhalation (dust))	NOAEL	OECD 414	0.5 mg/m³ air	16 days (gestation, daily)	Rat	No effect		Read-across
	LOAEL	OECD 414	2 mg/m³ air	16 days (gestation, daily)	Rat (male / female)	Maternal toxicity		Read-across
Effects on fertility (Inhalation (aerosol))	NOAEL	Equivalent to OECD 413	0.1 mg/kg bw/day	13 weeks (6h / day, 5 days / week)	Rat (male / female)	No effect		Read-across
	LOAEL	Equivalent to OECD 413	1 mg/kg bw/day	13 weeks (6h / day, 5 days / week)	Rat (male / female)	Adverse effect on sperm. Prolonged oestrus stages.		Read-across

cadmium oxide (non-pyrophoric)

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Inhalation (dust))	NOAEL	OECD 414	0.5 mg/m³ air	16 days (gestation, daily)	Rat	No effect		Experimental value
	LOAEL	OECD 414	2 mg/m³ air	16 days (gestation, daily)	Rat	Reduced skeletal ossification	Foetus	Experimental value
Maternal toxicity (Inhalation (dust))	NOAEL	OECD 414	0.5 mg/m³ air	16 days (gestation, daily)	Rat	No effect		Experimental value
	LOAEL	OECD 414	2 mg/m³ air	16 days (gestation, daily)	Rat	Weight changes	Liver; kidney	Experimental value
Effects on fertility (Inhalation (aerosol))	NOAEL	Equivalent to OECD 413	0.1 mg/m³ air	13 weeks (6h / day, 5 days / week)	Rat (male / female)	No effect		Experimental value
	LOAEL	Equivalent to OECD 413	1 mg/m³ air	13 weeks (6h / day, 5 days / week)	Rat (male / female)	Adverse effect on sperm. Prolonged oestrus stages.	sperm parameters or estrous cycle	Experimental value

cadmium sulphate

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (drinking water))	NOAEL	Developmental toxicity study	5 ppm	14 days (gestation, daily)	Rat	No effect		Read-across
	LOAEL	Developmental toxicity study	50 ppm	14 days (gestation, daily)	Rat	Fetotoxicity	Foetus	Read-across
Maternal toxicity (Oral (drinking water))	NOAEL	Developmental toxicity study	5 ppm	14 days (gestation, daily)	Rat	No effect		Read-across
	LOAEL	Developmental toxicity study	50 ppm	14 days (gestation, daily)	Rat	Maternal toxicity		Read-across
Effects on fertility (Oral (stomach tube))	NOAEL		1 mg/kg bw/day	9 weeks (daily)	Rat (female)	No effect		Read-across
	LOAEL		10 mg/kg bw/day	9 weeks (daily)	Rat (female)	Reduction in the number of pregnancies		Read-across

cobalt

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (stomach tube))	NOAEL	OECD 414	100 mg/kg bw/day	14 days (1x / day)	Rat	No effect		Experimental value of similar product
Maternal toxicity (Oral (stomach tube))	NOAEL	OECD 414	25 mg/kg bw/day	14 days (1x / day)	Rat	No effect		Experimental value of similar product
Effects on fertility (Oral (stomach tube))	NOAEL	OECD 408	30 mg/kg bw/day	90 days (1x / day)	Rat (male / female)	No effect		Experimental value

cobalt oxide

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (stomach tube))	NOAEL	OECD 414	100 mg/kg bw/day	14 days (gestation, daily)	Rat	No effect		Experimental value of similar product
Maternal toxicity (Oral (stomach tube))	NOAEL	OECD 414	25 mg/kg bw/day	14 days (gestation, daily)	Rat	No effect		Experimental value of similar product
Effects on fertility (Oral (stomach tube))	NOAEL	OECD 422	30 mg/kg bw/day		Rat (male / female)	No effect		Experimental value of similar product

copper chloride

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (stomach tube))	NOAEL	OECD 414	6 mg/kg bw/day	22 day(s)	Rabbit	No effect		Experimental value
Maternal toxicity (Oral (stomach tube))	NOAEL	OECD 414	6 mg/kg bw/day	22 day(s)	Rabbit	No effect		Experimental value
Effects on fertility (Oral (diet))	NOAEL	EPA OPPTS 870.3800	1000 ppm - 1500 ppm		Rat (male / female)	No effect		Experimental value

copper

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (stomach tube))	NOAEL	OECD 414	6 mg/kg bw/day	22 days (gestation, daily)	Rabbit	No effect		Experimental value
Maternal toxicity (Oral (stomach tube))	NOAEL	OECD 414	6 mg/kg bw/day	22 days (gestation, daily)	Rabbit	No effect		Experimental value
Effects on fertility (Oral (diet))	NOAEL	EPA OPPTS 870.3800	1000 ppm - 1500 ppm		Rat (male / female)	No effect		Experimental value

copper(II) oxide

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (stomach tube))	NOAEL	OECD 414	6 mg/kg bw/day	22 days (gestation, daily)	Rabbit	No effect		Experimental value
Maternal toxicity (Oral (stomach tube))	NOAEL	OECD 414	6 mg/kg bw/day	22 days (gestation, daily)	Rabbit	No effect		Experimental value
Effects on fertility (Oral (diet))	NOAEL	OECD 416	1500 ppm		Rat (male / female)	No effect		Experimental value

copper sulphate

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (stomach tube))	NOAEL	OECD 414	6 mg/kg bw/day	22 days (gestation, daily)	Rabbit	No effect		Experimental value
Maternal toxicity (Oral (stomach tube))	NOAEL	OECD 414	6 mg/kg bw/day	22 days (gestation, daily)	Rabbit	No effect		Experimental value
Effects on fertility (Oral (diet))	NOAEL	EPA OPPTS 870.3800	1000 ppm - 1500 ppm		Rat (male / female)	No effect		Experimental value

nickel

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (stomach tube))	NOAEL	Equivalent to OECD 416	≥ 1.1 mg/kg bw/day		Rat	No effect		Experimental value
Maternal toxicity (Oral (stomach tube))	NOAEL	Equivalent to OECD 416	10 mg/kg bw/day		Rat	No effect		Experimental value
Effects on fertility (Oral (stomach tube))	NOAEL	Equivalent to OECD 416	10 mg/kg bw/day		Rat (male / female)	No effect		Experimental value

nickel monoxide

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (drinking water))	LOAEL	Equivalent to OECD 414	42 mg/kg bw/day		Rat	Embryotoxicity and fetotoxicity		Experimental value
Maternal toxicity (Oral (drinking water))	NOAEL	Equivalent to OECD 414	6 mg/kg bw/day		Rat	No effect		Experimental value
Effects on fertility (Oral (stomach tube))	LOAEL	Equivalent to OECD 415	75 mg/kg bw/day		Rat (male / female)	Adverse effects on fertility		Experimental value

lead(II)sulphate

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity			category 1A					Annex VI
Effects on fertility			category 2					Annex VI

antimony trioxide

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Inhalation (dust))	NOAEC	OECD 414	≥ 6.3 mg/m³ air	20 days (6h / day)	Rat	No effect	Foetus	Experimental value
Maternal toxicity (Inhalation (dust))	LOAEC	OECD 414	2.6 mg/m³ air	20 days (6h / day)	Rat	Weight gain	Lungs	Experimental value
Effects on fertility (Oral (stomach tube))	NOAEL		1879 mg/kg bw/day	90 day(s)	Rat (female)	No effect	Female reproductive organ	Experimental value
	NOAEL		1686 mg/kg bw/day	90 day(s)	Rat (male)	No effect	Male reproductive organ	Experimental value

zinc

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity		Human observation			Human (female)	No effect		Experimental value
	NOAEL	Equivalent to OECD 416	200 mg/kg bw/day	1 days (gestation, daily) - 18 days (gestation, daily)	Rat (female)	No effect		Weight of evidence
Effects on fertility		Human observation			Human (female)	No adverse systemic effects		Experimental value
	NOAEL	Equivalent to OECD 406	200 mg/kg bw/day		Rat (male / female)	No effect		Weight of evidence

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

zinc oxide

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Inhalation (aerosol))	NOAEC	OECD 414	7.5 mg/kg bw/day	14 days (6h / day)	Rat	No effect	Foetus	Experimental value
Maternal toxicity (Inhalation (aerosol))	NOAEC	OECD 414	1.5 mg/kg bw/day	14 days (6h / day)	Rat	No effect		Experimental value
Effects on fertility (Oral (stomach tube))	LOAEL (P)	Equivalent to OECD 416	7.5 mg/kg bw/day	22 weeks (daily)	Rat (male / female)	Reproductive performance		Read-across

zinc sulphate (anhydrous)

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (stomach tube))	NOAEL	Developmental toxicity study	42.5 mg/kg bw/day	10 day(s)	Rat	No effect		Experimental value
Maternal toxicity (Oral (stomach tube))	NOAEL	Developmental toxicity study	42.5 mg/kg bw/day	10 day(s)	Rat	No effect		Experimental value
Effects on fertility (Oral (diet))	Dose level		4000 ppm		Rat (male)	Adverse effect on sperm	Reproductive organs	Experimental value

Conclusion

May damage fertility.
May damage the unborn child.

Toxicity other effects

Copper Chloride

No (test)data available

Chronic effects from short and long-term exposure

Copper Chloride

Possible inflammation of the respiratory tract. Respiratory difficulties. Risk of pneumonia. Affection of the renal tissue. Change in urine composition. Change in the haemogramme/blood composition. Affection/discolouration of the teeth. Slowing ossification.

11.2. Information on other hazards

No evidence of endocrine disrupting properties

SECTION 12: Ecological information

12.1. Toxicity

Copper Chloride

No (test)data available

Classification is based on the relevant ingredients

calcium sulfate, dihydrate

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		2980 mg/l	96 h	Lepomis macrochirus			Anhydrous form

cadmium (non-pyrophoric)

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		0.748 mg/l	96 h	Carassius auratus	Flow-through system	Fresh water	Read-across; Nominal concentration
Acute toxicity crustacea	LC50	EPA 600/4-78-012	38 µg/l	48 h	Daphnia magna	Static system	Fresh water	Read-across; Lethal
Toxicity algae and other aquatic plants	ErC50	OECD 201	0.070 mg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value; GLP
	NOEC	OECD 201	2.4 µg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value; Cell numbers
Long-term toxicity fish	NOEC		8 µg/l	10 day(s)	Salvelinus fontinalis	Static renewal	Fresh water	Experimental value; Survival
Long-term toxicity aquatic crustacea	NOEC		2 µg/l	33 day(s)	Americamysis bahia	Flow-through system	Salt water	Read-across; Growth
Toxicity aquatic micro-organisms	NOEC	OECD 209	200 µg/l	3 h	Activated sludge	Static system	Fresh water	Experimental value; GLP

cadmium oxide (non-pyrophoric)

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	EC50		34 µg/l		Salmo salar			Literature study; Cadmium ion
Acute toxicity crustacea	LC50	OECD 202	750 µg/l	48 h	Daphnia magna	Static system	Fresh water	Experimental value; Locomotor effect
Toxicity algae and other aquatic plants	ErC50	OECD 201	18 µg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value; GLP
	NOEC	OECD 201	2.4 µg/l	3 day(s)	Pseudokirchneriella subcapitata	Static system	Fresh water	Read-across; Cell numbers
Long-term toxicity fish	NOEC		1.3 µg/l	27 day(s)	Oncorhynchus kisutch	Flow-through system	Fresh water	Read-across; Biomass
Long-term toxicity aquatic crustacea	NOEC		2 µg/l	33 day(s)	Americamysis bahia	Flow-through system	Salt water	Read-across; Growth
Toxicity aquatic micro-organisms	NOEC	OECD 209	353 µg/l - 27300 µg/l	3 h	Activated sludge	Static system	Fresh water	Experimental value; Respiration

cadmium sulphate

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50	Other	2.5 mg/l	96 h	Jordanella floridae	Flow-through system	Fresh water	Read-across
	LC50		748 µg/l	4 day(s)	Carassius auratus	Flow-through system	Fresh water	Read-across; Nominal concentration
Acute toxicity crustacea	LC50	EPA 600/4-78-012	38 µg/l	48 h	Daphnia magna	Static system	Fresh water	Read-across; Lethal
Toxicity algae and other aquatic plants	EC50	OECD 201	23 µg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Read-across; Biomass
	NOEC	OECD 201	2.4 µg/l	3 day(s)	Pseudokirchneriella subcapitata	Static system	Fresh water	Read-across; Cell numbers
Long-term toxicity fish	NOEC		1.7 µg/l	36 month(s)	Salvelinus fontinalis	Flow-through system	Fresh water	Read-across; Growth rate
Long-term toxicity aquatic crustacea	NOEC		10 µg/l	7 day(s)	Ceriodaphnia dubia	Static renewal	Fresh water	Read-across; Reproduction
Toxicity aquatic micro-organisms	NOEC	OECD 209	200 µg/l	3 h	Activated sludge	Static system	Fresh water	Experimental value; Respiration

cobalt

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Toxicity aquatic micro-organisms	EC50	OECD 209	120 mg/l	30 minutes	Activated sludge	Static system	Fresh water	Experimental value; Growth

cobalt oxide

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		1.5 mg/l		Pisces		Fresh water	Literature study
Acute toxicity crustacea	EC50		0.61 mg/l		Ceriodaphnia dubia		Fresh water	Literature study
Toxicity algae and other aquatic plants	EC50		197 µg/l		Algae		Fresh water	Literature study
	EC10		66.9 µg/l		Algae		Fresh water	Literature study
Long-term toxicity fish	NOEC	ASTM	0.21 mg/l	34 day(s)	Pimephales promelas	Flow-through system	Fresh water	Experimental value; GLP
Long-term toxicity aquatic crustacea	EC10		7.55 µg/l		Invertebrata		Fresh water	Literature study

copper chloride

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50	APHA	2.8 µg/l - 4.2 µg/l	96 h	Oncorhynchus mykiss	Flow-through system	Fresh water	Experimental value
Acute toxicity crustacea	LC50		9.8 µg/l - 60 µg/l	48 h	Daphnia magna	Static system	Fresh water	Experimental value
Toxicity algae and other aquatic plants	EC50	OECD 201	18 µg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value
	NOEC	OECD 201	37.6 µg/l - 170.8 µg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value
Long-term toxicity fish	NOEC	OECD 204	2.2 µg/l	60 day(s)	Oncorhynchus mykiss	Flow-through system	Fresh water	Experimental value; Growth rate
Long-term toxicity aquatic crustacea	NOEC		4 µg/l - 40 µg/l		Daphnia pulex	Static renewal	Fresh water	Experimental value
Toxicity aquatic micro-organisms	NOEC		0.23 mg/l	30 day(s)	Activated sludge	Static system	Fresh water	Weight of evidence; Oxygen consumption

copper(II) oxide

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		38.4 µg/l	96 h	Pimephales promelas	Flow-through system	Fresh water	Read-across
Long-term toxicity fish	NOEC		2.2 µg/l		Oncorhynchus mykiss			Literature study; Chronic

copper sulphate

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		38.4 µg/l	96 h	Pimephales promelas	Flow-through system	Fresh water	Read-across; Cu ion
Acute toxicity crustacea	EC50	OECD 202	109 µg/l	48 h	Daphnia magna	Static system	Fresh water	Experimental value; Locomotor effect
Toxicity algae and other aquatic plants	EC50	OECD 201	0.047 mg/l	96 h	Chlamydomonas reinhardtii	Flow-through system	Fresh water	Experimental value; Growth
	NOEC	Equivalent to OECD 201	22 µg/l	10 day(s)	Chlamydomonas reinhardtii	Flow-through system	Fresh water	Experimental value; Growth rate
Long-term toxicity fish	NOEC	Equivalent to OECD 204	33 µg/l	330 day(s)	Pimephales promelas	Flow-through system	Fresh water	Experimental value; Growth rate
Long-term toxicity aquatic crustacea	NOEC		12.6 µg/l	21 day(s)	Daphnia magna	Flow-through system	Fresh water	Experimental value; Growth

nickel monoxide

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Toxicity aquatic micro-organisms	EC50	ISO 8192	33 mg/l	30 minutes	Activated sludge			Experimental value; Respiration

