



DISCLAIMER: The Manganese Consortium believes that the information presented is technically and scientifically correct. However, MARA does not represent or warrant the accuracy of the information contained in this document or its suitability for any general or specific use. The material contained herein is by necessity general in nature; it should not be used or relied upon for any specific or general application without first obtaining competent advice. MARA, its members, staff and consultants specifically disclaim any and all liability or responsibility of any kind for loss, damage, or injury resulting from the use of the information contained in this publication.

SAFETY DATA SHEET: MANGANESE SULFATE; MANGANESE (II) SULFATE MONOHYDRATE

Provided in accordance with Article 18(2) of Regulation (EC) No 1272/2008

SECTION 1: IDENTIFICATION

1.1 Product Identifier:

Substance name: Manganese (II) Sulfate Monohydrate

Other names: Manganese sulphate, $MnSO_4$

EINECS number: 232-089-9

CAS number: 7785-87-7

REACH Registration number: [If applicable]

Unique formula identifier (UFI): Not applicable for this substance

1.2 Relevant identified uses of the substance/mixture and uses advised against:

Formulation of non-fertiliser products: PC 23 Leather treatment products

Formulation of fertiliser products: PC 12 Fertilisers

Manufacture of fungicides: PC 8 Biocidal products

Production of other manganese-based compounds, intermediate: PC 20 Products such as ph-regulators, flocculants, precipitants, neutralisation agents

Large scale production of penicillin laboratory reagents: PC 29 Pharmaceuticals

Leather tanning: PC 23 Leather treatment products

Surface treatment: PC 9a: Coatings and paints, thinners, paint removal

Printing: PC 18: Ink and toners

Add or delete the above to suit your company's needs.

No known uses advised against

1.3 Details of the supplier of the safety data sheet:(including address, phone numbers etc:

Complete as required.

1.3.1 Name of supplier or manufacturer: (including address, phone numbers etc:

Complete as required.

1.3.2 Person responsible in EU member state / Only Representative

information: **Complete as required.**

1.4 Emergency telephone: **Complete as required (for EU include 112) CIAV # of receiving country.**




SECTION 2: HAZARD IDENTIFICATION

2.1 Classification of the substance or mixture:

Classification according to Regulation (EC) No. 1272/2008 [CLP] and the UN GHS: Classified as; STOT RE 2; Eye Dam.1; Aquatic Chronic 2*

2.2 Label elements:



Classification:	STOT RE 2; Eye Dam.1; Aquatic Chronic 2
Pictogram GHS05, GHS08 and GHS09 respectively	  
Signal word	Danger
Hazard statement	H373: May cause serious damage to the brain through prolonged or repeated exposure via inhalation. H318: Causes serious eye damage. H411: Toxic to aquatic life with long lasting effects
Precautionary statement Prevention	P260, P273, P280
Precautionary statement Response	P305+351+338
Precautionary Statement Disposal	P501
*Aquatic chronic	Harmonised classification but not supported by available data

2.3 Other hazards:

The substance is an inorganic metallic salt. Based on available information, the substance does not meet the criteria for classification here below:

- ED HH (Endocrine disruption for human health)
- ED ENV (Endocrine disruption for the environment)
- PBT (persistent, bioaccumulative, toxic),
- vPvB (very persistent, very bioaccumulative)
- PMT (persistent, mobile, toxic)
- vPvM (very persistent, very mobile)

Studies: Available information on invitro testing using MnCl₂ (readacross substance) as the test substance on various thyroid investigations – DIO-1, TPO, TR β CALUX and TTR TR β CALUX – confirmed negative results.

None of the constituent substances were included in the list established in accordance with Article 59(1) for having endocrine disrupting properties, nor are they identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/210056 or Commission Regulation (EU) 2018/60557.

May form explosible dust-air mixture if dispersed.

See section 8 for personal protection. **Include other hazards if known.**

During handling: If a significant amount of dust is present, precautions should be taken to limit this exposure through normal control procedures such as local exhaust ventilation (LEV) or respiratory protective equipment (RPE).

During use: Fumes may be produced during the melting operations. MnSO₄ may be present in these fumes in oxidized forms, some of which maybe hazardous. Precautions should be taken to limit this exposure through normal control procedures such as local exhaust ventilation (LEV) or respiratory protective equipment (RPE).

See section 8 for personal protection. **Include other hazards if known.**

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance(s) [Amend as appropriate].

Manganese sulfate is an inorganic mono-constituent substance. Its impurities are negligible and do not influence the overall classification.

