

Manganese Dioxide

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

1.1. Product identifier

Product name : Manganese Dioxide
Synonyms : MnO₂ rich material, cell mud, anode mud, MnO₂ sludge, Pb Mn cell mud, manganese sludge, anode cleaning sludge; slimes and sludges, zinc sulfate electrolytic
Registration number REACH : 01-2119467168-30-0000 (Nyrstar Belgium NV/SA)
 01-2119467168-30-0003 (Nyrstar Budel BV)
 01-2119467168-30-0006 (Nyrstar France SAS)
Product type REACH : Substance/UVCB
CAS number : 69012-43-7
EC number : 273-742-8

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

1.2.1 Relevant identified uses

Industrial use: manufacturing of chemicals
 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.
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 B-2490 Balen
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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 2	H351: Suspected of causing cancer if swallowed.
Repr.	category 1A	H360Df: May damage the unborn child if swallowed. Suspected of damaging fertility if swallowed.
STOT RE	category 1	H372: Causes damage to organs (blood, central nervous system, kidneys) through prolonged or repeated exposure if swallowed.
Acute Tox.	category 4	H332: Harmful if inhaled.
Acute Tox.	category 4	H302: Harmful if swallowed.
Aquatic Acute	category 1	H400: Very toxic to aquatic life.
Aquatic Chronic	category 2	H411: Toxic to aquatic life with long lasting effects.

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2.2. Label elements



Signal word
H-statements

H351
H360Df
H372

H302 + H332
H410

P-statements

P202
P280
P260
P304 + P340
P308 + P313
P312

Supplemental information

Restricted to professional users.



Danger



Suspected of causing cancer if swallowed.

May damage the unborn child if swallowed. Suspected of damaging fertility if swallowed.

Causes damage to organs (blood, central nervous system, kidneys) through prolonged or repeated exposure if swallowed.

Harmful if swallowed or if inhaled.

Very toxic to aquatic life with long lasting effects.

Do not handle until all safety precautions have been read and understood.

Wear protective gloves, protective clothing and eye protection/face protection.

Do not breathe dust.

IF INHALED: Remove person to fresh air and keep comfortable for breathing.

IF exposed or concerned: Get medical advice/attention.

Call a POISON CENTER/doctor if you feel unwell.

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

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
slimes and sludges, zinc sulfate electrolytic 01-2119467168-30	69012-43-7 273-742-8	C>99%	Carc. 2; H351 Repr. 1A; H360Df STOT RE 1; H372 Acute Tox. 4; H332 Acute Tox. 4; H302 Aquatic Acute 1; H400 Aquatic Chronic 2; H411	(1)	UVCB	M: 1 (Acute, BIG)
manganese dioxide 01-2119452801-43	1313-13-9 215-202-6	39.56% <C<94.95%	Acute Tox. 4; H332 Acute Tox. 4; H302 STOT RE 2; H373	(1)(2)(6)	Component UVCB	
lead(II)sulphate	7446-14-2 231-198-9	0.15% <C<29.27%	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)
zinc sulphate (anhydrous)	7733-02-0 231-793-3	0.24% <C<2.47%	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))
calcium sulfate 01-2119444918-26	7778-18-9 231-900-3	0.001% <C<5%		(2)	Component UVCB	
dipotassium oxide	12136-45-7 235-227-6	0% <C<1.74%	Skin Corr. 1A; H314 Eye Dam. 1; H318	(1)	Component UVCB	
potassium sulfate	7778-80-5 231-915-5	0% <C<2.32%		(2)	Component UVCB	
strontium sulphate	7759-02-6 231-850-2	0% <C<5.24%			Component UVCB	
silicon dioxide	7631-86-9 231-545-4	0%<C<5%		(2)	Component UVCB	

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- (1) For H- and EUH-statements in full: see section 16
(2) Substance with a Community workplace exposure limit
(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. In case of respiratory problems, consult a doctor/medical service.

After skin contact:

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

After eye contact:

Rinse immediately with (lukewarm) water. Remove contact lenses, if present and easy to do. Continue rinsing. If irritation develops, 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:

No effects known.

After skin contact:

No effects known.

After eye contact:

No effects known.

After ingestion:

Vomiting. Abdominal pain. Diarrhoea. Irritation of the gastric/intestinal mucosa.