lead(II)sulphate

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	TLm		7.48 mg/l	96 h	Pimephales promelas			Literature study; Lead ion
Acute toxicity crustacea	LC50		0.3 mg/l	48 h	Daphnia magna			Literature study; Lead ion
Toxicity algae and other aquatic plants	EC50		0.14 mg/l		Selenastrum capricornutum			Literature study; Lead ion

antimony trioxide

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		14.4 mg/l	96 h	Pimephales promelas	Static system	Fresh water	Experimental value; Lethal
Acute toxicity crustacea	LC50		12.1 mg/l - 18.8 mg/l	48 h	Daphnia magna	Static system	Fresh water	Experimental value; Lethal
Toxicity algae and other aquatic plants	ErC50	OECD 201	> 36.6 mg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value; Antimony
	NOEC	OECD 201	2.11 mg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value; Growth rate
Long-term toxicity fish	NOEC		2.31 mg/l	28 day(s)	Pimephales promelas	Flow-through system	Fresh water	Experimental value; Weight changes
Long-term toxicity aquatic crustacea	NOEC	OECD 211	1.74 mg/l - 3.13 mg/l	21 day(s)	Daphnia magna	Semi-static system	Fresh water	Experimental value; Reproduction
Toxicity aquatic micro-organisms	EC50	ISO 9509:2006	27 mg/l	4 h	Activated sludge	Static system	Fresh water	Experimental value

zinc

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50	ASTM	0.169 mg/l	96 h	Oncorhynchus mykiss	Static system	Fresh water	Read-across
	LC50	Other	0.330 mg/l - 0.780 mg/l	96 h	Pimephales promelas	Static system		Read-across
Acute toxicity crustacea	EC50	US EPA	0.413 mg/l	48 h	Ceriodaphnia dubia	Static system	Fresh water	Experimental value
	EC50	Equivalent to OECD 202	0.530 mg/l	48 h	Daphnia magna	Static system	Fresh water	Read-across
	EC50	Other	0.095 mg/l - 0.530 mg/l	48 h	Ceriodaphnia dubia	Static system	Fresh water	Read-across
	NOEC	Other	201 mg/kg sediment dw	35 day(s)	Gammarus pulex	Semi-static system	Fresh water	Read-across
Toxicity algae and other aquatic plants	IC50	OECD 201	0.136 mg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value
	EC10	Other	0.0077 mg/l	7 day(s)	Ceramium tenuicore	Static system	Salt water	Experimental value
	EC10	Other	0.6708 mg/l	10 day(s)	Algae	Flow-through system	Salt water	Read-across
Acute toxicity other aquatic organisms	NOEC	ASTM	1135 mg/kg sediment dw	28 day(s)	Tubifex tubifex	Flow-through system	Fresh water	Read-across
	NOEC	Other	0.400 mg/l	10 week(s)	Dreissena polymorpha	Static system	Fresh water	Read-across
Long-term toxicity fish	NOEC	Other	0.440 mg/l	72 day(s)	Oncorhynchus mykiss	Flow-through system	Fresh water	Read-across
	NOEC	Other	0.530 mg/l	36 month(s)	Salvelinus fontinalis	Flow-through system	Fresh water	Read-across
	NOEC	Other	0.025 mg/l	27 day(s)	Clupea harengus	Semi-static system	Salt water	Read-across
Long-term toxicity aquatic crustacea	NOEC	Other	0.037 mg/l	3 week(s)	Daphnia magna	Semi-static system	Fresh water	Read-across
	NOEC	US EPA	0.0056 mg/l	24 day(s)	Invertebrata	Semi-static system	Salt water	Read-across
Toxicity aquatic micro-organisms	EC50	Equivalent to OECD 209	5.2 mg/l	3 h		Static system	Fresh water	Read-across

	Parameter	Method	Value	Duration	Species	Value determination
Toxicity soil macro-organisms	NOEC	Other	1634 mg/kg soil dw	42 day(s)	Lumbricus terrestris	Read-across
	EC10	OECD 220	35.7 mg/kg soil dw	42 day(s)	Enchytraeus albidus	Read-across
Toxicity soil micro-organisms	NOEC	Other	17 mg/kg soil dw	12 week(s)	Soil micro-organisms	Read-across
	EC10	Other	2623 mg/kg soil dw	6 week(s)	Soil micro-organisms	Read-across
Toxicity terrestrial plants	EC10	OECD 208	5855 mg/kg soil dw	21 day(s)	Triticum aestivum	Read-across
	NOEC	OECD 208	32 mg/kg soil dw	25 day(s)	Triticum pratense	Read-across
Toxicity birds	NOEC	Other	> 150 mg/kg bw	28 day(s)	Anas plathyrhynchos	Experimental value

zinc oxide

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		1.55 mg/l	96 h	Danio rerio	Static system	Fresh water	Experimental value; Lethal
Acute toxicity crustacea	EC50	OECD 202	1 mg/l	48 h	Daphnia magna	Static system	Fresh water	Experimental value; Zinc ion
Toxicity algae and other aquatic plants	IC50	OECD 201	0.136 mg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value; Growth rate
	NOEC	OECD 201	0.024 mg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value; Growth rate
Long-term toxicity fish	NOEC	OECD 215	0.039 mg/l - 0.974 mg/l	30 day(s)	Oncorhynchus mykiss	Flow-through system	Fresh water	Read-across; Lethal
Long-term toxicity aquatic crustacea	NOEC	OECD 211	0.04 mg/l	21 day(s)	Daphnia magna	Semi-static system	Fresh water	Read-across; Reproduction
Toxicity aquatic micro-organisms	EC50	OECD 209	> 1000 mg/l	3 h	Activated sludge	Static system	Fresh water	Experimental value; Respiration

zinc sulphate (anhydrous)

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		330 µg/l - 780 µg/l	95 h	Pimephales promelas	Static system	Fresh water	Experimental value; Lethal
Acute toxicity crustacea	EC50	OECD 202	1.4 mg/l - 2.5 mg/l	48 h	Daphnia magna	Static system	Fresh water	Experimental value; Locomotor effect
Toxicity algae and other aquatic plants	IC50	OECD 201	136 µg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value; Growth rate
	NOEC	OECD 201	24 µg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value; Growth rate
Long-term toxicity fish	NOEC	OECD 210	56 µg/l - 61 µg/l	116 day(s)	Salmo trutta	Flow-through system	Fresh water	Experimental value
Long-term toxicity aquatic crustacea	NOEC		31 µg/l - 208 µg/l	50 day(s)	Daphnia magna	Semi-static system	Fresh water	Experimental value; Reproduction
Toxicity aquatic micro-organisms	EC50	Equivalent to OECD 209	5.2 mg/l	3 h	Activated sludge	Static system	Fresh water	Experimental value; Respiration

Conclusion

Very toxic to aquatic life.

Very toxic to aquatic life with long lasting effects.

12.2. Persistence and degradability

copper chloride

Biodegradation water

Method	Value	Duration	Value determination
	Not applicable (inorganic)		

Conclusion

Water

Biodegradability: not applicable

12.3. Bioaccumulative potential

Copper Chloride

Log Kow

Method	Remark	Value	Temperature	Value determination
	Not applicable (mixture)			

tricopper arsenide

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

calcium sulfate, dihydrate

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

cadmium (non-pyrophoric)

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

cadmium oxide (non-pyrophoric)

BCF fishes

Parameter	Method	Value	Duration	Species	Value determination
BCF		50 - 1385; Fresh weight	92 day(s)	Salmo salar	Read-across

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available (test not performed)			

cadmium sulphate

BCF fishes

Parameter	Method	Value	Duration	Species	Value determination
BCF		1385; Fresh weight	92 day(s)	Salmo salar	Read-across

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

cobalt

BCF fishes

Parameter	Method	Value	Duration	Species	Value determination
BCF		0.007 - 0.013	225 day(s)	Cyprinus carpio	Read-across

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

cobalt oxide

Log Kow

Method	Remark	Value	Temperature	Value determination
	Not applicable (inorganic)			

copper chloride

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

copper

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available in the literature			

copper(II) oxide

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available in the literature			

copper sulphate

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available in the literature			

nickel

BCF other aquatic organisms

Parameter	Method	Value	Duration	Species	Value determination
BCF		8 - 45; Fresh weight	≤ 4 week(s)	Cambarus sp.	Experimental value

Log Kow

Method	Remark	Value	Temperature	Value determination
	Not applicable (inorganic)			

nickel monoxide

BCF fishes

Parameter	Method	Value	Duration	Species	Value determination
BCF		0.8 - 4; Cinetic	180 day(s)	Oncorhynchus mykiss	Experimental value

Log Kow

Method	Remark	Value	Temperature	Value determination
	Not applicable (inorganic)			

lead(II)sulphate

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available in the literature			

antimony trioxide

BCF other aquatic organisms

Parameter	Method	Value	Duration	Species	Value determination
BCF		5.6 l/kg; Fresh	17 day(s)	Hyalella azteca	Experimental value

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

zinc

BCF fishes

Parameter	Method	Value	Duration	Species	Value determination
		Not applicable			

BCF other aquatic organisms

Parameter	Method	Value	Duration	Species	Value determination
		Not applicable			

Log Kow

Method	Remark	Value	Temperature	Value determination
	Not applicable			

zinc oxide

BCF fishes

Parameter	Method	Value	Duration	Species	Value determination
BCF		78 - 2060	14 day(s)	Oncorhynchus mykiss	Experimental value

Log Kow

Method	Remark	Value	Temperature	Value determination
		1.53		Estimated value

zinc sulphate (anhydrous)

BCF fishes

Parameter	Method	Value	Duration	Species	Value determination
BCF		0.4 - 7.51	45 day(s)	Channa punctatus	Experimental value

Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

Conclusion

Contains bioaccumulative component(s)

12.4. Mobility in soil

cadmium (non-pyrophoric)

(log) Koc

Parameter	Method	Value	Value determination
			Data waiving

cadmium sulphate

(log) Koc

Parameter	Method	Value	Value determination
			Data waiving

zinc oxide

(log) Koc

Parameter	Method	Value	Value determination
log Koc		2.2	Literature study

Conclusion

Contains component(s) that adsorb(s) into the soil

12.5. Results of PBT and vPvB assessment

The criteria of PBT and vPvB as listed in Annex XIII of Regulation (EC) No 1907/2006 do not apply to inorganic substances.

12.6. Endocrine disrupting properties

No evidence of endocrine disrupting properties

12.7. Other adverse effects

Copper Chloride

Greenhouse gases

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 517/2014)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009)

cadmium (non-pyrophoric)

Groundwater

Groundwater pollutant

cadmium oxide (non-pyrophoric)
Groundwater
Groundwater pollutant

cadmium sulphate
Groundwater
Groundwater pollutant
Water ecotoxicity pH
pH shift

cobalt
Groundwater
Groundwater pollutant

copper sulphate
Groundwater
Groundwater pollutant
Water ecotoxicity pH
pH shift

zinc oxide
Groundwater
Groundwater pollutant

zinc sulphate (anhydrous)
Water ecotoxicity pH
pH shift

SECTION 13: Disposal considerations

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

13.1. Waste treatment methods

13.1.1 Provisions relating to waste

European Union

Hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014 and Regulation (EU) No 2017/997. The waste code must be assigned by the user, preferably in consultation with the (environmental) authorities concerned.

13.1.2 Disposal methods

Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Do not discharge into drains or the environment. Dispose of at authorized waste collection point.

13.1.3 Packaging/Container

European Union

Waste material code packaging (Directive 2008/98/EC).
15 01 10* (packaging containing residues of or contaminated by dangerous substances).

SECTION 14: Transport information

Road (ADR)

14.1. UN number

UN number	3288

14.2. UN proper shipping name

Proper shipping name	toxic solid, inorganic, n.o.s. (cadmium (non-pyrophoric))

14.3. Transport hazard class(es)

Hazard identification number	60
Class	6.1
Classification code	T5

14.4. Packing group

Packing group	III
Labels	 6.1

14.5. Environmental hazards

Environmentally hazardous substance mark	 yes

14.6. Special precautions for user

Special provisions	274
Limited quantities	Combination packagings: not more than 5 kg per inner packaging for solids. A package shall not weigh more than 30 kg. (gross mass)

Rail (RID)

14.1. UN number

UN number	3288

14.2. UN proper shipping name

Proper shipping name	toxic solid, inorganic, n.o.s. (cadmium (non-pyrophoric))

14.3. Transport hazard class(es)

Hazard identification number	60
Class	6.1
Classification code	T5

14.4. Packing group

Packing group	III
Labels	 6 6.1

14.5. Environmental hazards

Environmentally hazardous substance mark	 yes

14.6. Special precautions for user

Special provisions	274
Limited quantities	Combination packagings: not more than 5 kg per inner packaging for solids. A package shall not weigh more than 30 kg. (gross mass)

Inland waterways (ADN)

14.1. UN number

UN number	3288

14.2. UN proper shipping name

Proper shipping name	toxic solid, inorganic, n.o.s. (cadmium (non-pyrophoric))

14.3. Transport hazard class(es)

Class	6.1
Classification code	T5

14.4. Packing group

Packing group	III
Labels	 6 6.1

14.5. Environmental hazards

Environmentally hazardous substance mark	 yes

14.6. Special precautions for user

Special provisions	274
Special provisions	802
Limited quantities	Combination packagings: not more than 5 kg per inner packaging for solids. A package shall not weigh more than 30 kg. (gross mass)

Sea (IMDG/IMSBC)

14.1. UN number

UN number	3288

14.2. UN proper shipping name

Proper shipping name	toxic solid, inorganic, n.o.s. (cadmium (non-pyrophoric))

14.3. Transport hazard class(es)

Class	6.1

14.4. Packing group

Packing group	III
Labels	 6.1

14.5. Environmental hazards

Marine pollutant	P
Environmentally hazardous substance mark	 yes

14.6. Special precautions for user

Special provisions	223
Special provisions	274
Limited quantities	Combination packagings: not more than 5 kg per inner packaging for solids. A package shall not weigh more than 30 kg. (gross mass)

14.7. Maritime transport in bulk according to IMO instruments

Annex II of MARPOL 73/78	Not applicable

Air (ICAO-TI/IATA-DGR)

14.1. UN number

UN number	3288

14.2. UN proper shipping name

Proper shipping name	toxic solid, inorganic, n.o.s. (cadmium (non-pyrophoric))

14.3. Transport hazard class(es)

Class	6.1

14.4. Packing group

Packing group	III
Labels	 6.1

14.5. Environmental hazards

Environmentally hazardous substance mark	 yes

14.6. Special precautions for user

Special provisions	A3
Special provisions	A5

Passenger and cargo transport

Limited quantities: maximum net quantity per packaging	10 kg

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

European legislation:

VOC content Directive 2010/75/EU

VOC content	Remark
	Not applicable (inorganic)

Directive 2012/18/EU (Seveso III)

Threshold values under normal circumstances

Substance or category	Low tier (tonnes)	Top tier (tonnes)	Group	For this substance or mixture the summation rule has to be applied for:
H2 ACUTE TOXIC	50	200	None	Toxicity
E1 Hazardous to the Aquatic Environment in Category Acute 1 or Chronic 1	100	200	None	Eco-toxicity

Prior informed consent (PIC)

Contains component(s) listed in Annex I of Regulation (EU) No 649/2012: Part 1 - List of chemicals subject to export notification procedure
European drinking water standards (98/83/EC and 2020/2184)

tricopper arsenide

Parameter	Parametric value	Note	Reference
Arsenic	10 µg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.
Copper	2 mg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

calcium sulfate, dihydrate

Parameter	Parametric value	Note	Reference
Sulphate	250 mg/l		Listed in Annex I, Part C, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

cadmium (non-pyrophoric)

Parameter	Parametric value	Note	Reference
Cadmium	5 µg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

cadmium oxide (non-pyrophoric)

Parameter	Parametric value	Note	Reference
Cadmium	5 µg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

cadmium sulphate

Parameter	Parametric value	Note	Reference
Cadmium	5 µg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.
Pesticides	0.1 µg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.
Pesticides — Total	0.5 µg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.
Sulphate	250 mg/l		Listed in Annex I, Part C, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

copper chloride

Parameter	Parametric value	Note	Reference
Copper	2 mg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.
Chloride	250 mg/l		Listed in Annex I, Part C, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

copper

Parameter	Parametric value	Note	Reference
Copper	2 mg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

copper(II) oxide

Parameter	Parametric value	Note	Reference
Copper	2 mg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

copper sulphate

Parameter	Parametric value	Note	Reference
Copper	2 mg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.
Sulphate	250 mg/l		Listed in Annex I, Part C, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

nickel monoxide

Parameter	Parametric value	Note	Reference
Nickel	20 µg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

lead(II)sulphate

Parameter	Parametric value	Note	Reference
Lead	5 µg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.
Sulphate	250 mg/l		Listed in Annex I, Part C, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.
Lead	10 µg/l		Listed in Annex I, Part D, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

antimony trioxide

Parameter	Parametric value	Note	Reference
Antimony	10 µg/l		Listed in Annex I, Part B, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

zinc sulphate (anhydrous)

Parameter	Parametric value	Note	Reference
Sulphate	250 mg/l		Listed in Annex I, Part C, of Directive (EU) 2020/2184 on the quality of water intended for human consumption.