Chemical name	EC No.	CAS number	Nominal % w/w	REACH Registration number
Manganese sulfate	232-089-9	7785-87-7	>95 - 100% (Complete as per your substance)	xx-xxxxxxxx-xx

Revision date 04/2025 superseding date 06/2023

11 rue Dulong – 75017 Paris - France

Tel : +33 (0) 1 45 63 06 34 Fax : +33 (0) 1 42 89 42 92

E-mail : reach@manganese.org - Web site : www.reach-manganese.org



Water	231-797-2	7732-18-15	<5% (Complete as per your substance)	
-------	-----------	------------	--------------------------------------	--

3.2 Mixtures: The substance is not a mixture.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures: **FOR REACH REGISTRANTS INFORMATION IN THIS SECTION MUST ALIGN WITH THAT OF THE GUIDANCE OF SAFE USE IN YOUR DOSSIER (IUCLID SECTION 11)**

4.1.1 General information

The substance will cause serious eye damage if this happens seek medical advice immediately.

4.1.2 Following inhalation: Do not inhale. Wear an appropriate mask. Coughing can be expected as an immediate effect, delayed effects are not expected. Move exposed individual to fresh air **Include other relevant information based on your company's procedures.**

4.1.3 Following skin contact: **Include information based on your company's procedures.**

4.1.4 Following eye contact: The substance will cause serious eye damage. **Include information based on your company's procedures.**

4.1.5 Following ingestion: **Include information based on your company's procedures.**

4.1.6 Self-protection of the first aider: **Include information based on your company's procedures.**

4.2 Most important symptoms and effects, both acute and delayed: Dust particles could cause eye irritation/itchiness and lung irritation/coughing. Breathing difficulties may occur immediately in the event of excessive dustiness due to lung overload.

4.3 Indication of any immediate medical attention and special treatment needed: Not combustible under normal conditions of use. **Include information based on your company's procedures.**

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing media: MnSO₄ is not combustible under normal conditions of use **Include information on an appropriate extinguishing media and any unsuitable extinguishing media based on your company's procedures.**

5.2 Special hazards arising from substance or mixture: The substance does not decompose naturally. However, upon combustion produces fumes of metallic oxides and oxides of carbon. **Include any other relevant information.**

5.3 Advice for fire-fighters: Not combustible under normal conditions of use but fine powders can combust. Wear suitable personal protective equipment (including self-contained breathing apparatus (SCBA) and full protective clothing) when extinguishing fires. **Include information based on your company's procedures.**

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

Eye protection and respirators should be worn where dust is a potential hazard. Gloves should be worn when handling this material because of the risk of contact with sharp particles. When dealing with powders avoid generating dust and remove all sources of ignition.

6.1.1 For non-emergency personnel:

a) Use personal protective equipment, such as dust masks, goggles and overalls to minimise inhalation. Eye and skin contact should be avoided for good industrial hygiene purposes. See section 8 for more details.

b) Must have dust control and sufficient ventilation. Avoid all ignition sources

c) In the event of accidental release, evacuate the immediate area and consult trained personnel.



M a n g a n e s e R E A C H A d m i n i s t r a t i o n

Association

6.1.2 For emergency responders:

Remove persons to safety. Isolate hazard area and deny entry. Ventilate closed spaces before entering. Use personal protective equipment - **Specify which to use/which not to use, see section 8 and 13 – Amend as per your company procedures.**

6.2 Environmental precautions:

The substance is not considered an environmental hazard based on the available studies. However, it is advisable to keep away from drains as large quantities could clog drains. Avoid release to surface and groundwater. **Include other information based on your company's procedures.**

6.3 Methods and material for containment and cleaning up:

The substance is not considered an environmental hazard based on the available studies. However, it is advisable to keep away from drains as large quantities could clog drains.

6.3.1 For containment: Collect in closed and suitable containers for disposal or reuse **Include other information based on your company's procedures.**

6.3.2 For cleaning up: Spills should be contained and recovered mechanically if possible. Collect dust or particulates using a vacuum cleaner with a high efficiency particulate air (HEPA) filter. Place in a designated, labelled waste container. Dispose of in accordance with local regulations. Contaminated objects and areas thoroughly observing environmental regulations **-include cleaning and vacuuming techniques.**

6.3.3 Other information: Avoid excessive dust generation. Material may be reclaimed for re-use. **Include information based on your company's procedure such as clean-up techniques/materials never to be used.**

6.4 Reference to other sections:

For Personal protective equipment and appropriate disposal: see section 8 and 13.