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. Use water moderately and if possible collect or contain it. Take account of toxic fire-fighting water.

5.3.2 Special protective equipment for fire-fighters:

Gloves (EN 374). Safety glasses (EN ISO 16321). Protective clothing (EN 14605 or EN 13034). Reactivity hazard: self-contained breathing apparatus (EN 136 + EN 137). Reactivity hazard: gas-tight suit (EN 943). 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. In case of hazardous reactions: keep upwind. Exposure to fire/heat: keep upwind. Exposure to fire/heat: consider evacuation. Exposure to fire/heat: have neighbourhood close doors and windows.

6.1.1 Protective equipment for non-emergency personnel

See section 8.2

6.1.2 Protective equipment for emergency responders

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Gloves (EN 374). Safety glasses (EN ISO 16321). Protective clothing (EN 14605 or EN 13034). Reactivity hazard: self-contained breathing apparatus (EN 136 + EN 137). Reactivity hazard: gas-tight suit (EN 943). 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

Prevent dust cloud formation. 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. Remove contaminated clothing immediately. 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:

Meet the legal requirements. Store in a dry area. Store at room temperature. Keep only in the original container. Keep container tightly closed.

7.2.2 Keep away from:

Heat sources, combustible materials, oxidizing agents, reducing agents, (strong) acids, organic materials.

7.2.3 Suitable packaging material:

No data available

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

Inorganic lead and its compounds	Time-weighted average exposure limit 8 h (Binding occupational exposure limit value)	0.03 mg/m ³ (1)
Manganese and inorganic manganese compounds (as manganese)	Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value)	0.05 mg/m ³ (2)
	Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value)	0.2 mg/m ³ (1)

(1) (1): Inhalable fraction

(2) (2): Respirable fraction

Belgium

Calcium (sulfate de) (anhydrate, hemihydrate, dihydrate, gypse)	Time-weighted average exposure limit 8 h	10 mg/m ³
Manganèse et ses composés (en Mn)	Time-weighted average exposure limit 8 h	0.05 mg/m ³ (1)
	Time-weighted average exposure limit 8 h	0.2 mg/m ³ (2)
Particules non classifiées autrement	Time-weighted average exposure limit 8 h	10 mg/m ³ (2)
	Time-weighted average exposure limit 8 h	3 mg/m ³ (1)
Plomb et ses composés inorganiques, mesurée en tant que Pb (non spécifié ailleurs)	Time-weighted average exposure limit 8 h	0.03 mg/m ³
Silices amorphes : précipités (gel de silice)	Time-weighted average exposure limit 8 h	10 mg/m ³
Silices amorphes: fumées	Time-weighted average exposure limit 8 h	2 mg/m ³ (1)
Silices amorphes: silice fondue SiO ₂	Time-weighted average exposure limit 8 h	0.1 mg/m ³ (3)
Silices amorphes: terre de diatomées, non calcinées	Time-weighted average exposure limit 8 h	10 mg/m ³ (2)
	Time-weighted average exposure limit 8 h	3 mg/m ³ (1)

(1) Fraction alvéolaire

(2) fraction inhalable

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(3) poussières alvéolaires

The Netherlands

Lood en anorganische loodverbindingen	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.0035 ppm (1)
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.03 mg/m ³ (1)
	<i>Als biologische grenswaarde op grond van artikel 4.16, eerste lid, van het besluit, wordt voor lood vastgesteld: 30 µg Pb/100 ml bloed.</i>	
Mangaan en anorganische mangaan-verbindingen (als mangaan)	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.022 ppm (2)
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.088 ppm (3)
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.05 mg/m ³ (2)
	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	0.2 mg/m ³ (3)

(1) inhaleerbaar

(2) respirabel, als mangaan

(3) inhaleerbaar, als mangaan

France

Calcium (sulfate de)	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	10 mg/m ³
Manganèse et ses composés exprimé en manganèse	Time-weighted average exposure limit 8 h (VRI: Valeur réglementaire indicative)	0.05 mg/m ³ (1)
	Time-weighted average exposure limit 8 h (VRI: Valeur réglementaire indicative)	0.20 mg/m ³ (2)
Plomb et ses composés inorganiques, en Pb (fraction inhalable)	Time-weighted average exposure limit 8 h (VRC: Valeur réglementaire contraignante)	0.03 mg/m ³ (2)
Poussières réputées sans effet spécifique	Time-weighted average exposure limit 8 h (VRC: Valeur réglementaire contraignante)	0.9 mg/m ³ (1)
	Time-weighted average exposure limit 8 h (VRC: Valeur réglementaire contraignante)	4 mg/m ³ (3)