REACH Candidate list

Contains component(s) included in candidate list of substances of very high concern (SVHC) for authorisation (Article 59 of Regulation (EC) No 1907/2006)

REACH Annex XVII - Restriction

Contains component(s) subject to restrictions of Annex XVII of Regulation (EC) No 1907/2006: restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles.

	Designation of the substance, of the group of substances or of the mixture	Conditions of restriction
· lead(II)sulphate	Lead sulphates; PbSO 4	Shall not be placed on the market, or used, as substances or in mixtures, where the substance or mixture is intended for use as paint. However, Member States may, in accordance with the provisions of International Labour Organization (ILO) Convention 13, permit the use on their territory of the substance or mixture for the restoration and maintenance of works of art and historic buildings and their interiors, as well as the placing on the market for such use. Where a Member State makes use of this derogation, it shall inform the Commission thereof.
· tricopper arsenide	Arsenic compounds	1.Shall not be placed on the market, or used, as substances or in mixtures where the substance or mixture is intended for use to prevent the fouling by micro-organisms, plants or animals of: — the hulls of boats, — cages, floats, nets and any other appliances or equipment used for fish or shellfish farming, — any totally or partly submerged appliances or equipment. 2. Shall not be placed on the market, or used, as substances or in mixtures where the substance or mixture is intended for use in the treatment of industrial waters, irrespective of their use. 3. Shall not be used in the preservation of wood. Furthermore, wood so treated shall not be placed on the market. 4. By way of derogation from paragraph 3: a) Relating to the substances and mixtures for the preservation of wood: these may only be used in industrial installations using vacuum or pressure to impregnate wood if they are solutions of inorganic compounds of the copper, chromium, arsenic (CCA) type C and if they are authorised in accordance with Article 5(1) of Directive 98/8/EC. Wood so treated shall not be placed on the market before fixation of the preservative is completed. b) Wood treated with CCA solution in accordance with point (a) may be placed on the market for professional and industrial use provided that the structural integrity of the wood is required for human or livestock safety and skin contact by the general public during its service life is unlikely: — as structural timber in public and agricultural buildings, office buildings, and industrial premises, — in bridges and bridgework, — as constructional timber in freshwater areas and brackish waters, for example jetties and bridges, — as noise barriers, — in avalanche control, — in highway safety fencing and barriers, — as debarked round conifer livestock fence posts, — in earth retaining structures, — as electric power transmission and telecommunications poles, — as underground railway sleepers. c) Without prejudice to the application of other Community provisions on the classification, packaging and labelling of substances and mixtures, suppliers shall ensure before the placing on the market that all treated wood placed on the market is individually labelled “For professional and industrial installation and use only, contains arsenic”. In addition, all wood placed on the market in packs shall also bear a label stating “Wear gloves when handling this wood. Wear a dust mask and eye protection when cutting or otherwise crafting this wood. Waste from this wood shall be treated as hazardous by an authorised undertaking”. d) Treated wood referred to under point a) shall not be used: — in residential or domestic constructions, whatever the purpose, — in any application where there is a risk of repeated skin contact, — in marine waters, — for agricultural purposes other than for livestock fence posts and structural uses in accordance with point (b), — in any application where the treated wood may come into contact with intermediate or finished products intended for human and/or animal consumption. 5. Wood treated with arsenic compounds that was in use in the Community before 30 September 2007, or that was placed on the market in accordance with paragraph 4 may remain in place and continue to be used until it reaches the end of its service life. 6. Wood treated with CCA type C that was in use in the Community before 30 September 2007, or that was placed on the market in accordance with paragraph 4: — may be used or reused subject to the conditions pertaining to its use listed under

		points 4(b), (c) and (d), — may be placed on the market subject to the conditions pertaining to its use listed under points 4(b), (c) and (d). 7. Member States may allow wood treated with other types of CCA solutions that was in use in the Community before 30 September 2007: — to be used or reused subject to the conditions pertaining to its use listed under points 4 (b), (c) and (d), — to be placed on the market subject to the conditions pertaining to its use listed under points 4(b), (c) and (d).
· cadmium (non-pyrophoric) · cadmium oxide (non-pyrophoric) · cadmium sulphate	Cadmium and its compounds	For the purpose of this entry, the codes and chapters indicated in square brackets are the codes and chapters of the tariff and statistical nomenclature of Common Customs Tariff as established by Council Regulation (EEC) No 2658/87 (OJ L 256, 7.9.1987, p. 42). 1. Shall not be used in mixtures and articles produced from synthetic organic polymers (hereafter referred to as plastic material) such as: — polymers or copolymers of vinyl chloride (PVC) [3904 10] [3904 21] — polyurethane (PUR) [3909 50] — low-density polyethylene (LDPE), with the exception of low-density polyethylene used for the production of coloured masterbatch [3901 10] — cellulose acetate (CA) [3912 11] — cellulose acetate butyrate (CAB) [3912 11] — epoxy resins [3907 30] — melamine-formaldehyde (MF) resins [3909 20] — urea-formaldehyde (UF) resins [3909 10] — unsaturated polyesters (UP) [3907 91] — polyethylene terephthalate (PET) [3907 60] — polybutylene terephthalate (PBT) — transparent/general-purpose polystyrene [3903 11] — acrylonitrile methylmethacrylate (AMMA) — cross-linked polyethylene (VPE) — high-impact polystyrene — polypropylene (PP) [3902 10] — high-density polyethylene (HDPE) [3901 20] — acrylonitrile butadiene styrene (ABS) [3903 30] — poly(methyl methacrylate) (PMMA) [3906 10]. Mixtures and articles produced from plastic material shall not be placed on the market if the concentration of cadmium (expressed as Cd metal) is equal to or greater than 0,01 % by weight of the plastic material. By way of derogation, the second subparagraph shall not apply to articles placed on the market before 10 December 2011. The first and second subparagraphs apply without prejudice to Council Directive 94/62/EC (OJ L 365, 31.12.1994, p. 10) and acts adopted on its basis. By 19 November 2012, in accordance with Article 69, the Commission shall ask the European Chemicals Agency to prepare a dossier conforming to the requirements of Annex XV in order to assess whether the use of cadmium and its compounds in plastic material, other than that listed in subparagraph 1, should be restricted. 2. Shall not be used or placed on the market in paints with codes [3208] [3209] in a concentration (expressed as Cd metal) equal to or greater than 0,01 % by weight. For paints with codes [3208] [3209] with a zinc content exceeding 10 % by weight of the paint, the concentration of cadmium (expressed as Cd metal) shall not be equal to or greater than 0,1 % by weight. Painted articles shall not be placed on the market if the concentration of cadmium (expressed as Cd metal) is equal to or greater than 0,1 % by weight of the paint on the painted article. 3. By way of derogation, paragraphs 1 and 2 shall not apply to articles coloured with mixtures containing cadmium for safety reasons. 4. By way of derogation, paragraph 1, second subparagraph shall not apply to: — mixtures produced from PVC waste, hereinafter referred to as “recovered PVC”, — mixtures and articles containing recovered PVC if their concentration of cadmium (expressed as Cd metal) does not exceed 0,1 % by weight of the plastic material in the following rigid PVC applications: (a) profiles and rigid sheets for building applications; (b) doors, windows, shutters, walls, blinds, fences, and roof gutters; (c) decks and terraces; (d) cable ducts; (e) pipes for non-drinking water if the recovered PVC is used in the middle layer of a multilayer pipe and is entirely covered with a layer of newly produced PVC in compliance with paragraph 1 above. Suppliers shall ensure, before the placing on the market of mixtures and articles containing recovered PVC for the first time, that these are visibly, legibly and indelibly marked as follows: “Contains recovered PVC” or with the following pictogram: Pictogram recovered PVC In accordance with Article 69 of this Regulation, the derogation granted in paragraph 4 will be reviewed, in particular with a view to reducing the limit value for cadmium and to reassess the derogation for the applications listed in points (a) to (e), by 31 December 2017. 5. For the purpose of this entry, “cadmium plating” means any deposit or coating of metallic cadmium on a metallic surface. Shall not be used for cadmium plating metallic articles or components of the articles used in the following sectors/applications: a) equipment and machinery for: — food production [8210] [8417 20] [8419 81] [8421 11] [8421 22] [8422] [8435] [8437] [8438] [8476 11] — agriculture [8419 31] [8424 81] [8432] [8433] [8434] [8436] — cooling and freezing [8418] — printing and book-binding [8440] [8442] [8443] (b) equipment and machinery for the production of: — household goods [7321] [8421 12] [8450] [8509] [8516]

		— furniture [8465] [8466] [9401] [9402] [9403] [9404] — sanitary ware [7324] — central heating and air conditioning plant [7322] [8403] [8404] [8415] In any case, whatever their use or intended final purpose, the placing on the market of cadmium-plated articles or components of such articles used in the sectors/applications listed in points (a) and (b) above and of articles manufactured in the sectors listed in point (b) above is prohibited. 6. The provisions referred to in paragraph 5 shall also be applicable to cadmium-plated articles or components of such articles when used in the sectors/applications listed in points (a) and (b) below and to articles manufactured in the sectors listed in (b) below: (a) equipment and machinery for the production of: — paper and board [8419 32] [8439] [8441] textiles and clothing [8444] [8445] [8447] [8448] [8449] [8451] [8452] (b) equipment and machinery for the production of: — industrial handling equipment and machinery [8425] [8426] [8427] [8428] [8429] [8430] [8431] — road and agricultural vehicles [chapter 87] — rolling stock [chapter 86] — vessels [chapter 89]. 7. However, the restrictions in paragraphs 5 and 6 shall not apply to: — articles and components of the articles used in the aeronautical, aerospace, mining, offshore and nuclear sectors whose applications require high safety standards and in safety devices in road and agricultural vehicles, rolling stock and vessels, — electrical contacts in any sector of use, where that is necessary to ensure the reliability required of the apparatus on which they are installed. 8. Shall not be used in brazing fillers in concentration equal to or greater than 0,01 % by weight. Brazing fillers shall not be placed on the market if the concentration of cadmium (expressed as Cd metal) is equal to or greater than 0,01 % by weight. For the purpose of this paragraph brazing shall mean a joining technique using alloys and undertaken at temperatures above 450 °C. 9. By way of derogation, paragraph 8 shall not apply to brazing fillers used in defence and aerospace applications and to brazing fillers used for safety reasons. 10. Shall not be used or placed on the market if the concentration is equal to or greater than 0,01 % by weight of the metal in: (i) metal beads and other metal components for jewellery making; (ii) metal parts of jewellery and imitation jewellery articles and hair accessories, including: — bracelets, necklaces and rings, — piercing jewellery, — wrist-watches and wrist-wear, — brooches and cufflinks. 11. By way of derogation, paragraph 10 shall not apply to articles placed on the market before 10 December 2011 and jewellery more than 50 years old on 10 December 2011
· nickel · nickel monoxide	Nickel and its compounds	1. Shall not be used: (a) in any post assemblies which are inserted into pierced ears and other pierced parts of the human body unless the rate of nickel release from such post assemblies is less than 0,2 µg/cm 2 /week (migration limit); (b) in articles intended to come into direct and prolonged contact with the skin such as: — earrings, — necklaces, bracelets and chains, anklets, finger rings, — wrist-watch cases, watch straps and tighteners, — rivet buttons, tighteners, rivets, zippers and metal marks, when these are used in garments, if the rate of nickel release from the parts of these articles coming into direct and prolonged contact with the skin is greater than 0,5 µg/cm 2 / week. (c) in articles referred to in point (b) where these have a non-nickel coating unless such coating is sufficient to ensure that the rate of nickel release from those parts of such articles coming into direct and prolonged contact with the skin will not exceed 0,5 µg/cm 2 / week for a period of at least two years of normal use of the article. 2. Articles which are the subject of paragraph 1 shall not be placed on the market unless they conform to the requirements set out in that paragraph. 3. The standards adopted by the European Committee for Standardisation (CEN) shall be used as the test methods for demonstrating the conformity of articles to paragraphs 1 and 2. Titles and references of harmonised standards under entry 27 of Annex XVII to REACH (see Commission communication (EU) No 2017/C 011/02)
· cadmium (non-pyrophoric) · cadmium oxide (non-pyrophoric) · cadmium sulphate · cobalt · nickel monoxide	Substances which are classified as carcinogen category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and are listed in Appendix 1 or Appendix 2, respectively.	Without prejudice to the other parts of this Annex the following shall apply to entries 28 to 30: 1. Shall not be placed on the market, or used, — as substances, — as constituents of other substances, or, — in mixtures, for supply to the general public when the individual concentration in the substance or mixture is equal to or greater than: — either the relevant specific concentration limit specified in Part 3 of Annex VI to Regulation (EC) No 1272/2008, or, — the relevant generic concentration limit specified in Part 3 of Annex I of Regulation (EC) No 1272/2008. Without prejudice to the implementation of other Community provisions relating to the classification, packaging and labelling of substances and mixtures, suppliers shall ensure before the placing on the market that the packaging of such substances and mixtures is marked visibly, legibly and indelibly as follows: “Restricted to professional users”. 2. By way of derogation, paragraph 1 shall not apply to: (a) medicinal or veterinary products as defined by Directive 2001/82/EC and Directive 2001/83/EC; (b) cosmetic products as defined by Directive 76/768/EEC;