Section 7: HANDLING AND STORAGE

7.1 Precautions for safe handling:

7.1.1 Recommendations:

- a) Use only in well-ventilated areas. Avoid spillages and avoid generating dust. Wear personal protective clothing especially eye protection. (see Section 8). **Include other information based on your company's procedures.**
- b) Avoid handling with incompatible substances/mixtures: Avoid contact with acids. **(List incompatible substances if known)**
- c) Avoid dust generating operations or must be carried out in properly ventilated areas while wearing appropriate PPE.
- d) Capture dust if possible and if generated, vacuum and compress into pellets to minimize environmental exposure- **Amend as per company procedures.**

7.1.2 Advice on general occupational hygiene:

- a) Do not eat, drink or smoke in work areas.
- b) Wash hands before and after use and keep them dry.
- c) Remove contaminated clothing and personal protective equipment before entering eating areas - **Include other information based on your company's procedures.**
- d) Capture dust if possible and if generated, vacuum and compress into pellets to minimize environmental exposure- **Amend as per company.**

7.2 Conditions for safe storage, including any incompatibilities:

7.2.1 Specific storage requirements:

- a) Risk management associated to physical and chemical properties
 - i) Explosive atmosphere: The substance is not explosive, however, store away from explosive materials
 - ii) Corrosive conditions: The substance does not corrode metal, hence no adverse corrosive effects are expected
 - iii) Flammability hazard: The substance is not flammable, however, keep away from flammable materials
 - iv) Incompatible substances or mixtures: Acids. **(List others if known) Include information based on company's procedures.**



M a n g a n e s e R E A C H A d m i n i s t r a t i o n

Association

v) Evaporative conditions: The substance does not evaporate. Avoid storage around organic evaporative materials/substances.

vi) Potential ignition sources: Keep away from ignition sources.

b) How to control effects from environmental conditions: (i) Weather conditions, (ii) ambient pressure, (iii) varying temperatures, (iv) sunlight, (v) humidity and (vi) vibration do not affect the integrity of the substance. However, storage environments should not be very humid – **Amend as per your company's procedures.**

c) How to maintain the integrity of the substance: The substance is very stable under normal conditions of use. It does not decompose or disintegrate. (i) Stabilisers and (ii) antioxidants are not required.

e) Other advice

i) Ventilation requirements: Ensure adequate ventilation and store at room temperature.

ii) Specific designs for storage: Keep/store only in original container/packaging. **Include other information based on your company's procedures.**

iii) Quantity limits under storage conditions: There is no limitation as the substance does not pose any physical and chemical hazards.

iv) Packaging compatibility: Store in original/similar packaging. Protect container/packaging against damage – **Amend as per company's procedures.**

7.3 Specific end uses(s):

Recommendations: Observe instructions for use and see exposure scenarios – Annex 1

SECTION 8: EXPOSURE CONTROLS/ PERSONAL PROTECTION

8.1 Control parameters:

8.1.1 Occupational exposure limits: The EU SCOEL OEL values for Manganese and its inorganic compounds are 0.2mg/m³ – inhalable and 0.05mg/m³ respirable.

8.1.1.1 National limits: **Include other relevant country specific workplace limits.**

8.1.1.2 Union limits: 0.2mg/m³ inhalable and 0.05mg/m³ respirable

8.1.1.3 Any other national exposure limit values: **Include if available.**

8.1.1.4 Union biological limit values: No union biological limit values exist for Inorganic manganese and its compounds.

8.1.1.5 Any other national biological limit values: **Include if available.**

8.1.2 Monitoring procedures: Dust monitoring is recommended, **provide methodology as per national laws/company procedures.**

8.1.3 Formation of air contaminants: The substance does not produce air contaminants under normal conditions of use. OEL/BLV are therefore not provided **Amend as per your company's use.**

8.1.4 Derived No Effects Limits (DNELs)/Predicted No Effects Concentrations (PNECs):

Hazard Assessment conclusion for Workers: DNELS

Route	Type of effect	Hazard conclusion	Most sensitive endpoint
Inhalation	Systemic effects - Long-term	DNEL (Derived No Effect Level) 0,2mg/m ³	neurotoxicity
Inhalation	Systemic effects - Acute	no hazard identified	
Inhalation	Local effects - Long-term	no hazard identified	
Inhalation	Local effects - Acute	no hazard identified	

Revision date 04/2025 superseding date 06/2023

11 rue Dulong – 75017 Paris - France

Tel : +33 (0) 1 45 63 06 34 Fax : +33 (0) 1 42 89 42 92

E-mail : reach@manganese.org - Web site : www.reach-manganese.org



Dermal	Systemic effects - Long-term	DNEL (Derived No Effect Level) 2,86mg/kg bw/day	neurotoxicity
Dermal	Systemic effects - Acute	no hazard identified	
Dermal	Local effects - Long-term	no hazard identified	
Dermal	Local effects - Acute	no hazard identified	
Eyes	Local effects	medium hazard (no threshold derived)	