(1) La valeur limite concerne la fraction alvéolaire

(2) La valeur limite concerne la fraction inhalable

(3) La valeur limite concerne la fraction totale

Germany

Allgemeiner Staubgrenzwert: Alveolengängige Fraktion	Time-weighted average exposure limit 8 h (TRGS 900)	1.25 mg/m ³ (1)
Blei und anorganischen Bleiverbindungen	Time-weighted average exposure limit 8 h (TRGS 505)	30 µg/m ³ (2)
Calciumsulfat: Anhydrit (alveolengängige Fraktion)	<i>vgl. Abschn. IIb</i>	
Calciumsulfat: Anhydrit	Time-weighted average exposure limit 8 h (MAK)	4 mg/m ³ (3)
	<i>vgl. Abschn. Vf) und g)</i>	
Kieselsäuren, amorphe	Time-weighted average exposure limit 8 h (TRGS 900)	1 mg/m ³ (4)
	<i>Kolloidale amorphe Kieselsäure (7631-86-9) einschließlich pyrogener Kieselsäure und im Nassverfahren hergestellter Kieselsäure (Fällungskieselsäure, Kieselgel).</i>	
Strontium und seine anorganischen Verbindungen	<i>vgl. Abschn. IIb</i>	
Zink und seine anorganischen Verbindungen	Time-weighted average exposure limit 8 h (MAK)	0.1 mg/m ³ (5)
	Time-weighted average exposure limit 8 h (MAK)	2 mg/m ³ (6)

(1) Alveolengängige Fraktion

(2) Die Richtlinie (RL) 2004/37/EG legt einen bindenden Luftgrenzwert von 30 µg Blei/m³ fest, der gemäß § 7 Absatz 8 Nummer 2 der GefStoffV einzuhalten ist. Dieser Wert ist nicht gesundheitsbasiert. Es besteht zudem keine Korrelation zwischen Luftmesswerten und Wirkungsdaten. Entsprechend besteht auch kein unmittelbarer Zusammenhang zwischen dem Luftgrenzwert und dem BGW.

(3) Einatembare Fraktion

(4) Einatembare Fraktion; UF: 8 (II)

(5) Alveolengängige Fraktion; UF: I(4)

(6) Einatembare Fraktion; UF: I(2); Zinkchlorid: Kurzzeitkategorie I(1)

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Austria

Calciumsulfat	Tagesmittelwert (MAK)	5 mg/m ³ (1)
	Kurzzeitwert 60(Miw) 2x (MAK)	10 mg/m ³ (1)
Kieselsäuren, amorphe a) kolloidale amorphe Kieselsäure einschl. pyrogener Kieselsäure und im Nassverfahren hergestellter Kieselsäure (Fällungskieselsäure, Kieselgel) und ungebrannter Kieselgur	Tagesmittelwert (MAK)	4 mg/m ³ (2)
Mangan und seine anorganischen Verbindungen einschließlich Trimangantetroxid	Tagesmittelwert (MAK)	0.05 mg/m ³ (3)
	Tagesmittelwert (MAK)	0.2 mg/m ³ (4)
	Kurzzeitwert 15(Miw) 4x (MAK)	0.4 mg/m ³ (3)
	Kurzzeitwert 15(Miw) 4x (MAK)	1.6 mg/m ³ (4)

(1) Alveolengängige Fraktion

(2) Einatembare Fraktion

(3) Alveolengängige Fraktion; als Mn berechnet

(4) Einatembare Fraktion; als Mn berechnet

UK

Inhalable dust	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	10 mg/m ³
Lead other than lead alkyls	Time-weighted average exposure limit 8 h (Occupational exposure limit (Control of lead at work))	0.15 mg/m ³
Manganese and its inorganic compounds (as Mn)	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.05 mg/m ³ (1)
	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.2 mg/m ³ (2)
Respirable dust	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	4 mg/m ³
Silica, amorphous	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	2.4 mg/m ³ (3)
	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	6 mg/m ³ (4)