		(c) the following fuels and oil products: — motor fuels which are covered by Directive 98/70/EC, — mineral oil products intended for use as fuel in mobile or fixed combustion plants, — fuels sold in closed systems (e.g. liquid gas bottles); (d) artists' paints covered by Regulation (EC) No 1272/2008; (e) the substances listed in Appendix 11, column 1, for the applications or uses listed in Appendix 11, column 2. Where a date is specified in column 2 of Appendix 11, the derogation shall apply until the said date; (f) devices covered by Regulation (EU) 2017/745.
· cadmium sulphate	Substances which are classified as germ cell mutagen category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and are listed in Appendix 3 or Appendix 4, respectively.	Without prejudice to the other parts of this Annex the following shall apply to entries 28 to 30: 1. Shall not be placed on the market, or used, — as substances, — as constituents of other substances, or, — in mixtures, for supply to the general public when the individual concentration in the substance or mixture is equal to or greater than: — either the relevant specific concentration limit specified in Part 3 of Annex VI to Regulation (EC) No 1272/2008, or, — the relevant generic concentration limit specified in Part 3 of Annex I of Regulation (EC) No 1272/2008. Without prejudice to the implementation of other Community provisions relating to the classification, packaging and labelling of substances and mixtures, suppliers shall ensure before the placing on the market that the packaging of such substances and mixtures is marked visibly, legibly and indelibly as follows: "Restricted to professional users". 2. By way of derogation, paragraph 1 shall not apply to: (a) medicinal or veterinary products as defined by Directive 2001/82/EC and Directive 2001/83/EC; (b) cosmetic products as defined by Directive 76/768/EEC; (c) the following fuels and oil products: — motor fuels which are covered by Directive 98/70/EC, — mineral oil products intended for use as fuel in mobile or fixed combustion plants, — fuels sold in closed systems (e.g. liquid gas bottles); (d) artists' paints covered by Regulation (EC) No 1272/2008; (e) the substances listed in Appendix 11, column 1, for the applications or uses listed in Appendix 11, column 2. Where a date is specified in column 2 of Appendix 11, the derogation shall apply until the said date; (f) devices covered by Regulation (EU) 2017/745.
· cadmium sulphate · cobalt · lead(II)sulphate	Substances which are classified as reproductive toxicant category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and are listed in Appendix 5 or Appendix 6, respectively.	Without prejudice to the other parts of this Annex the following shall apply to entries 28 to 30: 1. Shall not be placed on the market, or used, — as substances, — as constituents of other substances, or, — in mixtures, for supply to the general public when the individual concentration in the substance or mixture is equal to or greater than: — either the relevant specific concentration limit specified in Part 3 of Annex VI to Regulation (EC) No 1272/2008, or, — the relevant generic concentration limit specified in Part 3 of Annex I of Regulation (EC) No 1272/2008. Without prejudice to the implementation of other Community provisions relating to the classification, packaging and labelling of substances and mixtures, suppliers shall ensure before the placing on the market that the packaging of such substances and mixtures is marked visibly, legibly and indelibly as follows: "Restricted to professional users". 2. By way of derogation, paragraph 1 shall not apply to: (a) medicinal or veterinary products as defined by Directive 2001/82/EC and Directive 2001/83/EC; (b) cosmetic products as defined by Directive 76/768/EEC; (c) the following fuels and oil products: — motor fuels which are covered by Directive 98/70/EC, — mineral oil products intended for use as fuel in mobile or fixed combustion plants, — fuels sold in closed systems (e.g. liquid gas bottles); (d) artists' paints covered by Regulation (EC) No 1272/2008; (e) the substances listed in Appendix 11, column 1, for the applications or uses listed in Appendix 11, column 2. Where a date is specified in column 2 of Appendix 11, the derogation shall apply until the said date; (f) devices covered by Regulation (EU) 2017/745.
· lead(II)sulphate	Lead and its compounds	1. Shall not be placed on the market or used in any individual part of jewellery articles if the concentration of lead (expressed as metal) in such a part is equal to or greater than 0,05 % by weight. 2. For the purposes of paragraph 1: (i) "jewellery articles" shall include jewellery and imitation jewellery articles and hair accessories, including: (a) bracelets, necklaces and rings; (b) piercing jewellery; (c) wrist watches and wrist-wear; (d) brooches and cufflinks; (ii) "any individual part" shall include the materials from which the jewellery is made, as well as the individual components of the jewellery articles. 3. Paragraph 1 shall also apply to individual parts when placed on the market or used for jewellery-making. 4. By way of derogation, paragraph 1 shall not apply to: (a) crystal glass as defined in Annex I (categories 1, 2, 3 and 4) to Council Directive 69/493/EEC (*); (b) internal components of watch timepieces inaccessible to consumers;

			(c) non-synthetic or reconstructed precious and semiprecious stones (CN code 7103, as established by Regulation (EEC) No 2658/87), unless they have been treated with lead or its compounds or mixtures containing these substances; (d) enamels, defined as vitrifiable mixtures resulting from the fusion, vitrification or sintering of minerals melted at a temperature of at least 500 °C. (*) OJ L 326, 29.12.1969, p. 36. 5. By way of derogation, paragraph 1 shall not apply to jewellery articles placed on the market for the first time before 9 October 2013 and jewellery articles produced before 10 December 1961. 6. By 9 October 2017, the Commission shall re-evaluate paragraphs 1 to 5 of this entry in the light of new scientific information, including the availability of alternatives and the migration of lead from the articles referred to in paragraph 1 and, if appropriate, modify this entry accordingly. 7. Shall not be placed on the market or used in articles supplied to the general public, if the concentration of lead (expressed as metal) in those articles or accessible parts thereof is equal to or greater than 0,05 % by weight, and those articles or accessible parts thereof may, during normal or reasonably foreseeable conditions of use, be placed in the mouth by children. That limit shall not apply where it can be demonstrated that the rate of lead release from such an article or any such accessible part of an article, whether coated or uncoated, does not exceed 0,05 µg/cm2 per hour (equivalent to 0,05 µg/g/h), and, for coated articles, that the coating is sufficient to ensure that this release rate is not exceeded for a period of at least two years of normal or reasonably foreseeable conditions of use of the article. For the purposes of this paragraph, it is considered that an article or accessible part of an article may be placed in the mouth by children if it is smaller than 5 cm in one dimension or has a detachable or protruding part of that size. 8. By way of derogation, paragraph 7 shall not apply to: (a) jewellery articles covered by paragraph 1; (b) crystal glass as defined in Annex I (categories 1, 2, 3 and 4) to Directive 69/493/EEC; (c) non-synthetic or reconstructed precious and semi-precious stones (CN code 7103 as established by Regulation (EEC) No 2658/87) unless they have been treated with lead or its compounds or mixtures containing these substances; (d) enamels, defined as vitrifiable mixtures resulting from the fusion, vitrification or sintering of mineral melted at a temperature of at least 500 °C; (e) keys and locks, including padlocks; (f) musical instruments; (g) articles and parts of articles comprising brass alloys, if the concentration of lead (expressed as metal) in the brass alloy does not exceed 0,5 % by weight; (h) the tips of writing instruments; (i) religious articles; (j) portable zinc-carbon batteries and button cell batteries; (k) articles within the scope of: (i) Directive 94/62/EC; (ii) Regulation (EC) No 1935/2004; (iii) Directive 2009/48/EC of the European Parliament and of the Council (*); (iv) Directive 2011/65/EU of the European Parliament and of the Council (**) 9. By 1 July 2019, the Commission shall re-evaluate paragraphs 7 and 8(e), (f), (i) and (j) of this entry in the light of new scientific information, including the availability of alternatives and the migration of lead from the articles referred to in paragraph 7, including the requirement on coating integrity, and, if appropriate, modify this entry accordingly. 10. By way of derogation paragraph 7 shall not apply to articles placed on the market for the first time before 1 June 2016. (*) Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys (OJ L 170, 30.6.2009, p. 1). (**) Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (OJ L 174, 1.7.2011, p. 88). 11. Doing either of the following acts after 15 February 2023 in or within 100 metres of wetlands is prohibited: (a) discharging gunshot containing a concentration of lead (expressed as metal) equal to or greater than 1 % by weight; (b) carrying any such gunshot where this occurs while out wetland shooting or as part of going wetland shooting. For the purposes of the first subparagraph: (a) “within 100 metres of wetlands” means within 100 metres outward from any outer boundary point of a wetland; (b) “wetland shooting” means shooting in or within 100 metres of wetlands; (c) if a person is found carrying gunshot in or within 100 metres of wetlands while out shooting or as part of going shooting, the shooting concerned shall be presumed to be wetland shooting unless that person can demonstrate that it was some other type of shooting. The restriction laid down in the first subparagraph shall not apply in a Member State if that Member State notifies the Commission in accordance with paragraph 12 that it intends to make use of the option granted by that paragraph. 12. If at least 20 % in total of the territory, excluding the territorial waters, of a Member State are wetlands, that Member State may, in place of the restriction laid down in the first subparagraph of paragraph 11, prohibit the following acts throughout the whole of its territory from 15 February 2024: (a) the placing on the market of gunshot containing a concentration of lead (expressed as metal) equal to or greater than 1 % by weight; (b) the discharging of any such gunshot; (c) carrying any such gunshot while out shooting or as part of going shooting. Any Member State intending to make use of the option granted by the first subparagraph

		shall notify the Commission of this intention by 15 August 2021. The Member State shall communicate the text of the national measures adopted by it to the Commission without delay and in any event by 15 August 2023. The Commission shall make publicly available without delay any such notices of intention and texts of national measures received by it. 13. For the purposes of paragraphs 11 and 12: (a) “wetlands” means areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 metres; (b) “gunshot” means pellets used or intended for use in a single charge or cartridge in a shotgun; (c) “shotgun” means a smooth-bore gun, excluding airguns; (d) “shooting” means any shooting with a shotgun; (e) “carrying” means any carrying on the person or carrying or transporting by any other means; (f) in determining whether a person found with gunshot is carrying gunshot “as part of going shooting”: (i) regard shall be had to all the circumstances of the case; (ii) the person found with the gunshot need not necessarily be the same person as the person shooting. 14. Member States may maintain national provisions for protection of the environment or human health in force on 15 February 2021 and restricting lead in gunshot more severely than provided for in paragraph 11. The Member State shall communicate the text of those national provisions to the Commission without delay. The Commission shall make publicly available without delay any such texts of national provisions received by it.
· cadmium (non-pyrophoric) · cadmium oxide (non-pyrophoric) · cadmium sulphate	The substances listed in column 1 of the Table in Appendix 12	1. Shall not be placed on the market after 1 November 2020 in any of the following: (a) clothing or related accessories; (b) textiles other than clothing which, under normal or reasonably foreseeable conditions of use, come into contact with human skin to an extent similar to clothing; (c) footwear; if the clothing, related accessory, textile other than clothing or footwear is for use by consumers and the substance is present in a concentration, measured in homogeneous material, equal to or greater than that specified for that substance in Appendix 12. 2. By way of derogation, in relation to the placing on the market of formaldehyde [CAS No 50-00-0] in jackets, coats or upholstery, the relevant concentration for the purposes of paragraph 1 shall be 300 mg/kg during the period between 1 November 2020 and 1 November 2023. The concentration specified in Appendix 12 shall apply thereafter. 3. Paragraph 1 shall not apply to: (a) clothing, related accessories or footwear, or parts of clothing, related accessories or footwear, made exclusively of natural leather, fur or hide; (b) non-textile fasteners and non-textile decorative attachments; (c) second-hand clothing, related accessories, textiles other than clothing or footwear (d) wall-to-wall carpets and textile floor coverings for indoor use, rugs and runners. 4. Paragraph 1 shall not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 of the European Parliament and of the Council (*) or Regulation (EU) 2017/745 of the European Parliament and of the Council (**). 5. Paragraph 1(b) shall not apply to disposable textiles. ‘Disposable textiles’ means textiles that are designed to be used only once or for a limited time and are not intended for subsequent use for the same or a similar purpose. 6. Paragraphs 1 and 2 shall apply without prejudice to the application of any stricter restrictions set out in this Annex or in other applicable Union legislation. 7. The Commission shall review the exemption in paragraph 3(d) and, if appropriate, modify that point accordingly. (*) Regulation (EU) 2016/425 of the European Parliament and of the Council of of 9 March 2016 on personal protective equipment and repealing Council Directive 89/686/EEC (OJ L 81, 31.3.2016, p. 51). (**) Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (OJ L 117, 5.5.2017, p. 1).
· lead(II)sulphate	The substances listed in column 1 of the Table in Appendix 12	1. Shall not be placed on the market after 1 November 2020 in any of the following: (a) clothing or related accessories; (b) textiles other than clothing which, under normal or reasonably foreseeable conditions of use, come into contact with human skin to an extent similar to clothing; (c) footwear; if the clothing, related accessory, textile other than clothing or footwear is for use by consumers and the substance is present in a concentration, measured in homogeneous material, equal to or greater than that specified for that substance in Appendix 12. 2. By way of derogation, in relation to the placing on the market of formaldehyde [CAS No 50-00-0] in jackets, coats or upholstery, the relevant concentration for the purposes of paragraph 1 shall be 300 mg/kg during the period between 1 November 2020 and 1 November 2023. The concentration specified in Appendix 12 shall apply thereafter. 3. Paragraph 1 shall not apply to: (a) clothing, related accessories or footwear, or parts of clothing, related accessories or footwear, made exclusively of natural leather, fur or hide; (b) non-textile fasteners and non-textile decorative attachments; (c) second-hand clothing, related accessories, textiles other than clothing or footwear (d) wall-to-wall carpets and textile floor coverings for indoor use, rugs and runners. 4. Paragraph 1 shall not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 of the European Parliament and of the Council (*) or Regulation (EU) 2017/745 of the European Parliament and of the Council (**). 5. Paragraph 1(b) shall not apply to disposable textiles. ‘Disposable textiles’ means textiles that are designed to be used only once or for a limited time and are not intended

		for subsequent use for the same or a similar purpose. 6. Paragraphs 1 and 2 shall apply without prejudice to the application of any stricter restrictions set out in this Annex or in other applicable Union legislation. 7. The Commission shall review the exemption in paragraph 3(d) and, if appropriate, modify that point accordingly. (*) Regulation (EU) 2016/425 of the European Parliament and of the Council of of 9 March 2016 on personal protective equipment and repealing Council Directive 89/686/EEC (OJ L 81, 31.3.2016, p. 51). (**) Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (OJ L 117, 5.5.2017, p. 1).
· cadmium oxide (non-pyrophoric) · cadmium sulphate · cobalt oxide · copper sulphate · nickel monoxide · zinc sulphate (anhydrous)	Substances falling within one or more of the following points: (a) substances classified as any of the following in Part 3 of Annex VI to Regulation (EC) No 1272/2008: — carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, but excluding any such substances classified due to effects only following exposure by inhalation — reproductive toxicant category 1A, 1B or 2 but excluding any such substances classified due to effects only following exposure by inhalation — skin sensitiser category 1, 1A or 1B — skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2 — serious eye damage category 1 or eye irritant category 2 (b) substances listed in Annex II to Regulation (EC) No 1223/2009 of the European Parliament and of the Council (c) substances listed in Annex IV to Regulation (EC) No 1223/2009 for which a condition is specified in at least one of the columns g, h and i of the table in that Annex (d) substances listed in Appendix 13 to this Annex. The ancillary requirements in paragraphs 7 and 8 of column 2 of this entry apply to all mixtures for use for tattooing purposes, whether or not they contain a substance falling within points (a) to (d) of this column of this entry.	Mixtures for tattooing purposes are subject to the restrictions of Regulation (EU) 2020/2081
· nickel	Substances falling within one or more of the following points: (a) substances classified as any of the following in Part 3 of Annex VI to Regulation (EC) No 1272/2008: — carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, but excluding any such substances classified due to effects only following exposure by inhalation — reproductive toxicant category 1A, 1B or 2 but excluding any such substances classified due to effects only following exposure by inhalation — skin sensitiser category 1, 1A or 1B — skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2 — serious eye damage category 1 or eye irritant category 2 (b) substances listed in Annex II to Regulation (EC) No 1223/2009 of the European Parliament and of the Council (c) substances listed in Annex IV to Regulation (EC) No 1223/2009 for which a condition is specified in at least one of the columns g, h and i of the table in that Annex (d) substances listed in Appendix 13 to this Annex. The ancillary requirements in paragraphs 7 and 8 of column 2 of this entry apply to all mixtures for use for tattooing purposes, whether or not they contain a substance falling within points (a) to (d) of this column of this entry.	Mixtures for tattooing purposes are subject to the restrictions of Regulation (EU) 2020/2081
· cadmium (non-pyrophoric)	Substances falling within one or more of the following points: (a) substances classified as any of the following in Part 3 of Annex VI to Regulation (EC) No 1272/2008:	Mixtures for tattooing purposes are subject to the restrictions of Regulation (EU) 2020/2081

	— carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, but excluding any such substances classified due to effects only following exposure by inhalation — reproductive toxicant category 1A, 1B or 2 but excluding any such substances classified due to effects only following exposure by inhalation — skin sensitiser category 1, 1A or 1B — skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2 — serious eye damage category 1 or eye irritant category 2 (b) substances listed in Annex II to Regulation (EC) No 1223/2009 of the European Parliament and of the Council (c) substances listed in Annex IV to Regulation (EC) No 1223/2009 for which a condition is specified in at least one of the columns g, h and i of the table in that Annex (d) substances listed in Appendix 13 to this Annex. The ancillary requirements in paragraphs 7 and 8 of column 2 of this entry apply to all mixtures for use for tattooing purposes, whether or not they contain a substance falling within points (a) to (d) of this column of this entry.	
· cobalt	Substances falling within one or more of the following points: (a) substances classified as any of the following in Part 3 of Annex VI to Regulation (EC) No 1272/2008: — carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, but excluding any such substances classified due to effects only following exposure by inhalation — reproductive toxicant category 1A, 1B or 2 but excluding any such substances classified due to effects only following exposure by inhalation — skin sensitiser category 1, 1A or 1B — skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2 — serious eye damage category 1 or eye irritant category 2 (b) substances listed in Annex II to Regulation (EC) No 1223/2009 of the European Parliament and of the Council (c) substances listed in Annex IV to Regulation (EC) No 1223/2009 for which a condition is specified in at least one of the columns g, h and i of the table in that Annex (d) substances listed in Appendix 13 to this Annex. The ancillary requirements in paragraphs 7 and 8 of column 2 of this entry apply to all mixtures for use for tattooing purposes, whether or not they contain a substance falling within points (a) to (d) of this column of this entry.	Mixtures for tattooing purposes are subject to the restrictions of Regulation (EU) 2020/2081
· copper	Substances falling within one or more of the following points: (a) substances classified as any of the following in Part 3 of Annex VI to Regulation (EC) No 1272/2008: — carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, but excluding any such substances classified due to effects only following exposure by inhalation — reproductive toxicant category 1A, 1B or 2 but excluding any such substances classified due to effects only following exposure by inhalation — skin sensitiser category 1, 1A or 1B — skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2 — serious eye damage category 1 or eye irritant category 2 (b) substances listed in Annex II to Regulation (EC) No 1223/2009 of the European Parliament and of the Council	Mixtures for tattooing purposes are subject to the restrictions of Regulation (EU) 2020/2081

	(c) substances listed in Annex IV to Regulation (EC) No 1223/2009 for which a condition is specified in at least one of the columns g, h and i of the table in that Annex (d) substances listed in Appendix 13 to this Annex. The ancillary requirements in paragraphs 7 and 8 of column 2 of this entry apply to all mixtures for use for tattooing purposes, whether or not they contain a substance falling within points (a) to (d) of this column of this entry.	
· zinc	Substances falling within one or more of the following points: (a) substances classified as any of the following in Part 3 of Annex VI to Regulation (EC) No 1272/2008: — carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, but excluding any such substances classified due to effects only following exposure by inhalation — reproductive toxicant category 1A, 1B or 2 but excluding any such substances classified due to effects only following exposure by inhalation — skin sensitiser category 1, 1A or 1B — skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2 — serious eye damage category 1 or eye irritant category 2 (b) substances listed in Annex II to Regulation (EC) No 1223/2009 of the European Parliament and of the Council (c) substances listed in Annex IV to Regulation (EC) No 1223/2009 for which a condition is specified in at least one of the columns g, h and i of the table in that Annex (d) substances listed in Appendix 13 to this Annex. The ancillary requirements in paragraphs 7 and 8 of column 2 of this entry apply to all mixtures for use for tattooing purposes, whether or not they contain a substance falling within points (a) to (d) of this column of this entry.	Mixtures for tattooing purposes are subject to the restrictions of Regulation (EU) 2020/2081

National legislation Belgium

Copper Chloride

Agents cancérigènes, mutagènes et reprotoxiques (Code du bien-être au travail, Livre VI, titre 2)	cancérigène catégorie 1A ou 1B selon CLP, n.s.a.
	mutagène catégorie 1A ou 1B selon CLP, n.s.a.
	reprotoxique catégorie 1A ou 1B selon CLP, n.s.a.

tricopper arsenide

Additional classification	Arsenic, acide arsénique et ses sels, ainsi que ses composés inorganiques (en As); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.

cadmium (non-pyrophoric)

Additional classification	Cadmium et ses composés (particules alvéolaires) (en Cd); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.
	Cadmium et ses composés (particules inhalables) (en Cd); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.
	Cadmium et ses composés (particules inhalables) (en Cd); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.
Agents cancérigènes, mutagènes et reprotoxiques (Code du bien-être au travail, Livre VI, titre 2)	cancérigène catégorie 1A ou 1B selon CLP, n.s.a.

cadmium oxide (non-pyrophoric)

Additional classification	Cadmium et ses composés (particules alvéolaires) (en Cd); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.
	Cadmium et ses composés (particules inhalables) (en Cd); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.
	Cadmium et ses composés (particules inhalables) (en Cd); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.
Agents cancérigènes, mutagènes et reprotoxiques (Code du bien-être au travail, Livre VI, titre 2)	cancérigène catégorie 1A ou 1B selon CLP, n.s.a.

cadmium sulphate

Additional classification	Cadmium et ses composés (particules alvéolaires) (en Cd); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.
	Cadmium et ses composés (particules inhalables) (en Cd); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.
	Cadmium et ses composés (particules inhalables) (en Cd); C; La mention “C” signifie que l’agent en question relève du champ d’application de l’arrêté royal du 2 décembre 1993 concernant la protection des travailleurs contre les risques liés à l’exposition à des agents cancérigènes et mutagènes et reprotoxiques au travail.
Agents cancérigènes, mutagènes et reprotoxiques (Code du bien-être au travail, Livre VI, titre 2)	cancérigène catégorie 1A ou 1B selon CLP, n.s.a.
	mutagène catégorie 1A ou 1B selon CLP, n.s.a.
	reprotoxique catégorie 1A ou 1B selon CLP, n.s.a.

cobalt

Agents cancérigènes, mutagènes et reprotoxiques (Code du bien-être au travail, Livre VI, titre 2)	Cobalt et ses composés; VI.2.3.; Liste non limitative de substances, mélanges et procédés visés à l’article VI.2-1, alinéa 3

nickel

Agents cancérigènes, mutagènes et reprotoxiques (Code du bien-être au travail, Livre VI, titre 2)	Nickel; VI.2.3.; Liste non limitative de substances, mélanges et procédés visés à l’article VI.2-1, alinéa 3

nickel monoxide

Agents cancérigènes, mutagènes et reprotoxiques (Code du bien-être au travail, Livre VI, titre 2)	cancérigène catégorie 1A ou 1B selon CLP, n.s.a.

lead(II)sulphate

Agents cancérigènes, mutagènes et reprotoxiques (Code du bien-être au travail, Livre VI, titre 2)	reprotoxique catégorie 1A ou 1B selon CLP, n.s.a.
	Plomb et ses composés inorganiques; VI.2.3.; Liste non limitative de substances, mélanges et procédés visés à l’article VI.2-1, alinéa 3

antimony trioxide

Agents cancérigènes, mutagènes et reprotoxiques (Code du bien-être au travail, Livre VI, titre 2)	Antimoine (trioxyde de di-); VI.2.3.; Liste non limitative de substances, mélanges et procédés visés à l’article VI.2-1, alinéa 3

National legislation The Netherlands

Copper Chloride

Waterbezwaarlijkheid	Z (1); Algemene Beoordelingsmethodiek (ABM)

tricopper arsenide

SZW - Lijst van kankerverwekkende stoffen	anorganische arseen verbindingen; Listed in SZW-list of carcinogenic substances

cadmium (non-pyrophoric)

SZW - Lijst van kankerverwekkende stoffen	Cadmium, zowel gestabiliseerd als pyrofoor; Listed in SZW-list of carcinogenic substances
SZW - Lijst van voor de voortplanting giftige stoffen (ontwikkeling)	Cadmium, zowel gestabiliseerd als pyrofoor; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (ontwikkeling); 2
SZW - Lijst van voor de voortplanting giftige stoffen (vruchtbaarheid)	Cadmium, zowel gestabiliseerd als pyrofoor; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (vruchtbaarheid); 2
SZW - Lijst van voor de voortplanting giftige stoffen (borstvoeding)	Cadmium, zowel gestabiliseerd als pyrofoor; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (borstvoeding)

cadmium oxide (non-pyrophoric)

SZW - Lijst van kankerverwekkende stoffen	Cadmiumoxide, gestabiliseerd; Listed in SZW-list of carcinogenic substances
SZW - Lijst van voor de voortplanting giftige stoffen (ontwikkeling)	cadmiumoxide; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (ontwikkeling); 1B
SZW - Lijst van voor de voortplanting giftige stoffen (vruchtbaarheid)	cadmiumoxide; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (vruchtbaarheid); 1B
SZW - Lijst van voor de voortplanting giftige stoffen (borstvoeding)	cadmiumoxide; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (borstvoeding)

cadmium sulphate

SZW - Lijst van kankerverwekkende stoffen	Cadmiumsulfaat; Listed in SZW-list of carcinogenic substances
SZW - Lijst van mutagene stoffen	Cadmiumsulfaat; Listed in SZW-list of mutagenic substances
SZW - Lijst van voor de voortplanting giftige stoffen (ontwikkeling)	Cadmiumsulfaat; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (ontwikkeling); 1B
SZW - Lijst van voor de voortplanting giftige stoffen (vruchtbaarheid)	Cadmiumsulfaat; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (vruchtbaarheid); 1B

cobalt

SZW - Lijst van kankerverwekkende stoffen	kobalt; Listed in SZW-list of carcinogenic substances
SZW - Lijst van voor de voortplanting giftige stoffen (vruchtbaarheid)	kobalt; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (vruchtbaarheid); 1B

nickel monoxide

SZW - Lijst van kankerverwekkende stoffen	nikkelmonoxide; Listed in SZW-list of carcinogenic substances

lead(II)sulphate

SZW - Lijst van voor de voortplanting giftige stoffen (ontwikkeling)	loodverbindingen, alle; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (ontwikkeling); 1A
SZW - Lijst van voor de voortplanting giftige stoffen (vruchtbaarheid)	loodverbindingen, alle; Opgenomen in SZW-lijst van voor de voortplanting giftige stoffen (vruchtbaarheid); 2

National legislation France

Copper Chloride

No data available

cadmium (non-pyrophoric)

Catégorie cancérogène	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
Catégorie mutagène	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
Catégorie toxique pour la reproduction	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)

cadmium oxide (non-pyrophoric)

Catégorie cancérogène	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
Catégorie mutagène	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
Catégorie toxique pour la reproduction	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)

cadmium sulphate

Catégorie cancérogène	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
Catégorie mutagène	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
Catégorie toxique pour la reproduction	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)
	Cadmium et ses composés inorganiques (fraction inhalable ou alvéolaire)

nickel

Catégorie cancérogène	Nickel (métal); C2

nickel monoxide

Catégorie cancérogène	Nickel (oxyde de), en Ni; C1A

lead(II)sulphate

Catégorie cancérogène	Plomb métallique et composés, en Pb
Catégorie toxique pour la reproduction	Plomb métallique et composés, en Pb

antimony trioxide

Catégorie cancérogène	Antimoine et ses composés, en Sb

National legislation Germany

Copper Chloride

WGK	3; Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (AwSV) - 18. April 2017

tricopper arsenide

TA-Luft	5.2.7.1.1/I

calcium sulfate, dihydrate

TA-Luft	5.2.1

cadmium (non-pyrophoric)

TA-Luft	5.2.7.1.1/I
TRGS905 - Krebserzeugend	Cadmium-Verbindungen (in Form atembarer Stäube/Aerosole), ausgenommen: die nachfolgend genannten sowie, die in Anhang VI Teil 3 der CLP-Verordnung namentlich aufgeführten, soweit sie "geringer eingestuft" sind; 1B
TRGS900 - Kanzerogener Stoff	Cadmium und anorganische Cadmium Verbindungen

cadmium oxide (non-pyrophoric)

TRGS900 - Kanzerogener Stoff	Cadmium und anorganische Cadmium Verbindungen

cadmium sulphate

TA-Luft	5.2.7.1.1/I
TRGS905 - Krebserzeugend	Cadmium-Verbindungen (in Form atembarer Stäube/Aerosole), ausgenommen: die nachfolgend genannten sowie, die in Anhang VI Teil 3 der CLP-Verordnung namentlich aufgeführten, soweit sie "geringer eingestuft" sind; 1B
TRGS900 - Kanzerogener Stoff	Cadmium und anorganische Cadmium Verbindungen

cobalt

TA-Luft	5.2.7.1.1/I

cobalt oxide

TA-Luft	5.2.2/II
TRGS905 - Krebserzeugend	Cobaltoxid (in Form atembarer Stäube/Aerosole); 2
TRGS905 - Erbgutverändernd	Cobaltoxid (in Form atembarer Stäube/Aerosole); -
TRGS905 - Fruchtbarkeitsgefährdend	Cobaltoxid (in Form atembarer Stäube/Aerosole); -
TRGS905 - Fruchtschädigend	Cobaltoxid (in Form atembarer Stäube/Aerosole); -

copper chloride

TA-Luft	5.2.2/III

copper

TA-Luft	5.2.2/III

copper(II) oxide

TA-Luft	5.2.2/III

copper sulphate

TA-Luft	5.2.2/III

nickel

TA-Luft	5.2.7.1.1/II
TRGS900 - Risiko der Fruchtschädigung	Nickelmetall; Y; Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes nicht befürchtet zu werden
Sensibilisierende Stoffe	Nickelmetall; Sh; Hautsensibilisierende Stoffe

nickel monoxide

TA-Luft	5.2.7.1.1/II
TRGS900 - Risiko der Fruchtschädigung	Nickel und Nickelverbindungen; Y; Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes nicht befürchtet zu werden
Sensibilisierende Stoffe	Nickel und Nickelverbindungen; Sh; Hautsensibilisierende Stoffe

lead(II)sulphate

TA-Luft	5.2.2/II

antimony trioxide

TA-Luft	5.2.2/III
TRGS900 - Risiko der Fruchtschädigung	Diantimontrioxid; Y; Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes nicht befürchtet zu werden

zinc oxide

TA-Luft	5.2.1

zinc sulphate (anhydrous)

TA-Luft	5.2.1

National legislation Austria

Copper Chloride

No data available

cadmium (non-pyrophoric)

Krebserzeugend	Cadmium und seine Verbindungen; III A2
	Cadmium und seine Verbindungen; III A2
	Cadmium; III A2
Fortpflanzungsgefährdend [fruchtschädigend (entwicklungsschädigend)]	Cadmium und seine Verbindungen; d
	Cadmium und seine Verbindungen; d
	Cadmium; d
Fortpflanzungsgefährdend [Beeinträchtigung der Fortpflanzungsfähigkeit (Fruchtbarkeit)]	Cadmium und seine Verbindungen; f
	Cadmium und seine Verbindungen; f
	Cadmium; f

cadmium oxide (non-pyrophoric)