Hazard Assessment conclusion for the Environment: PNECs

Compartment	Hazard conclusion	Remarks/Justification
Freshwater	<p>PNEC aqua (freshwater): 1,249mg/l</p> <p>Intermittent releases:</p>	<p>Assessment factor: 2</p> <p>Extrapolation method: sensitivity distribution</p> <p>PNEC aqua (freshwater)</p> <p>5 % SSD (HC₅) = 0.91 mg Mn/L (which is equivalent to 2.498 mg MnSO₄/L when a molecular weight correction is made; MW of Mn = 55 g/mol and MW of MnSO₄ = 151 g/mol)</p> <p>As assessment factor of 5 to 1 is applied on the endpoint derived from Species Sensitivity Distributions (SSDs) method. An AF of 2 has been applied. Full justification has been provided below.</p>
Marine water	<p>PNEC aqua (marine water): 0,0151mg/l</p> <p>Intermittent releases:</p>	<p>Assessment factor: 100</p> <p>Extrapolation method: assessment factor</p> <p>PNEC aqua (marine water)</p> <p>The lowest long term toxicity endpoint observed from the three freshwater or saltwater species representatives of three trophic levels (algae, crustaceans [invertebrates] and fish) is observed for fish, which is NOEC (65 d) = 0.55 mg Mn/L (which is</p>

Revision date 04/2025 superseding date 06/2023

11 rue Dulong – 75017 Paris - France

Tel : +33 (0) 1 45 63 06 34 Fax : +33 (0) 1 42 89 42 92

E-mail : reach@manganese.org - Web site : www.reach-manganese.org



		<p>equivalent to 1.51 mg MnSO₄/L when a molecular weight correction is made; MW of Mn = 55 g/mol and MW of MnSO₄ = 151 g/mol)</p> <p>An assessment factor of 100 is applied to the lowest long-term results (e.g., EC10 or NOEC) from three freshwater or saltwater species representatives of three trophic levels (algae, crustaceans [invertebrates] and fish). Note that a number of studies for each trophic level are available and so the AF represents a worst-case.</p>
Sediments (freshwater)	<p>PNEC (freshwater): 1,587mg/kg dw</p> <p>sediment sediment</p>	<p>Assessment factor: 100</p> <p>Extrapolation method: assessment factor</p> <p>PNEC sediment (freshwater)</p> <p>Only one reliable long term freshwater sediment test data is available.</p> <p>EC₁₀ = 16.34 mg Mn/L (equivalent to 158.738 mg MnSO₄/kg dwt, corrected for sediment density)</p> <p>EC₁₀ (54 d) = 16.34 mg Mn/L (which is equivalent to 12.569 mg Mn/kg wwt, assuming the sediment density of 1.3 g/cm³). Further, using the wet weight to dry weight conversion factor for sediment (i.e., 4.6), EC₁₀ (54 d) = 57.818 mg Mn/kg dwt (which is equivalent to 158.738 mg MnSO₄/kg dwt when a molecular weight correction is made; MW of Mn = 55 g/mol and MW of MnSO₄ = 151 g/mol)</p> <p>An assessment factor of 100 is applied when one long term freshwater sediment test data (NOEC or EC10) is available.</p>
Sediments (marine water)	<p>PNEC sediment (marine water): 0,1587mg/kg sediment dw</p>	<p>Assessment factor: 1000</p> <p>Extrapolation method: assessment factor</p> <p>PNEC sediment (marine water)</p> <p>Only one reliable long term freshwater sediment test data is available.</p> <p>EC₁₀ = 16.34 mg Mn/L (equivalent to 158.738 mg MnSO₄/kg dwt corrected for sediment density)</p>