(1) Respirable fraction

(2) Inhalable fraction

(3) Respirable dust

(4) Inhalable dust

USA (TLV-ACGIH)

Calcium sulfate	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	10 mg/m ³ (1)
Lead and inorganic compounds, as Pb	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.05 mg/m ³
Manganese, elemental and inorganic compounds, as Mn	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.02 mg/m ³ (2)
	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.1 mg/m ³ (1)

(1) (I): Inhalable fraction

(2) (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 inorganiques (Lead)	sang	30 µg/100ml	A partir du 1er janvier 2029, la valeur limite biologique contraignante est de 15 µg Pb/100 ml de sang. Il est recommandé que la plombémie des travailleuses en âge de procréer ne dépasse pas la valeur biologique de référence de 4,5 µg Pb/100 ml de sang.
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Germany

Blei, anorganischen Bleiverbindungen und bleihaltigen Gemischen (Blei)	Vollblut: keine beschränkung im fließgleichgewicht	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.
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USA (BEI-ACGIH)

Manganese Dioxide

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.
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8.1.2 Sampling methods

If applicable and available it will be listed below.

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

If applicable and available it will be listed below.

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
chlorinated polyethylene	Good resistance
nitrile rubber	Good resistance
neoprene (chloroprene rubber)	Good resistance
PVC	Good resistance
chlorinated polyethylene	Good resistance

c) Eye protection:

Safety glasses (EN ISO 16321). In case of dust production: protective goggles (EN ISO 16321).

d) Skin protection:

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

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
Colour	Black
Odour	Odourless
Odour threshold	Not applicable
Melting point	Not applicable (decomposes) ; 1013 hPa ; EU Method A.1
Boiling point	Not applicable (decomposes)
Flammability	Not classified as flammable
Explosion limits	Not applicable
Flash point	Not applicable (solid)
Auto-ignition temperature	Not applicable
Decomposition temperature	193 °C ; EU Method A.1 ; 1013 hPa
pH	2.28 - 2.32 ; 28 mg/l ; 20 °C ; OECD 105
Kinematic viscosity	Not applicable (solid)
Dynamic viscosity	Not applicable (solid)
Solubility	Water ; < 0.1 g/100 ml ; 20 °C ; OECD 105
Log Kow	Not applicable (inorganic)
Vapour pressure	Not applicable (solid)
Absolute density	4090 kg/m³ ; 22 °C ; EU Method A.3
Relative density	4.09 ; 22 °C ; EU Method A.3
Relative vapour density	Not applicable (solid)
Particle size	D50 ; 929 µm ; ASTM E323-09
	D80 ; 2083 µm ; ASTM E323-09

9.2. Other information

No data available

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SECTION 10: Stability and reactivity

10.1. Reactivity

Acid reaction.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Reacts with (some) acids: release of toxic and corrosive gases/vapours.

10.4. Conditions to avoid

Precautionary measures

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

10.5. Incompatible materials

Combustible materials, oxidizing agents, reducing agents, (strong) acids, organic materials.

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

Acute toxicity

Manganese Dioxide

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	ATE		300 mg/kg bw - 2000 mg/kg bw			Calculated value	
Inhalation (dust)	ATE		1 mg/l - 5 mg/l	4 h		Calculated value	

Conclusion

Harmful if swallowed.

Harmful if inhaled.

Not classified as acute toxic in contact with skin

Corrosion/irritation

Manganese Dioxide

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 of similar product	Single treatment
Skin	Not irritating	OECD 404	4 h	24; 48; 72 hours	Rabbit	Experimental value of similar product	

Conclusion

Not classified as irritating to the skin

Not classified as irritating to the eyes

Not classified as irritating to the respiratory system

Respiratory or skin sensitisation

Manganese Dioxide

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Dermal (on the ears)	Not sensitizing	OECD 429			Mouse (female)	Experimental value of similar product	
Inhalation (dust)	Not sensitizing					Calculated value	