Krebserzeugend	Cadmiumoxid; III A2
Fortpflanzungsgefährdend [fruchtschädigend (entwicklungsschädigend)]	Cadmiumoxid; d
Fortpflanzungsgefährdend [Beeinträchtigung der Fortpflanzungsfähigkeit (Fruchtbarkeit)]	Cadmiumoxid; f

cadmium sulphate

Krebserzeugend	Cadmiumsulfat; III A2
Fortpflanzungsgefährdend [fruchtschädigend (entwicklungsschädigend)]	Cadmiumsulfat; D
Fortpflanzungsgefährdend [Beeinträchtigung der Fortpflanzungsfähigkeit (Fruchtbarkeit)]	Cadmiumsulfat; F

cobalt

Krebserzeugend	Cobalt und seine Verbindungen (Cobalt als Cobaltmetall, Cobaltoxid, Cobaltsulfid und Cobaltsulfat, Staub von Cobaltlegierungen)– Herstellung von Cobaltpulver und Katalysatoren, Hartmetall- und Magnetherstellung (Pulveraufarbeitung, Pressenund mechanische Bearbeitung nicht gesinterter Werkstücke)– im übrigen; III A2
	Cobalt und seine Verbindungen (Cobalt als Cobaltmetall, Cobaltoxid, Cobaltsulfid und Cobaltsulfat, Staub von Cobaltlegierungen)– Herstellung von Cobaltpulver und Katalysatoren, Hartmetall- und Magnetherstellung (Pulveraufarbeitung, Pressenund mechanische Bearbeitung nicht gesinterter Werkstücke)– im übrigen; III A2
Gefahr der Sensibilisierung der Haut	Cobalt und seine Verbindungen (Cobalt als Cobaltmetall, Cobaltoxid, Cobaltsulfid und Cobaltsulfat, Staub von Cobaltlegierungen)– Herstellung von Cobaltpulver und Katalysatoren, Hartmetall- und Magnetherstellung (Pulveraufarbeitung, Pressenund mechanische Bearbeitung nicht gesinterter Werkstücke)– im übrigen; Sh
	Cobalt und seine Verbindungen (Cobalt als Cobaltmetall, Cobaltoxid, Cobaltsulfid und Cobaltsulfat, Staub von Cobaltlegierungen)– Herstellung von Cobaltpulver und Katalysatoren, Hartmetall- und Magnetherstellung (Pulveraufarbeitung, Pressenund mechanische Bearbeitung nicht gesinterter Werkstücke)– im übrigen; Sh
besondere Gefahr der Hautresorption	Cobalt und seine Verbindungen (Cobalt als Cobaltmetall, Cobaltoxid, Cobaltsulfid und Cobaltsulfat, Staub von Cobaltlegierungen)– Herstellung von Cobaltpulver und Katalysatoren, Hartmetall- und Magnetherstellung (Pulveraufarbeitung, Pressenund mechanische Bearbeitung nicht gesinterter Werkstücke)– im übrigen; H
	Cobalt und seine Verbindungen (Cobalt als Cobaltmetall, Cobaltoxid, Cobaltsulfid und Cobaltsulfat, Staub von Cobaltlegierungen)– Herstellung von Cobaltpulver und Katalysatoren, Hartmetall- und Magnetherstellung (Pulveraufarbeitung, Pressenund mechanische Bearbeitung nicht gesinterter Werkstücke)– im übrigen; H
Gefahr der Sensibilisierung der Atemwege	Cobalt und seine Verbindungen (Cobalt als Cobaltmetall, Cobaltoxid, Cobaltsulfid und Cobaltsulfat, Staub von Cobaltlegierungen)– Herstellung von Cobaltpulver und Katalysatoren, Hartmetall- und Magnetherstellung (Pulveraufarbeitung, Pressenund mechanische Bearbeitung nicht gesinterter Werkstücke)– im übrigen; Sa
	Cobalt und seine Verbindungen (Cobalt als Cobaltmetall, Cobaltoxid, Cobaltsulfid und Cobaltsulfat, Staub von Cobaltlegierungen)– Herstellung von Cobaltpulver und Katalysatoren, Hartmetall- und Magnetherstellung (Pulveraufarbeitung, Pressenund mechanische Bearbeitung nicht gesinterter Werkstücke)– im übrigen; Sa

nickel

Krebserzeugend	Nickel (Stäube von Nickelmetall, Nickelsulfid und sulfidischen Erzen, Nickeloxide, Nickelchromat und Nickel- carbonat) und Stäube von Nickelverbindungen und Nickellegierungen; III A1
Gefahr der Sensibilisierung der Haut	Nickel (Stäube von Nickelmetall, Nickelsulfid und sulfidischen Erzen, Nickeloxide, Nickelchromat und Nickel- carbonat) und Stäube von Nickelverbindungen und Nickellegierungen; Sh
Gefahr der Sensibilisierung der Atemwege	Nickel (Stäube von Nickelmetall, Nickelsulfid und sulfidischen Erzen, Nickeloxide, Nickelchromat und Nickel- carbonat) und Stäube von Nickelverbindungen und Nickellegierungen; Sa

nickel monoxide

Krebserzeugend	Nickelverbindungen in Form einatembarer Tröpfchen; III A1
	Nickelverbindungen gelten als eindeutig krebserzeugend und; III A1
Fortpflanzungsgefährdend [fruchtschädigend (entwicklungsschädigend)]	Nickelverbindungen gelten als eindeutig krebserzeugend und; D
Gefahr der Sensibilisierung der Haut	Nickelverbindungen in Form einatembarer Tröpfchen; Sh
	Nickelverbindungen gelten als eindeutig krebserzeugend und; Sh
Gefahr der Sensibilisierung der Atemwege	Nickelverbindungen in Form einatembarer Tröpfchen; Sa

antimony trioxide

Krebserzeugend	Antimontrioxid– Herstellung von Antimon- trioxid, Herstellung von Antimontrioxid-Masterbatches und -pasten (Wiegen und Mischen von Antimontrioxid- Pulver)– im übrigen; III A2
	Antimontrioxid– Herstellung von Antimon- trioxid, Herstellung von Antimontrioxid-Masterbatches und -pasten (Wiegen und Mischen von Antimontrioxid- Pulver)– im übrigen; III A2

National legislation United Kingdom

Copper Chloride

No data available

tricopper arsenide

Carcinogen	Arsenic and compounds except arsine (as As); Carc

cadmium sulphate

Carcinogen	Cadmium compounds except cadmium oxide fume, cadmium sulphide and cadmium sulphide pigments (as Cd); Carc

cobalt

Skin Sensitisation	Cobalt; Sen
Respiratory sensitisation	Cobalt; Sen

cobalt oxide

Carcinogen	Cobalt compounds (as Co); Carc
Skin Sensitisation	Cobalt compounds (as Co); Sen
Respiratory sensitisation	Cobalt compounds (as Co); Sen

nickel

Skin absorption	Nickel metal; Sk

nickel monoxide

Carcinogen	Nickel, insoluble inorganic compounds (as Ni)(except nickel tetracarbonyl); Carc
Skin absorption	Nickel, insoluble inorganic compounds (as Ni)(except nickel tetracarbonyl); Sk

Other relevant data

Copper Chloride

No data available

tricopper arsenide

TLV - Carcinogen	Arsenic and inorganic compounds, as As; A1

cadmium (non-pyrophoric)

IARC - classification	1; Cadmium and cadmium compounds
TLV - Carcinogen	Cadmium and compounds, as Cd; A2
	Cadmium and compounds, as Cd; A2

cadmium oxide (non-pyrophoric)

TLV - Carcinogen	Cadmium and compounds, as Cd; A2
	Cadmium and compounds, as Cd; A2

cadmium sulphate

TLV - Carcinogen	Cadmium and compounds, as Cd; A2
	Cadmium and compounds, as Cd; A2

cobalt

TLV - Skin Sensitisation	Cobalt and inorganic compounds, as Co; SEN; Sensitization
IARC - classification	2B; Cobalt and cobalt compounds
TLV - Carcinogen	Cobalt and inorganic compounds, as Co; A3
TLV - Respiratory Sensitisation	Cobalt and inorganic compounds, as Co; SEN; Sensitization

cobalt oxide

TLV - Skin Sensitisation	Cobalt and inorganic compounds, as Co; SEN; Sensitization
IARC - classification	2B; Cobalt and cobalt compounds
TLV - Respiratory Sensitisation	Cobalt and inorganic compounds, as Co; SEN; Sensitization
TLV - Carcinogen	Cobalt and inorganic compounds, as Co; A3

nickel

IARC - classification	2B; Nickel and nickel compounds
TLV - Carcinogen	Nickel and inorganic compounds including Nickel subsulfide, as Ni: Elemental; A5

nickel monoxide

IARC - classification	1; Nickel and nickel compounds
TLV - Carcinogen	Nickel and inorganic compounds including Nickel subsulfide, as Ni: Insoluble inorganic compounds (NOS); A1

lead(II)sulphate

TLV - Carcinogen	Lead and inorganic compounds, as Pb; A3

antimony trioxide

TLV - Carcinogen	Antimony trioxide; A2
IARC - classification	2B; Antimony trioxide and antimony trisulfide

15.2. Chemical safety assessment

A chemical safety assessment has been performed.

SECTION 16: Other information

Full text of any H- and EUH-statements referred to under section 3:

H301 Toxic if swallowed.
H302 Harmful if swallowed.
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H330 Fatal if inhaled.
H331 Toxic if inhaled.
H332 Harmful if inhaled.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H340 May cause genetic defects.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H350i May cause cancer by inhalation.
H351 Suspected of causing cancer.
H351 Suspected of causing cancer if inhaled.
H360Df May damage the unborn child. Suspected of damaging fertility.
H360F May damage fertility.
H360FD May damage fertility. May damage the unborn child.
H361fd Suspected of damaging fertility. Suspected of damaging the unborn child.
H372 Causes damage to organs (lungs) through prolonged or repeated exposure if inhaled.
H372 Causes damage to organs through prolonged or repeated exposure.
H372 Causes damage to organs (bones, lungs, kidneys) through prolonged or repeated exposure if inhaled.
H373 May cause damage to organs through prolonged or repeated exposure.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.
H413 May cause long lasting harmful effects to aquatic life.
EUH208 Contains a sensitising substance. May produce an allergic reaction.

(*)	INTERNAL CLASSIFICATION BY BIG
ADI	Acceptable daily intake
AOEL	Acceptable operator exposure level

ATE	Acute Toxicity Estimate
CLP (EU-GHS)	Classification, labelling and packaging (Globally Harmonised System in Europe)
DMEL	Derived Minimal Effect Level
DNEL	Derived No Effect Level
EC50	Effect Concentration 50 %
ErC50	EC50 in terms of reduction of growth rate
LC50	Lethal Concentration 50 %
LD50	Lethal Dose 50 %
NOAEL	No Observed Adverse Effect Level
NOEC	No Observed Effect Concentration
OECD	Organisation for Economic Co-operation and Development
PBT	Persistent, Bioaccumulative & Toxic
PNEC	Predicted No Effect Concentration
STP	Sludge Treatment Process
vPvB	very Persistent & very Bioaccumulative

The information in this safety data sheet is based on data and samples provided to BIG. The sheet was written to the best of our ability and according to the state of knowledge at that time. The safety data sheet only constitutes a guideline for the safe handling, use, consumption, storage, transport and disposal of the substances/preparations/mixtures mentioned under point 1. New safety data sheets are written from time to time. Only the most recent versions may be used. Unless indicated otherwise word for word on the safety data sheet, the information does not apply to substances/preparations/mixtures in purer form, mixed with other substances or in processes. The safety data sheet offers no quality specification for the substances/preparations/mixtures in question. Compliance with the instructions in this safety data sheet does not release the user from the obligation to take all measures dictated by common sense, regulations and recommendations or which are necessary and/or useful based on the real applicable circumstances. BIG does not guarantee the accuracy or exhaustiveness of the information provided and cannot be held liable for any changes by third parties. This safety data sheet is only to be used within the European Union, Switzerland, Iceland, Norway and Liechtenstein. Any use outside of this area is at your own risk. Use of this safety data sheet is subject to the licence and liability limiting conditions as stated in your BIG licence agreement or when this is failing the general conditions of BIG. All intellectual property rights to this sheet are the property of BIG and its distribution and reproduction are limited. Consult the mentioned agreement/conditions for details.

1. EXPOSURE ASSESSMENT (and related risk characterisation)

1.1. Exposure scenario 1: Manufacture - Manufacture; Intermediate

Environment contributing scenario(s):		
CS 1	Manufacture; Intermediate	ERC 1
Worker contributing scenario(s):		
CS 2	Manufacture; Intermediate	PROC 4
CS 3	Handling of solid inorganic substances at ambient temperature	PROC 26

Further description of the use:

The elimination of impurities from the electrolyte, prior to electrolysis, is key for the quality of the zinc deposit. Purification of the zinc-bearing solution can be carried out in a number of ways using zinc powder (to reduce and precipitate metallic impurities) or by solvent extraction (to extract a pure ZnSO4 solution). The processes used are dependent on the concentrations of the various metals contained in the raw materials and vary accordingly. The basic chemical purification processes involve the use of zinc powder to precipitate impurities such as Cu, Cd, Ni, Co and Tl. Being more noble than zinc, these impurities are reduced and form a metallic precipitate upon addition of fine zinc powder to the solution, following the generic electrochemical reaction:Me2+ + Zn0 => Me0 + Zn2+ where Me2+ = Cu, Cd, Co, Ni, Tl or Pb. Copper and cadmium can be precipitated easily with zinc powder. The zinc powder used in the purification process is typically produced on site using cathodic zinc from the electrolytic process. The consumption of zinc powder varies among the plants and processes and, as a range, 1.5–6 % of cathodes will be used for purification. Zinc powder consumption is affected not only by the process route, but also by the concentration/amounts of impurities in the solution treated. Although the different plants may have different process set-ups and layouts, the basic chemical reactions are the same.

1.1.1. Env CS 1: Manufacture; Intermediate (ERC 1)

Assessment entity group used for the assessment of this contributing scenario: Copper chloride
Production of copper chloride

1.1.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use amount at site: <= 15 tonnes/day
• Annual use amount at site: <= 5E3 tonnes/year
Technical and organisational conditions and measures
• Efficiency risk management measures to limit releases to air [Effectiveness Air: 90%]
• Risk management measure to control air emissions: One or more of the following measures should be present to reduce emissions to air: Electrostatic precipitators, Wet electrostatic precipitators, Cyclones, but as primary collector, Fabric or bag filters, Ceramic/Metal mesh filters or Wet scrubbers.
• Risk management measure to control water emissions: One or more of the following measures should be present to reduce emissions to water: Chemical precipitation, Sedimentation, Filtration, Electrolysis, Reverse osmosis or Ion exchange.

Conditions and measures related to biological sewage treatment plant
• Biological STP: Standard [Effectiveness Water: 21.48%]
• Discharge rate of STP: >= 2E3 m3/day
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (no waste) *No waste generated.*
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/day

1.1.1.2. Releases

The local releases to the environment are reported in the following table. Note that the releases reported do not account for the removal in the modelled biological STP.

Table: Local releases to the environment

Release	Assessment entity	Release estimation method	Explanations
Water	Arsenic	Measured release rate (whole plant)	**Release factor after on site RMM:** 2.74E-7% **Local release rate:** 4.11E-5 kg/day
	Cadmium	Measured release rate (whole plant)	**Release factor after on site RMM:** 6.85E-7% **Local release rate:** 1.03E-4 kg/day
	Cobalt	Measured release rate (whole plant)	**Release factor after on site RMM:** 4.8E-7% **Local release rate:** 7.2E-5 kg/day
	Lead	Measured release rate (whole plant)	**Release factor after on site RMM:** 7.35E-7% **Local release rate:** 1.1E-4 kg/day
	Copper	Measured release rate (whole plant)	**Release factor after on site RMM:** 1.11E-6% **Local release rate:** 1.66E-4 kg/day
	Zinc	Measured release rate (whole plant)	**Release factor after on site RMM:** 8E-6% **Local release rate:** 1.2E-3 kg/day
	NIckel	Measured release rate (whole plant)	**Release factor after on site RMM:** 7.35E-7% **Local release rate:** 1.1E-4 kg/day
Air	Arsenic	Measured release rate (leaching area)	**Release factor after on site RMM:** 2.33E-5% **Local release rate:** 3.5E-3 kg/day
	Cadmium	Measured release rate (leaching area)	**Release factor after on site RMM:** 3.08E-4% **Local release rate:** 0.046 kg/day
	Cobalt	Measured release rate (leaching area)	**Release factor after on site RMM:** 3.03E-4% **Local release rate:** 0.045 kg/day

Release	Assessment entity	Release estimation method	Explanations
	Lead	Measured release rate (leaching area)	**Release factor after on site RMM:** 5.18E-4% **Local release rate:** 0.078 kg/day
	Copper	Measured release rate (leaching area)	**Release factor after on site RMM:** 2.33E-4% **Local release rate:** 0.035 kg/day
	Zinc	Measured release rate (leaching area)	**Release factor after on site RMM:** 0.02% **Local release rate:** 3.05 kg/day
	NIckel	Measured release rate (leaching area)	**Release factor after on site RMM:** 5.13E-4% **Local release rate:** 0.077 kg/day
Non-agricultural soil	Arsenic	ERC	**Release factor after on site RMM:** 0.01%
	Cadmium	ERC	**Release factor after on site RMM:** 0.01%
	Cobalt	ERC	**Release factor after on site RMM:** 0.01%
	Lead	ERC	**Release factor after on site RMM:** 0.01%
	Copper	ERC	**Release factor after on site RMM:** 0.01%
	Zinc	ERC	**Release factor after on site RMM:** 0.01%
	NIckel	ERC	**Release factor after on site RMM:** 0.01%

1.1.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table. The exposure estimates have been obtained with EUSES 2.1.2 unless stated otherwise.