		<p>EC10 (54 d) = 16.34 mg Mn/L (which is equivalent to 12.569 mg Mn/kg wwt, assuming the sediment density of 1.3 g/cm³). Further, using the wet weight to dry weight conversion factor for sediment (i.e., 4.6), EC10 (54 d) = 57.818 mg Mn/kg dwt (which is equivalent to 158.738 mg MnSO₄/kg dwt when a molecular weight correction is made; MW of Mn = 55 g/mol and MW of MnSO₄ = 151 g/mol)</p> <p>An assessment factor of 1000 is applied when one long term freshwater sediment test data (NOEC or EC10) is available.</p>
Sewage treatment plant	PNEC STP: 56mg/l	<p>Assessment factor: 10</p> <p>Extrapolation method: assessment factor</p> <p>PNEC STP</p> <p>NOEC (3 h) = 560 mg MnSO₄/L</p> <p>When NOEC derived from activated sludge respiration inhibition test is available, an assessment factor of 10 is applied.</p>
Soil	PNEC soil: 40,028mg/kg soil dw	<p>Assessment factor: 10</p> <p>Extrapolation method: assessment factor</p> <p>PNEC soil</p> <p>The lowest long term toxicity endpoint after organic matter content correction from the three species of at least three trophic levels (e.g., plants, earthworm, microorganisms, arthropods) is observed for soil microorganisms, which is NOEC (28 h) = 145.80 mg Mn/kg dwt or equivalent to 400.28 mg MnSO₄/kg dwt (corrected for organic matter content).</p> <p>NOEC (28 h) = 207 mg Mn/kg dwt (which is equivalent to 145.80 mg Mn/kg dwt when corrected for organic matter content of 4.827 %). Further, correction for molecular weight (MW of Mn = 55 g/mol and MW of MnSO₄ = 151 g/mol) results in NOEC of 400.28 mg MnSO₄/kg dwt</p> <p>When long-term toxicity tests for three species of three trophic levels are available, AF of 10 is used.</p>



Air	no hazard identified:	
Secondary poisoning	no potential for bioaccumulation:	Bioaccumulation of Mn is not expected to occur. Hence no secondary poisoning risk exists.

8.1.5 Control banding: A control banding approach is not used to decrease risk management measure during the use of this substance for the uses specified in section 1.2.

8.2 Exposure controls: See Exposure scenarios on, Annex 1

8.2.1 Appropriate engineering controls: Dust is trapped and recycled where possible. Waste water is collected for treatment and recycled. LEV is encouraged. **Amend as per your company's procedures**

8.2.2 Individual protective measures: Overalls, goggles and masks are mandatory during use.

8.2.2.1 Other non-personal protection: Good industrial hygiene is a must. Keep and use in well ventilated areas. See section 5 for more information **Amend as per your company's procedures**

8.2.2.2 CEN stand requirement for protective equipment: (Please state the quality/standard/thickness of the personal protective equipment used by your organisation)

a) Eye/face protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. **Complete as per your company procedures**

b) Skin protection: Overalls, gloves and boots are not mandatory; however, they are encouraged for good industrial hygiene. Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this substance. (Please specify type of overall, gloves, boots including the thickness of material and amend as per your company procedures)

c) Respiratory protection: Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the substance and the safe working limits of the selected respirator. (Amend as per your company procedures)

d) Thermal hazards: Not applicable

8.2.3 Environmental exposure controls: The substance is not harmful to the environment. (Please include environmental controls employed by your company)

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES [the information below is based on available literature and studies]

9.1 General information

Revision date 04/2025 superseding date 06/2023

11 rue Dulong – 75017 Paris - France

Tel : +33 (0) 1 45 63 06 34 Fax : +33 (0) 1 42 89 42 92

E-mail : reach@manganese.org - Web site : www.reach-manganese.org



State	Solid
Colour	Light Pink
Odour	Odourless
Melting point (Mpt) / Freezing point	>723 K (>450°C), Regulation (EC) No. 440/2008, Annex, A1
Boiling point or initial boiling point/boiling range	Melting pt >300°C, hence study not applicable
Flammability of solids	Not flammable, Regulation (EC) No. 440/2008, Method A10
Lower and upper explosion limit	Not applicable to solids
Flash Point	Not applicable to solids
Auto-ignition temperature	Not applicable to solids
Decomposition temperature	Not applicable to inorganic solids
pH	Include if known (where the substance is a solid, the pH of an aqueous solution at a given concentration shall be indicated)
Kinematic viscosity	Not applicable to solids
Water Solubility	Soluble: 42.5 to 45.0% at 20±0.5°C., Regulation (EC) No. 440/2008, Annex A6
Partition Coefficient	Not applicable for inorganic substances
Vapour pressure	Study not conducted as Mpt >300°C
Density/Relative density	2.93 at 220. +/- 0.5°C, Regulation (EC) No. 440/2008, Annex, A3
Particle characteristics	Data lacking
9.2 Other information	None
9.2.1 Physical hazard classes	
Explosive properties	Predicted to be non-explosive
Flammable gases	Not applicable as the substance is a solid
Aerosols	Not applicable under normal conditions of use
Oxidizing gases	Not applicable as the substance is a solid
Gases under pressure	Not applicable as the substance is a solid
Flammability of liquids/Solids	Not flammable
Self-reactive substances and mixtures	Not self-reactive
Pyrophoric liquids	Not applicable as the substance is a solid
Pyrophoric solids	Does not have pyrophoric properties
Self-heating substances and mixtures	Spontaneous ignition does not occur
Substances and mixtures which emit flammable gases in contact with water	Predicted not to emit flammable gases upon contact with water
Oxidising Liquids/solids	Non oxidising, Method A17
Organic peroxides	Not applicable to inorganic substances
Corrosive to metals	The substance is not corrosive to metals
Desensitised explosives	Not applicable
Bulk density	1.20-1.40gm/cc
9.2 Other information	No additional information relevant to the safe use of the substance