Conclusion

Not classified as sensitizing for skin

Not classified as sensitizing for inhalation

Specific target organ toxicity

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Route of exposure	Parameter	Method	Value	Organ/Effect	Exposure time	Species	Value determination	Remark
Oral (diet)	NOAEL	NTP	1700 mg/kg bw/day - 2000 mg/kg bw/day	No effect	13 weeks (daily)	Rat (male / female)	Experimental value of similar product	
Inhalation (aerosol)	NOEL	OECD 416	20 mg/m ³ air	No effect		Rat (male / female)	Experimental value of similar product	

Conclusion

Causes damage to organs (blood, central nervous system, kidneys) through prolonged or repeated exposure if swallowed.
 Not classified as sub-chronically toxic in contact with skin
 Not classified as sub-chronically toxic if inhaled

Mutagenicity (in vitro)

Manganese Dioxide

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 471	Bacteria (S. typhimurium and E. coli)	No effect	Experimental value of similar product	
Negative with metabolic activation, negative without metabolic activation	OECD 473	Human lymphocytes	No effect	Experimental value of similar product	

Mutagenicity (in vivo)

Manganese Dioxide

Result	Method	Exposure time	Test substrate	Organ/Effect	Value determination	Remark
Negative (Oral (stomach tube))	OECD 474	2 dose(s)/24-hour interval	Mouse (female)	No effect	Experimental value of similar product	

Conclusion

Not classified for mutagenic or genotoxic toxicity

Carcinogenicity

Manganese Dioxide

Route of exposure	Parameter	Method	Value	Organ/Effect	Exposure time	Species	Value determination	Remark
Unknown			category 2				Calculated value	

Conclusion

Suspected of causing cancer if swallowed.

Reproductive toxicity

Manganese Dioxide

Category	Parameter	Method	Value	Exposure time	Species	Effect/Organ	Value determination	Remark
Developmental toxicity (Inhalation (aerosol))	NOAEL	OECD 414	15 mg/m ³ air	15 days (6h / day)	Rat	No effect	Experimental value of similar product	
Maternal toxicity (Inhalation (aerosol))	NOAEL	OECD 414	5 mg/m ³ air	15 days (6h / day)	Rat	No effect	Experimental value of similar product	
Effects on fertility (Inhalation (aerosol))	NOEL	OECD 416	20 mg/m ³ air		Rat (male / female)	No effect	Experimental value of similar product	
Effects on fertility (Oral (drinking water))	Dose level	1 generation study	325 mg/kg bw/day - 715 mg/kg bw/day	90 day(s)	Rat (male / female)	Reproductive performance	Experimental value of similar product	

Conclusion

Suspected of damaging fertility if swallowed.
 May damage the unborn child if swallowed.

Aspiration hazard

Manganese Dioxide

Not classified for aspiration toxicity

Toxicity other effects

Reason for revision: 3; 5; 6; 7; 8; 9; 10; 11; 12; 13

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Manganese Dioxide

Manganese Dioxide

No (test)data on the mixture available

Chronic effects from short and long-term exposure

Manganese Dioxide

Feeling of weakness. Loss of appetite. Loss of weight. Sleeplessness. Brain affection. Behavioural disturbances. Delusions. Disturbed tactile sensibility. Movement disturbances. Coordination disorders. Disturbed motor response. Tremor. Coughing. Respiratory difficulties. Risk of pneumonia. Change in the haemogramme/blood composition. Impairment of the blood forming system. Possible premature birth. Discolouration of the gums.

11.2. Information on other hazards

No evidence of endocrine disrupting properties

SECTION 12: Ecological information

12.1. Toxicity

Manganese Dioxide

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50		≤ 1 mg/l	96 h	Pisces			Calculated value
Acute toxicity crustacea	EC50		≤ 1 mg/l	48 h	Invertebrata			Calculated value
Toxicity algae and other aquatic plants	EC50		≤ 1 mg/l	72 h	Algae			Calculated value
	EC10		≤ 1 mg/l	72 h	Algae			Calculated value
Long-term toxicity fish	NOEC	OECD 210	0.55 mg/l	65 day(s)	Salvelinus fontinalis	Flow-through system	Fresh water	Experimental value
Long-term toxicity aquatic crustacea	NOEC		≤ 1 mg/l	21 day(s)	Invertebrata			Calculated value
Toxicity aquatic micro-organisms	EC50	OECD 209	> 1000 mg/l	3 h	Activated sludge	Static system	Fresh water	Experimental value; Nominal concentration

Conclusion

Very toxic to aquatic life.