Table: Exposure concentrations and risks for the environment and man via the environment

Protection target	Assessment entity	Exposure concentration	Risk quantification
Fresh water	Arsenic	**Local PEC:** 1.55E-6 mg/L RCR = 9.04E-5	Final RCR = 0.01
	Cadmium	**Local PEC:** 1.14E-6 mg/L RCR = 6E-3	
	Cobalt	**Local PEC:** 1.36E-6 mg/L RCR = 2.2E-3	
	Lead	**Local PEC:** 5.49E-7 mg/L RCR = 8.44E-5	
	Copper	**Local PEC:** 4.49E-6 mg/L RCR = 5.75E-4	
	Zinc	**Local PEC:** 1.49E-5 mg/L RCR = 9.42E-4	
	NIckel	**Local PEC:** 1.88E-6 mg/L RCR = 2.65E-4	

Sediment (freshwater)	Arsenic	**Local PEC:** 0.015 mg/kg dw RCR = 9.04E-5	Final RCR = 0.112
	Cadmium	**Local PEC:** 0.143 mg/kg dw RCR = 0.102	
	Cobalt	**Local PEC:** 0.053 mg/kg dw RCR = 9.86E-4	
	Lead	**Local PEC:** 0.162 mg/kg dw RCR = 9.31E-4	
	Copper	**Local PEC:** 0.135 mg/kg dw RCR = 1.56E-3	
	Zinc	**Local PEC:** 1.632 mg/kg dw RCR = 5.9E-3	
	NIckel	**Local PEC:** 0.05 mg/kg dw RCR = 3.65E-4	
Marine water	Arsenic	**Local PEC:** 1.55E-7 mg/L RCR = 1.29E-4	Final RCR < 0.01
	Cadmium	**Local PEC:** 1.14E-7 mg/L RCR = 1E-4	
	Cobalt	**Local PEC:** 1.36E-7 mg/L RCR = 5.78E-5	
	Lead	**Local PEC:** 5.49E-8 mg/L RCR = 1.61E-5	
	Copper	**Local PEC:** 4.49E-7 mg/L RCR = 8.63E-5	
	Zinc	**Local PEC:** 1.49E-6 mg/L RCR = 2.44E-4	
	NIckel	**Local PEC:** 1.88E-7 mg/L RCR = 2.19E-5	
Sediment (marine water)	Arsenic	**Local PEC:** 1.55E-3 mg/kg dw RCR = 1.29E-4	Final RCR < 0.01
	Cadmium	**Local PEC:** 0.014 mg/kg dw RCR = 4.35E-3	
	Cobalt	**Local PEC:** 5.31E-3 mg/kg dw RCR = 7.6E-5	
	Lead	**Local PEC:** 0.016 mg/kg dw RCR = 9.88E-5	
	Copper	**Local PEC:** 0.014 mg/kg dw RCR = 2E-5	
	Zinc	**Local PEC:** 0.163 mg/kg dw RCR = 1.19E-3	
	NIckel	**Local PEC:** 4.96E-3 mg/kg dw RCR = 3.65E-5	

Sewage Treatment Plant	Arsenic	**Local PEC:** 1.78E-5 mg/L RCR = 2.21E-4	Final RCR < 0.01
	Cadmium	**Local PEC:** 3.29E-5 mg/L RCR = 1.65E-3	
	Cobalt	**Local PEC:** 2.16E-5 mg/L RCR = 5.84E-5	
	Lead	**Local PEC:** 2.98E-5 mg/L RCR = 2.98E-4	
	Copper	**Local PEC:** 6.52E-5 mg/L RCR = 2.83E-4	
	Zinc	**Local PEC:** 3.94E-4 mg/L RCR = 3.94E-3	
	NIckel	**Local PEC:** 2.63E-5 mg/L RCR = 7.96E-5	
Agricultural soil	Arsenic	**Local PEC:** 1.36E-4 mg/kg dw RCR = 1.94E-4	
	Cadmium	**Local PEC:** 1.01E-3 mg/kg dw RCR = 1.13E-3	
	Cobalt		
	Lead	**Local PEC:** 1.5E-3 mg/kg dw RCR = 1.02E-5	
	Copper	**Local PEC:** 9.45E-4 mg/kg dw RCR = 1.45E-5	
	Zinc	**Local PEC:** 0.022 mg/kg dw RCR = 2.02E-4	
	NIckel	**Local PEC:** 1.06E-3 mg/kg dw RCR = 3.54E-5	
Predator's prey (freshwater)	Arsenic	**Local PEC:** 1.91E-4 mg/kg ww RCR = 1.46E-4	Final RCR = 0.151
	Cadmium	**Local PEC:** 0.022 mg/kg ww RCR = 0.14	
	Lead	**Local PEC:** 0.022 mg/kg ww RCR = 2.05E-3	
	NIckel	**Local PEC:** 9.81E-4 mg/kg ww RCR = 8.18E-3	
Predator's prey (marine water)	Arsenic	**Local PEC:** 1.91E-5 mg/kg ww RCR = 1.46E-5	Final RCR = 0.015
	Cadmium	**Local PEC:** 2.25E-3 mg/kg ww RCR = 0.014	
	Lead	**Local PEC:** 2.23E-3 mg/kg ww RCR = 2.05E-4	
	NIckel	**Local PEC:** 9.81E-5 mg/kg ww RCR = 8.18E-4	

Top predator's prey (marine water)	Arsenic	**Local PEC:** 3.81E-6 mg/kg ww RCR = 2.91E-6	Final RCR = 0.029
	Cadmium	**Local PEC:** 4.49E-3 mg/kg ww RCR = 0.028	
	Lead	**Local PEC:** 4.46E-3 mg/kg ww RCR = 4.09E-4	
	NIckel	**Local PEC:** 1.96E-5 mg/kg ww RCR = 1.64E-4	
Predator's prey (terrestrial)	Arsenic	**Local PEC:** 1.86E-5 mg/kg ww RCR = 1.42E-5	Final RCR = 0.051
	Cadmium	**Local PEC:** 7.76E-3 mg/kg ww RCR = 0.048	
	Lead	**Local PEC:** 1.03E-4 mg/kg ww RCR = 9.46E-6	
	NIckel	**Local PEC:** 2.57E-4 mg/kg ww RCR = 2.14E-3	
Man via environment - Inhalation	Arsenic	**Concentration in air:** 8.89E-7 mg/m³ RCR = 3.55E-4	Final RCR = 0.978 Qualitative risk
	Lead	**Concentration in air:** 1.97E-5 mg/m³	
	Zinc	**Concentration in air:** 7.74E-4 mg/m³ RCR = 3.1E-4	
	NIckel	**Concentration in air:** 1.95E-5 mg/m³ RCR = 0.977	
Man via environment - combined routes			

Risk characterisation

Qualitative risk characterisation (Man via environment - Inhalation, Man via environment - Oral):
Due to the limited emissions of the metals related to the production and use of the intermediate, and taking into account its short life-cycle, with production and use in only a small number of industrial sites in the EU, and, moreover, since there are no downstream or wide dispersive uses that may lead to significant further exposure through the environment, it is considered that the exposure to the metals contained in the intermediate via the environment is insignificant. The assessment of the exposure to the different metals is made in the respective chemical safety reports.

1.1.2. Worker CS 2: Manufacture; Intermediate (PROC 4)

Assessment entity group used for the assessment of this contributing scenario: Copper chloride chemical purification process involving the use of zinc powder to precipitate impurities such as Cu

1.1.2.1. 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 (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: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: -%, Dermal: -%]	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 80%]	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
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	

1.1.2.2. Exposure and risks for workers

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

Table: Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Arsenic	0.2 µg/m³ (Measured data: 90P workplace) RCR = 0.04	Final RCR = 0.057
	Lead	19 µg/m³ (Measured data: 90P workplace) RCR = 3.8E-3	
	Zinc	52.1 µg/m³ (Measured data: 90P workplace) RCR = 0.01	
	NIckel	0.15 µg/m³ (Measured data: 90P workplace) RCR = 3E-3	
Inhalation, systemic, acute	Lead	19 µg/m³ (Measured data: 90P workplace)	Qualitative risk
Inhalation, local, long term	Cadmium	1.1 µg/m³ (Measured data: 90P workplace) RCR = 0.275	
	Cobalt	(TRA Workers)	
	NIckel	0.15 µg/m³ (Measured data: 90P workplace) RCR = 3E-3	

Inhalation, local, acute	Cobalt	(TRA Workers)	Final RCR < 0.01 Qualitative risk
	NIckel	0.15 µg/m³ (Measured data: 90P workplace) RCR = 3.75E-5	
Dermal, local, long term	Cobalt	(TRA Workers)	Qualitative risk
Dermal, local, acute	Cobalt	(TRA Workers)	Qualitative risk
Combined routes, systemic, long-term			
Combined routes, systemic, acute			

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 0 Pa for Cobalt.

Remarks on measured exposure:

90P workplace for Arsenic:
Identity of the substance used: Arsenic
Inhalation exposure, long term concentration: Number of measured data points: 18
Inhalation exposure, short term concentration: Number of measured data points: 18

90P workplace for Cadmium:
Identity of the substance used: cadmium
Inhalation exposure, long term concentration: Number of measured data points: 25
Inhalation exposure, short term concentration: Number of measured data points: 25

90P workplace for Lead:
Identity of the substance used: lead
Inhalation exposure, long term concentration: Number of measured data points: 25
Inhalation exposure, short term concentration: Number of measured data points: 25

90P workplace for Zinc:
Identity of the substance used: zinc
Inhalation exposure, long term concentration: Number of measured data points: 22
Inhalation exposure, short term concentration: Number of measured data points: 22

Risk characterisation

Qualitative risk characterisation (Inhalation, systemic, acute, Inhalation, local, acute, Dermal, systemic, long term, Dermal, systemic, acute, Dermal, local, long term , Dermal, local, acute, Eye, local):
The substance is under the form of a humid/wet cake so inhalation exposure is unlikely

1.1.3. Worker CS 3: Handling of solid inorganic substances at ambient temperature (PROC 26)

Assessment entity group used for the assessment of this contributing scenario: Copper chloride

1.1.3.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of the used product: Solid (non or low dusty form)	MEASE 1.02 , MEASE 1.02 , MEASE 1.02 , MEASE 1.02
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02 , MEASE 1.02 , MEASE 1.02 , MEASE 1.02
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%]	MEASE 1.02
• Occupational Health and Safety Management System: Advanced	MEASE 1.02 , MEASE 1.02 , MEASE 1.02 , MEASE 1.02
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: -%, Dermal: -%]	MEASE 1.02 , MEASE 1.02 , MEASE 1.02
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	MEASE 1.02
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 80%]	MEASE 1.02 , MEASE 1.02 , MEASE 1.02 , MEASE 1.02
Other conditions affecting workers exposure	
• Place of use: Indoor	MEASE 1.02
• Operating temperature: <= 40 °C	MEASE 1.02 , MEASE 1.02 , MEASE 1.02 , MEASE 1.02

1.1.3.2. Exposure and risks for workers

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

Table: Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Arsenic	0.2 µg/m³ (Measured data: 90P workplace) RCR = 0.04	Final RCR = 0.057
	Lead	19 µg/m³ (Measured data: 90P workplace) RCR = 3.8E-3	
	Zinc	52.1 µg/m³ (Measured data: 90P workplace) RCR = 0.01	
	Nickel	0.15 µg/m³ (Measured data: 90P workplace) RCR = 3E-3	
Inhalation, systemic, acute	Lead	19 µg/m³ (Measured data: 90P workplace)	Qualitative risk

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, local, long term	Cadmium	1.1 µg/m³ (Measured data: 90P workplace) RCR = 0.275	Final RCR = 0.968
	Cobalt	27.6 µg/m³ (MEASE 1.02) RCR = 0.69	
	Nickel	0.15 µg/m³ (Measured data: 90P workplace) RCR = 3E-3	
Inhalation, local, acute	Cobalt	27.6 µg/m³ (MEASE 1.02)	Final RCR < 0.01 Qualitative risk
	Nickel	0.15 µg/m³ (Measured data: 90P workplace) RCR = 3.75E-5	
Dermal, systemic, long term	Arsenic	8.4E-3 µg/kg bw/day (MEASE 1.02) RCR = 7.5E-5	Final RCR < 0.01 Qualitative risk
	Copper	0.014 µg/kg bw/day (MEASE 1.02) RCR = 1.02E-7	
	Zinc	8.4E-3 µg/kg bw/day (MEASE 1.02) RCR = 1.01E-7	
Dermal, systemic, acute	Copper	0.014 µg/kg bw/day (MEASE 1.02) RCR = 5.13E-8	Final RCR < 0.01 Qualitative risk
Dermal, local, long term	Cobalt	0.03 µg/cm² (MEASE 1.02)	Qualitative risk
Dermal, local, acute	Cobalt	0.03 µg/cm² (MEASE 1.02)	Qualitative risk
Combined routes, systemic, long-term			Final RCR = 0.057
Combined routes, systemic, acute			Final RCR < 0.01

Remarks on measured exposure:

90P workplace for Zinc:
Identity of the substance used: zinc
Inhalation exposure, long term concentration: Number of measured data points: 22
Inhalation exposure, short term concentration: Number of measured data points: 22

90P workplace for Arsenic:
Identity of the substance used: Arsenic
Inhalation exposure, long term concentration: Number of measured data points: 18
Inhalation exposure, short term concentration: Number of measured data points: 18

90P workplace for NIckel:
Identity of the substance used: nickel
Inhalation exposure, long term concentration: Number of measured data points: 4
Inhalation exposure, short term concentration: Number of measured data points: 4

90P workplace for Cadmium:
Identity of the substance used: cadmium
Inhalation exposure, long term concentration: Number of measured data points: 25
Inhalation exposure, short term concentration: Number of measured data points: 25

Risk characterisation

Qualitative risk characterisation (Inhalation, systemic, acute, Inhalation, local, acute, Dermal, systemic, long term, Dermal, systemic, acute, Dermal, local, long term , Dermal, local, acute, Eye, local):
The very low exposure of workplace air associated with dermal and eye protection insure no risks are predicted for dermal/eye effects.

1.2. Exposure scenario 2: Use at industrial sites - Industrial use; Use of intermediate

Product category used: PC 7: Base metals and alloys
Sector of use: SU 14: Manufacture of basic metals, including alloys

Environment contributing scenario(s):		
CS 1	Industrial use; Use of intermediate	ERC 6a
Worker contributing scenario(s):		
CS 2	Industrial use; Intermediate (precursor)	PROC 8b
CS 3	Manufacturing and processing of minerals and/or metals at substantially elevated temperature	PROC 22

Further description of the use:

The'Copper-precipitate'is unloaded from transport trucks, ADR-big-bags or containers, …and transferred to storage silo's through especially designed transfer units,The'Copper-precipitate'is optionally blended with other Copper-containing primary or secondary materialsThe mixture is continuously fed- in hydrometallurgical uses, to leaching tanks (closed loop of acidic solution, mostly sulphate) used in the production of (Intermediate) Copper salt- in pyrometallurgical uses, to furnaces, i.e. ISA, Blast... used in the smelting and extraction of Copper metal (EC 231-159-6)

1.2.1. Env CS 1: Industrial use; Use of intermediate (ERC 6a)

Assessment entity group used for the assessment of this contributing scenario: Copper chloride
Processing of the copper chloride - transferring operations

1.2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use amount at site: <= 15 tonnes/day
• Annual use amount at site: <= 5E3 tonnes/year
Technical and organisational conditions and measures
• Efficiency risk management measures to limit releases to air [Effectiveness Air: 90%]
• Risk management measure to control air emissions: One or more of the following measures should be present to reduce emissions to air: Electrostatic precipitators, Wet electrostatic precipitators, Cyclones, but as primary collector, Fabric or bag filters, Ceramic/Metal mesh filters or Wet scrubbers.
• Risk management measure to control water emissions: One or more of the following measures should be present to reduce emissions to water: Chemical precipitation, Sedimentation, Filtration, Electrolysis, Reverse osmosis or Ion exchange.
Conditions and measures related to biological sewage treatment plant
• Biological STP: Standard [Effectiveness Water: 52.32%]
• Discharge rate of STP: >= 2E3 m3/day
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (no waste) *No waste generated.*

Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.24E7 m3/day *Measured flow rate of receiving water giving together with the measured flow rate of the effluent a dilution factor of 4424*

1.2.1.2. Releases

The local releases to the environment are reported in the following table. Note that the releases reported do not account for the removal in the modelled biological STP.