SECTION 10: STABILITY AND REACTIVITY [Amend information below to conform to your company information]

10.1 Reactivity: No specific test data related to reactivity available for this substance.

10.1.1 **Reactivity hazard of substance:** Not applicable for inorganic substances

10.1.2 **Reactivity hazard of mixture:** Not applicable as the substance is not a mixture.

Revision date 04/2025 superseding date 06/2023

11 rue Dulong – 75017 Paris - France

Tel : +33 (0) 1 45 63 06 34 Fax : +33 (0) 1 42 89 42 92

E-mail : reach@manganese.org - Web site : www.reach-manganese.org



M a n g a n e s e R E A C H A d m i n i s t r a t i o n

Association

- 10.2 Chemical stability:** The substance is chemically stable under recommended conditions of storage, use and temperature.
- 10.3 Possibility of hazardous reaction:** No hazardous reaction when handled and stored according to provisions.
- 10.4 Conditions to avoid:** Include your company's information.
- 10.5 Incompatible materials:** Acids. Include your company's information.
- 10.6 Hazardous decomposition products:** Does not decompose when used for intended uses. Include your company's information.

SECTION 11: TOXICOLOGICAL INFORMATION [The information in this section is from experimental data and other available literature]

11.1 Information on toxicological effects:

- a) Acute toxicity: Based on available data, the classification criteria are not met
Acute oral toxicity: No adverse effect observed (LD50 >2000 mg/kg bw)
Acute dermal toxicity: No study available. No concerns predicted
Acute inhalation toxicity: No adverse effects observed (LD50 >5000 mg/m3)
- b) Skin corrosion/irritation: Based on available data, the classification criteria are not met
Not irritating in rabbits (one study according to OECD guideline 404 and EU method B.4, GLP), applied to the intact skin for 24 hours and 72 hours post dosing. Primary dermal irritation index for all animals = 0. No effects were noted during the study.
- c) Serious eye damage/irritation: Based on available data, the classification criteria are met
- d) Respiratory or skin sensitization: Based on available data, the classification criteria are not met
Not a skin sensitizer in the mouse (One study to OECD guideline 429 and EU method B.42, Local lymph node assay, GLP). There is not information available for sensitization. However, it is predicted not to be a respiratory sensitizer.
- e) Germ cell mutagenicity: Based on available data, the classification criteria are not met
Data lacking for the substance as such. However, data on MnCl₂ – a very soluble salt considered as a worse-case evaluation concludes – no effects:
- Ames test with *S. typhimurium* TA 98, TA 100, TA 1535, TA 1537, *E. coli* WP2 uvrA (Met. act.: with and without) (OECD TG 471, EU method B13 and GLP); No toxicity was observed up a concentration of 5000 ug/plate.
- Mammalian cell gene mutation assay with mouse lymphoma L5178Y cells (met. act.: with and without) (OECD 476 and GLP); Negative for mouse lymphoma Cytotoxicity: Yes, induced toxicity was not at the highest dose.
- In-vitro mammalian chromosome aberration test with human lymphocytes (Met. act.: with and without) (OECD guideline 473 and GLP). Negative for lymphocytes. Cytotoxicity: Yes
- f) Carcinogenicity: Based on available data, the classification criteria are not met
There are no specific studies on carcinogenicity for this substance – data lacking. However, a literature review on carcinogenicity for Mn and its inorganic compounds (Assem et al, 2011) concluded – No concerns, carcinogenicity in humans is not expected. This is supported by the EU SCOEL review outcome.
- g) Reproductive toxicity: Based on available data, the classification criteria are not met
An extended one generation study is not available for this substance. However, a two generation reprotoxicity study on the male/female rats using MnCl₂ via inhalation (OECD guideline 416, GLP) concluded: No treatment related effects at 20 mg/m³ air in F0, F1 and F2 generations (Jardine L, 2013 and McGough & Jardine, 2017) - Not toxic to reproduction.
A prenatal-developmental toxicity study using MnCl₂ via inhalation (OECD 414, GLP) concluded: No fetal abnormalities at 15 mg/m³ (Dettwiler M, 2016) – No effects reported.
- h) Specific target organ toxicity (Single exposure):
Based on available data the classification criteria are not met.
- i) Specific target organ toxicity (repeated exposure):
Based on a thorough review of available evidence, a proposed classification for oral or inhaled MnSO₄ is STOT RE Category 2, target organ the brain. Aspiration hazard: Based on available data, the classification criteria are not met