Toxic to aquatic life with long lasting effects.

12.2. Persistence and degradability

Water

Biodegradability: not applicable

12.3. Bioaccumulative potential

Manganese Dioxide

Log Kow

Method	Remark	Value	Temperature	Value determination
	Not applicable (inorganic)			

Conclusion

Not bioaccumulative

12.4. Mobility in soil

No (test)data on mobility of the substance available

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

PMT conclusion

The criteria of PMT and vPvM as listed in Annex I of Regulation (EC) No 1272/2008 do not apply to inorganic substances

Manganese Dioxide

Greenhouse gases

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 2024/573)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 2024/590)

Manganese Dioxide

Groundwater

Groundwater pollutant

Water ecotoxicity pH

pH shift

manganese dioxide

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 2024/590)

Groundwater

Groundwater pollutant

lead(II)sulphate

Greenhouse gases

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 2024/573)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 2024/590)

zinc sulphate (anhydrous)

Greenhouse gases

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 2024/573)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 2024/590)

Water ecotoxicity pH

pH shift

calcium sulfate

Greenhouse gases

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 2024/573)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 2024/590)

dipotassium oxide

Greenhouse gases

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 2024/573)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 2024/590)

Groundwater

Groundwater pollutant

potassium sulfate

Greenhouse gases

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 2024/573)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 2024/590)

strontium sulphate

Greenhouse gases

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 2024/573)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 2024/590)

silicon dioxide

Greenhouse gases

Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 2024/573)

Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 2024/590)

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.

Waste material code (Directive 2008/98/EC, Decision 2000/0532/EC).

06 03 13* (wastes from the MFSU of salts and their solutions and metallic oxides: solid salts and solutions containing heavy metals).

Depending on branch of industry and production process, also other waste codes may be applicable. Industrial waste.

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 surface water (Directive 2000/60/EC, Council Decision 2455/2001/EC). Do not discharge into drains or the environment. Dispose of at authorized waste collection point.

13.1.3 Packaging/Container

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Manganese Dioxide

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 or ID number

UN number	3077
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14.2. UN proper shipping name

Proper shipping name	environmentally hazardous substance, solid, n.o.s. (slimes and sludges, zinc sulfate electrolytic)
----------------------	--

14.3. Transport hazard class(es)

Hazard identification number	90
Class	9
Classification code	M7

14.4. Packing group

Packing group	III
Labels	



14.5. Environmental hazards

Environmentally hazardous substance mark	
--	--

14.6. Special precautions for user

Special provisions	274
Special provisions	335
Special provisions	375
Special provisions	601
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 or ID number

UN number	3077
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14.2. UN proper shipping name

Proper shipping name	environmentally hazardous substance, solid, n.o.s. (slimes and sludges, zinc sulfate electrolytic)
----------------------	--

14.3. Transport hazard class(es)

Hazard identification number	90
Class	9
Classification code	M7

14.4. Packing group

Packing group	III
Labels	



14.5. Environmental hazards

Environmentally hazardous substance mark	
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14.6. Special precautions for user

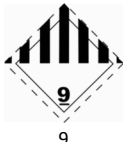
Special provisions	274
Special provisions	335
Special provisions	375
Special provisions	601
Limited quantities	Combination packagings: not more than 5 kg per inner packaging for solids. A package shall not weigh more than 30 kg (gross mass).

Manganese Dioxide

Inland waterways (ADN)

14.1. UN number or ID number	UN number/ID number	3077
14.2. UN proper shipping name	Proper shipping name	environmentally hazardous substance, solid, n.o.s. (slimes and sludges, zinc sulfate electrolytic)
14.3. Transport hazard class(es)	Class	9
	Classification code	M7
14.4. Packing group	Packing group	III
	Labels	
14.5. Environmental hazards	Environmentally hazardous substance mark	
14.6. Special precautions for user	Special provisions	274
	Special provisions	335
	Special provisions	375
	Special provisions	601
	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 or ID number	UN number	3077
14.2. UN proper shipping name	Proper shipping name	environmentally hazardous substance, solid, n.o.s. (slimes and sludges, zinc sulfate electrolytic)
14.3. Transport hazard class(es)	Class	9
14.4. Packing group	Packing group	III
	Labels	
14.5. Environmental hazards	Marine pollutant	P
	Environmentally hazardous substance mark	
14.6. Special precautions for user	Special provisions	274
	Special provisions	335
	Special provisions	375
	Special provisions	966
	Special provisions	967
	Special provisions	969
	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 or ID number	UN number/ID number	3077
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Manganese Dioxide