Table: Local releases to the environment

Release	Assessment entity	Release estimation method	Explanations
Water	Arsenic	Measured release rate (90P receiving water)	**Release factor after on site RMM:** 3.29E-10% **Local release rate:** 4.93E-8 kg/day
	Cadmium	Measured release rate (90P receiving water)	**Release factor after on site RMM:** 2.41E-11% **Local release rate:** 3.62E-9 kg/day
	Cobalt	Measured release rate (90P receiving water)	**Release factor after on site RMM:** 2.67E-12% **Local release rate:** 4E-10 kg/day
	Lead	Measured release rate (90P receiving water)	**Release factor after on site RMM:** 3.6E-11% **Local release rate:** 5.4E-9 kg/day
	Copper	Measured release rate (90P receiving water)	**Release factor after on site RMM:** 3.62E-11% **Local release rate:** 5.42E-9 kg/day
	Zinc	Measured release rate (90P receiving water)	**Release factor after on site RMM:** 3.47E-11% **Local release rate:** 5.2E-9 kg/day
	NIckel	Measured release rate (90P receiving water)	**Release factor after on site RMM:** 7.67E-11% **Local release rate:** 1.15E-8 kg/day
Air	Arsenic	Measured release rate (90P emission rate)	**Release factor after on site RMM:** 1.73E-4% **Local release rate:** 0.026 kg/day
	Cadmium	Measured release rate (90P emission rate)	**Release factor after on site RMM:** 4.23E-5% **Local release rate:** 6.35E-3 kg/day
	Cobalt	Measured release rate (90P emission rate)	**Release factor after on site RMM:** 6.67E-6% **Local release rate:** 1E-3 kg/day
	Lead	Measured release rate (90P emission rate)	**Release factor after on site RMM:** 2.49E-4% **Local release rate:** 0.037 kg/day
	Copper	Measured release rate (90P emission rate)	**Release factor after on site RMM:** 1.31E-4% **Local release rate:** 0.02 kg/day

Release	Assessment entity	Release estimation method	Explanations
	Zinc	Measured release rate (90P emission rate)	**Release factor after on site RMM:** 9.77E-5% **Local release rate:** 0.015 kg/day
	NIckel	Measured release rate (90P emission rate)	**Release factor after on site RMM:** 6.67E-6% **Local release rate:** 1E-3 kg/day
Non agricultural soil	Arsenic	Estimated release factor (SPERS)	**Release factor after on site RMM:** 0.01%
	Cadmium	Estimated release factor (SPERC)	**Release factor after on site RMM:** 0.01%
	Cobalt	Estimated release factor (SPERC)	**Release factor after on site RMM:** 0.01%
	Lead	Estimated release factor (SPERC)	**Release factor after on site RMM:** 0.01%
	Copper	Estimated release factor (SPERC)	**Release factor after on site RMM:** 0.01%
	Zinc	Estimated release factor (SPERC)	**Release factor after on site RMM:** 0.01%
	NIckel	Estimated release factor (SPERC)	**Release factor after on site RMM:** 0.01%

Releases to waste

Release factor to external waste: 0.1 %

1.2.1.3. Exposure and risks for the environment and man via the environment

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table. The exposure estimates have been obtained with EUSES 2.1.2 unless stated otherwise.

Table: Exposure concentrations and risks for the environment and man via the environment

Protection target	Assessment entity	Exposure concentration	Risk quantification
Fresh water	Arsenic	**Local PEC:** 2.98E-12 mg/L RCR = 1.74E-10	Final RCR < 0.01
	Cadmium	**Local PEC:** 6.45E-14 mg/L RCR = 3.39E-10	
	Cobalt	**Local PEC:** 1.22E-14 mg/L RCR = 1.96E-11	
	Lead	**Local PEC:** 4.32E-14 mg/L RCR = 6.65E-12	
	Copper	**Local PEC:** 2.36E-13 mg/L	

Protection target	Assessment entity	Exposure concentration	Risk quantification
		RCR = 3.02E-11	
	Zinc	**Local PEC:** 1.04E-13 mg/L RCR = 6.56E-12	
	NIckel	**Local PEC:** 3.16E-13 mg/L RCR = 4.45E-11	
Sediment (freshwater)	Arsenic	**Local PEC:** 2.98E-8 mg/kg dw RCR = 1.74E-10	Final RCR < 0.01
	Cadmium	**Local PEC:** 8.12E-9 mg/kg dw RCR = 5.8E-9	
	Cobalt	**Local PEC:** 4.74E-10 mg/kg dw RCR = 8.81E-12	
	Lead	**Local PEC:** 1.28E-8 mg/kg dw RCR = 7.33E-11	
	Copper	**Local PEC:** 7.12E-9 mg/kg dw RCR = 8.18E-11	
	Zinc	**Local PEC:** 1.14E-8 mg/kg dw RCR = 4.11E-11	
	NIckel	**Local PEC:** 8.31E-9 mg/kg dw RCR = 6.11E-11	
Marine water	Arsenic	**Local PEC:** 1.85E-10 mg/L RCR = 1.55E-7	Final RCR < 0.01
	Cadmium	**Local PEC:** 4.01E-12 mg/L RCR = 3.52E-9	
	Cobalt	**Local PEC:** 7.58E-13 mg/L RCR = 3.21E-10	
	Lead	**Local PEC:** 2.69E-12 mg/L RCR = 7.91E-10	
	Copper	**Local PEC:** 1.47E-11 mg/L RCR = 2.82E-9	
	Zinc	**Local PEC:** 6.45E-12 mg/L RCR = 1.06E-9	
	Nickel	**Local PEC:** 1.97E-11 mg/L RCR = 2.29E-9	
Sediment (marine water)	Arsenic	**Local PEC:** 1.85E-6 mg/kg dw RCR = 1.55E-7	Final RCR < 0.01
	Cadmium	**Local PEC:** 5.05E-7 mg/kg dw RCR = 1.53E-7	
	Cobalt	**Local PEC:** 2.95E-8 mg/kg dw RCR = 4.22E-10	
	Lead	**Local PEC:** 7.94E-7 mg/kg dw RCR = 4.84E-9	
	Copper	**Local PEC:** 4.43E-7 mg/kg dw RCR = 6.55E-10	
	Zinc	**Local PEC:** 7.07E-7 mg/kg dw RCR = 5.16E-9	
	Nickel	**Local PEC:** 5.17E-7 mg/kg dw	

Protection target	Assessment entity	Exposure concentration	Risk quantification
		RCR = 3.8E-9	
Sewage Treatment Plant	Arsenic	**Local PEC:** 2.13E-8 mg/L RCR = 2.66E-7	Final RCR < 0.01
	Cadmium	**Local PEC:** 1.16E-9 mg/L RCR = 5.79E-8	
	Cobalt	**Local PEC:** 1.2E-10 mg/L RCR = 3.24E-10	
	Lead	**Local PEC:** 1.46E-9 mg/L RCR = 1.46E-8	
	Copper	**Local PEC:** 2.13E-9 mg/L RCR = 9.26E-9	
	Zinc	**Local PEC:** 1.71E-9 mg/L RCR = 1.71E-8	
	Nickel	**Local PEC:** 2.74E-9 mg/L RCR = 8.31E-9	
Agricultural soil	Arsenic	**Local PEC:** 1.45E-4 mg/kg dw RCR = 2.07E-4	
	Cadmium	**Local PEC:** 3.56E-5 mg/kg dw RCR = 3.96E-5	
	Cobalt		
	Lead	**Local PEC:** 2.08E-4 mg/kg dw RCR = 1.42E-6	
	Copper	**Local PEC:** 1.09E-4 mg/kg dw RCR = 1.68E-6	
	Zinc	**Local PEC:** 6.34E-5 mg/kg dw RCR = 5.93E-7	
	NIckel	**Local PEC:** 4.43E-6 mg/kg dw RCR = 1.48E-7	
Man via environment - Inhalation	Arsenic	**Concentration in air:** 6.59E-6 mg/m³ RCR = 2.64E-3	Final RCR = 0.015 Qualitative risk
	Lead	**Concentration in air:** 9.48E-6 mg/m³	
	Zinc	**Concentration in air:** 3.72E-6 mg/m³ RCR = 1.49E-6	
	NIckel	**Concentration in air:** 2.54E-7 mg/m³ RCR = 0.013	
Man via environment - Oral	Arsenic	**Exposure via food consumption:** 9.99E-4 mg/kg bw/day RCR = 0.454	Qualitative risk
	Cadmium	**Exposure via food consumption:** 2.65E-4 mg/kg bw/day RCR = 0.265	
	Cobalt		
	Lead	**Exposure via food consumption:** 1.72E-3 mg/kg bw/day	
	Copper	**Exposure via food consumption:** 7.29E-4 mg/kg bw/day	

Protection target	Assessment entity	Exposure concentration	Risk quantification
		RCR = 0.018	
	Zinc	**Exposure via food consumption:** 5.39E-4 mg/kg bw/day RCR = 6.5E-4	
	NIckel	**Exposure via food consumption:** 9.86E-8 mg/kg bw/day RCR = 4.93E-6	
Man via environment - combined routes			

Risk characterisation

Qualitative risk characterisation (Man via environment - Inhalation, Man via environment - Oral):
Due to the limited emissions of the metals related to the production and use of the intermediate, and taking into account its short life-cycle, with production and use in only a small number of industrial sites in the EU, and, moreover, since there are no downstream or wide dispersive uses that may lead to significant further exposure through the environment, it is considered that the exposure to the metals contained in the intermediate via the environment is insignificant. The assessment of the exposure to the different metals is made in the respective chemical safety reports.

1.2.2. Worker CS 2: Industrial use; Intermediate (precursor) (PROC 8b)

Assessment entity group used for the assessment of this contributing scenario: Copper chloride
Transferring operations of the intermediate at dedicated facility

1.2.2.1. Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0

Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%]	TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: -%, Dermal: -%]	MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , 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 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 80%]	MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0

Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
• Operating temperature: <= 40 °C	MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0

1.2.2.2. Exposure and risks for workers

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

Table: Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Arsenic	(TRA Workers)	
	Lead	(TRA Workers)	
	Zinc	(TRA Workers)	
	NIckel	(TRA Workers)	
Inhalation, systemic, acute	Lead	(TRA Workers)	Qualitative risk
Inhalation, local, long term	Cadmium	(TRA Workers)	
	Cobalt	(TRA Workers)	
	NIckel	(TRA Workers)	
Inhalation, local, acute	Cobalt	(TRA Workers)	Qualitative risk
	NIckel	(TRA Workers)	
Dermal, systemic, long term	Arsenic	0.2 µg/kg bw/day (MEASE 1.02) RCR = 1.79E-3	Qualitative risk
	Cadmium	(TRA Workers)	
	Copper	(TRA Workers)	
	Zinc	(TRA Workers)	
Dermal, local, long term	Cadmium	(TRA Workers)	Final RCR < 0.01 Qualitative risk
	Cobalt	(TRA Workers)	
	NIckel	0.03 µg/cm² (MEASE 1.02) RCR = 8.57E-4	
Dermal, local, acute	Cadmium	(TRA Workers)	Qualitative risk
	Cobalt	(TRA Workers)	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Combined routes, systemic, long-term			
Combined routes, systemic, acute			

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 2.63E-4 Pa for Zinc.
The vapour pressure at operating temperature (40°C) used for the calculation is 0 Pa for Cobalt.
The vapour pressure at operating temperature (40°C) used for the calculation is 0.087 Pa for Arsenic.
The vapour pressure at operating temperature (40°C) used for the calculation is 2.63E-4 Pa for Lead.
The vapour pressure at operating temperature (40°C) used for the calculation is 2.63E-4 Pa for Cadmium.
The vapour pressure at operating temperature (40°C) used for the calculation is 2.78E-4 Pa for Copper .
The vapour pressure at operating temperature (40°C) used for the calculation is 2.63E-4 Pa for NIckel.

Risk characterisation

Qualitative risk characterisation (Inhalation, systemic, acute, Inhalation, local, acute, Dermal, systemic, long term, Dermal, systemic, acute, Dermal, local, long term , Dermal, local, acute, Eye, local):
A number of abatement measures are available to limit inhalation exposure: the substance is transported via a closed conveyor belt or sprinkling devices are in place (for more information, refer to BREF notes NFM)
Workers are not indirect contact with the substance and wear protective equipment including goggles, eye exposure is unlikely

1.2.3. Worker CS 3: Manufacturing and processing of minerals and/or metals at substantially elevated temperature (PROC 22)

Assessment entity group used for the assessment of this contributing scenario: Copper chloride
Processing of cement by hydro- or pyro-metallurgical process

1.2.3.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , 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 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) [Effectiveness Inhalation: 70%]	TRA Workers 3.0 , TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: -%, Dermal: -%]	TRA Workers 3.0 , MEASE 1.02 , 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 , TRA Workers 3.0
• Dermal protection: Yes (Chemically resistant gloves conforming to EN374) and (other) appropriate dermal protection [Effectiveness Dermal: 80%]	TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0 , TRA Workers 3.0
• Operating temperature: <= 40 °C	TRA Workers 3.0 , MEASE 1.02 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0 , TRA Workers 3.0

1.2.3.2. Exposure and risks for workers

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

Table: Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Arsenic	2.07 µg/m³ (Measured data: 90P handling) RCR = 0.414	Final RCR = 0.487
	Lead	53.8 µg/m³ (Measured data: 90P handling) RCR = 0.011	
	Zinc	29.69 µg/m³ (Measured data: 90P handling) RCR = 5.94E-3	
	Nickel	2.8 µg/m³ (Measured data: 90P handling) RCR = 0.056	
Inhalation, systemic, acute	Lead	53.8 µg/m³ (Measured data: 90P handling)	Qualitative risk
Inhalation, local, long term	Cadmium	0.66 µg/m³ (Measured data: 90P handling) RCR = 0.165	
	Cobalt	(TRA Workers)	
	Nickel	2.8 µg/m³ (Measured data: 90P handling) RCR = 0.056	
Inhalation, local, acute	Cobalt	(TRA Workers)	Final RCR < 0.01 Qualitative risk
	Nickel	2.8 µg/m³ (Measured data: 90P handling) RCR = 7E-4	
Dermal, systemic, long term	Arsenic	8.4E-4 mg/kg bw/day (MEASE 1.02) RCR = 7.5E-3	Qualitative risk
	Cadmium	(TRA Workers)	
	Copper	(TRA Workers)	
	Zinc	(TRA Workers)	
Dermal, local, long term	Cadmium	(TRA Workers)	Qualitative risk
	Cobalt	(TRA Workers)	
	Nickel	(TRA Workers)	
Dermal, local, acute	Cadmium	(TRA Workers)	Qualitative risk
	Cobalt	(TRA Workers)	
Combined routes, systemic, long-term			
Combined routes, systemic, acute			

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 2.63E-4 Pa for Zinc.
The vapour pressure at operating temperature (40°C) used for the calculation is 0 Pa for Cobalt.
The vapour pressure at operating temperature (40°C) used for the calculation is 0.087 Pa for Arsenic.
The vapour pressure at operating temperature (40°C) used for the calculation is 2.63E-4 Pa for Lead.
The vapour pressure at operating temperature (40°C) used for the calculation is 2.63E-4 Pa for Cadmium.
The vapour pressure at operating temperature (40°C) used for the calculation is 2.78E-4 Pa for Copper .
The vapour pressure at operating temperature (40°C) used for the calculation is 2.63E-4 Pa for Nickel.

Risk characterisation

Qualitative risk characterisation (Inhalation, systemic, acute, Inhalation, local, acute, Dermal, systemic, long term, Dermal, systemic, acute, Dermal, local, long term , Dermal, local, acute, Eye, local):
A number of abatement measures are available to limit inhalation exposure: the substance is transported via a closed conveyor belt or sprinkling devices are in place (for more information, refer to BREF notes NFM)
Workers are not indirect contact with the substance and wear protective equipment including goggles, eye exposure is unlikely