11.2 Information on other hazard

Revision date 04/2025 superseding date 06/2023

11 rue Dulong – 75017 Paris - France

Tel : +33 (0) 1 45 63 06 34 Fax : +33 (0) 1 42 89 42 92

E-mail : reach@manganese.org - Web site : www.reach-manganese.org



Manganese REACH Administration

Association

11.2.1 Endocrine disrupting properties: A thorough review of the regulatory weight of evidence indicates no adverse effect on endocrine modality. Invitro studies on analogue substance (MnCl₂) concludes – no ED effects.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity: Toxic to aquatic life with long-lasting effects by harmonise classification, which is not applicable based on available data

Acute (short-term)

Aquatic vertebrates:

a) Fish: LC50 (96h): 49.9 mg/L Mn based on mortality (test material-MnSO₄)

b) Fish: LC50 (96h): 27.5 mg/L Mn based on: mortality (150 Hardness. 95 % 23.4 - 31.6 mg/L.) and LL50 (96h): 5.12 mg/L Mn based on: mortality (30 Hardness. 95 % CL 4.6 - 5.7 mg/L.) (test material -MnCl₂ based on readacross)

Aquatic invertebrates:

a) Daphnia magna: LC50 (48h): 9.8 mg/L dissolved (meas. (arithm. mean)) based on: as Mn²⁺ (Without Food) (test material -MnCl₂ based on readacross)

Chronic (long-term) toxicity:

Aquatic vertebrates:

a) Fish early-life stage toxicity: NOEC (4mo): 0.6 mg/L Mn (test material – MnCl₂ based on readacross)

b) Fish early-life stage toxicity: NOEC (4mo): 2.03 mg/L Mn (test material – MnCl₂ based on readacross)

c) Oncorhynchus mykiss (previous name: Salmo gairdneri): Early life: NOEC (4mo): 0.6 mg/L Mn (test material-MnSO₄)

Aquatic invertebrates:

a) Fresh water Ceriodaphnia dubia: LC50 (48h): 5.7 mg Mn/L (Average) test mat. (estimated) based on soft water survival (test material -MnCl₂ based on readacross)

b) Aquatic worm Aeolosoma sp.: LC50 (48h): 39.46 mg/L dissolved (meas. (arithm. mean)) based on: mortality (95 % CL); LOEC (48h): 53.67 mg/L dissolved (meas. (arithm. mean)) based on: Survival; NOEC (48h): 27.2 mg/L dissolved (meas. (arithm. mean)) based on: Survival (test material -MnCl₂ based on readacross)

c) ASRI: No effects were seen on microbial activity (OECD Guideline 209, Activated Sludge, Respiration Inhibition- ASRI) at 3 hours exposure: 560 mg/L test material and EC50 (3h) >1000 mg/L test material (nominal) based on: inhibition of total respiration - respiration rate (test material -MnCl₂ based on readacross)

Other environmental studies:

a) Soil macro-organisms at levels up to 157 mg/kg soil dw Mn during 28 days exposure (Kuperman RG, et al DJ 2002)

Therefore, based on available studies conducted at different trophic levels, the substance is not harmful to aquatic life. However, harmonise classification takes precedence.

12.1 Persistence and degradation: The substance does not have the potential for persistence.

12.2 Bioaccumulation potential: The substance does not have the potential to bioaccumulate.

12.3 Mobility in soil: Insignificant solubility in water, immobile

12.4 Results of PBT and vPvB assessment: Results of PBT, vPvB, PMT, vPvM assessment: Not PBT, vPvB, PMT and vPvM based on knowledge of the constituent substances.

12.5 Endocrine disrupting properties:

The substance is not considered an endocrine disruptor based on available literature and invitro studies.