14.2. UN proper shipping name

Proper shipping name	environmentally hazardous substance, solid, n.o.s. (slimes and sludges, zinc sulfate electrolytic)
----------------------	--

14.3. Transport hazard class(es)

Class	9
-------	---

14.4. Packing group

Packing group	III
---------------	-----

Labels



14.5. Environmental hazards

Environmentally hazardous substance mark	 yes
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14.6. Special precautions for user

Special provisions	A158
Special provisions	A179
Special provisions	A197
Special provisions	A215
Special provisions	A97

Passenger and cargo transport

Limited quantities: maximum net quantity per packaging	30 kg G
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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:
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)

Manganese Dioxide

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

Information exposure scenarios

This safety data sheet does not contain an exposure scenario; exempted as (isolated) intermediate

REACH Candidate list

Not enumerated in candidate list of substances of very high concern (SVHC) for authorisation (Article 59 of Regulation (EC) No 1907/2006)

REACH Candidate list

Does not contain 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 XIV - Authorisation

Not enumerated in Annex XIV of Regulation (EC) No 1907/2006: list of substances subject to authorisation

REACH Annex XIV - Authorisation

Does not contain component(s) included in Annex XIV of Regulation (EC) No 1907/2006: list of substances subject to authorisation

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Manganese Dioxide

REACH Annex XVII - Restriction

Not 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.

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.

National legislation Belgium

Agents cancérigènes, mutagènes et reprotoxiques et aux agents possédant des propriétés perturbant le système endocrinien (Code du bien-être au travail, Livre VI, titre 2)	reprotoxique catégorie 1A ou 1B selon CLP, n.s.a.
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National legislation The Netherlands

Waterbezwaarlijkheid	Z (1); Algemene Beoordelingsmethodiek (ABM)
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National legislation France

No data available

National legislation Germany

Lagerklasse (TRGS510)	6.1 D: Nichtbrennbare, akut toxische Kat. 3 / giftige oder chronisch wirkende Gefahrstoffe
WGK	3; Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (AwSV) - 18. April 2017
TA-Luft	5.2.7.1.3

National legislation Austria

No data available

National legislation United Kingdom

No data available

Other relevant data

No data available

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:

H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H332 Harmful if inhaled.
H351 Suspected of causing cancer if swallowed.
H360Df May damage the unborn child if swallowed. Suspected of damaging fertility if swallowed.
H360Df May damage the unborn child. Suspected of damaging fertility.
H372 Causes damage to organs (blood, central nervous system, kidneys) through prolonged or repeated exposure if swallowed.
H373 May cause damage to organs (brain) 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.
H411 Toxic to aquatic life with long lasting effects.

(*)	INTERNAL CLASSIFICATION BY BIG
ADI	Acceptable daily intake
AOEL	Acceptable operator exposure level
ATE	Acute Toxicity Estimate
BCF	Bioconcentration Factor
BEI	Biological Exposure Indices
CLP (EU-GHS)	Classification, labelling and packaging (Globally Harmonised System in Europe)
DMEL	Derived Minimal Effect Level
DNEL	Derived No Effect Level
EC10	Effect Concentration 10 %
EC50	Effect Concentration 50 %
Erc50	EC50 in terms of reduction of growth rate
GLP	Good Laboratory Practice
HS	Harmonized System of Nomenclature, a standardized international system for classifying goods under the Harmonized System Convention, as drawn up by the World Customs Organization Secretariat
LC0	Lethal Concentration 0 %
LC50	Lethal Concentration 50 %
LD50	Lethal Dose 50 %
LOAEC/LOAEL	Lowest Observed Adverse Effect Concentration/Lowest Observed Adverse Effect Level

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Manganese Dioxide

NOAEC/NOAEL	No Observed Adverse Effect Concentration/No Observed Adverse Effect Level
NOEC/NOEL	No Observed Effect Concentration/No Observed Effect Level
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.