12.7 Other adverse effects: The substance is an inorganic metallic alloy with no ozone layer depletion potential. **Include your company's information**

SECTION 13: DISPOSAL CONSIDERATIONS **Include your company's information.**

13.1 Waste treatment methods: Waste disposal in accordance with local and national laws covering waste and dangerous waste. **Include additional company specific information.**

a) Waste treatment-relevant information: **Include your company's /national law information.**

b) Physical/chemical properties that affect waste treatment option: **None known.**

Revision date 04/2025 superseding date 06/2023

11 rue Dulong – 75017 Paris - France

Tel : +33 (0) 1 45 63 06 34 Fax : +33 (0) 1 42 89 42 92

E-mail : reach@manganese.org - Web site : www.reach-manganese.org



M a n g a n e s e R E A C H A d m i n i s t r a t i o n

Association

- c) Sewage disposal-relevant information: **Include your company's/national laws information.**
- d) Precautions for recommended waste treatment options: **Include your company's information.**

SECTION 14: TRANSPORT INFORMATION

Transport may take place according to national regulations or land transport (ADR/RID), sea transport (IMDG) or Air transport (ICAO-TI/IATA-DGR).

- 14.1 UN Number:** **Include number or use not applicable if this is the case.**
- 14.2 UN proper shipping name:** **Include name or use not applicable if this is the case.**
- 14.3 Transport hazard class:** **Not hazardous**
- 14.4 Packaging group:** **Include packaging group or use not applicable if this is the case.**
- 14.5 Environmental hazard:** Not hazardous to the environment
- 14.6 Special precautions for users:** Always transport in close containers, avoid generating dust **[Amend as appropriate]**
- 14.7 Maritime transport in bulk according to IMO instruments** **Complete as appropriate or used not applicable if this is the case.**

SECTION 15: REGULATORY INFORMATION **[Delete as appropriate and include regulatory information specific to your country..]**

15.1 Safety, health and environmental regulations/legislation for the substance:

UN GHS - UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS): According to Chapter 1.5.2 of the UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS) safety data sheets (SDS) are only required for substances and mixtures that meet the harmonized

criteria for physical, health or environmental hazards. This substance meets these criteria; hence a safety data sheet is required.

EU CLP – Classification Labeling and Packaging Regulation: According to Article 59(2)(b) of (EC) No 1272/2008 (CLP), which amends REACH article 31(1), safety data sheets (SDS) are only required for substances and mixtures/special preparations that meet the harmonized criteria for physical, health or environmental hazards. MnSO4 meets this criterion, hence a SDS according to 453/2010/EC is needed – this template is designed to meet this criteria.

EU REACH – Registration, Evaluation and Authorisation of Chemicals: REACH article 31(7) requires relevant exposure scenarios from the Chemical Safety Report (CSR) to be annexed to the SDS. These exposure scenarios are only required for hazard-classified substances or mixtures. This substance is hazard-classified according to CLP; therefore exposure scenarios are required. Ask your REACH/Chemical regulatory team.

15.2 Chemical Safety Report (CSR): A chemical safety assessment has been carried for this substance.

SECTION 16: OTHER INFORMATION

a) Updated sections	Main changes: 1.1 UFI, 1.3 details of supplier of safety substance information, 2.3 Other hazards, 3.1 substances and impurities, 4 first aid measures, 5 fire fighting measures 7 handling and storage, 8.2 control exposure, 9.2.1 physical hazard classes, 11 toxicological information, 12 ecological information; 12.1 toxicological information, 13.1 waste treatment methods, 14, transport information, 16 other information Editorial changes throughout the document.
b) A key/legend to abbreviations and acronyms used in the SDS should be added in this section	ADN – European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterway ADR – European Agreement concerning the International Carriage of Dangerous Goods by Road BCF – Bioconcentration Factor CAS – Chemical Abstract Service CL – Concentration limits CLP – Classification, Labelling and Packaging Regulation (EC) No. 1272/2008

Revision date 04/2025 superseding date 06/2023

11 rue Dulong – 75017 Paris - France

Tel : +33 (0) 1 45 63 06 34 Fax : +33 (0) 1 42 89 42 92

E-mail : reach@manganese.org - Web site : www.reach-manganese.org



	<p>DMEL – Derived Minimal Effect Level DNEL – Derived No Effect Level EC – European Commission ED – Endocrine Disruption EL50 – Half maximal effect loading rate (Loading rate halfway between the maximum and baseline of an effect) EC50 – Half maximal effect concentration (Concentration halfway between the maximum and baseline of an effect) ErC50 – Half maximal effect concentration growth rate (Concentration halfway between the maximum and baseline of an effect) ECHA – European Chemicals Agency GHS – Globally Harmonized System of Classification and Labelling of Chemicals IATA – International Air Transport Association IBC – Intermediate Bulk Carrier IMDG – International Maritime Dangerous Good LC50 – Median lethal concentration (Concentration which causes 50 % mortality of the test population) LD50 – Median lethal dose (Dose which causes 50 % mortality of the test population) LL50 – Median Lethal Load (Dose which causes 50 % mortality of the test population) MARPOL – International Convention for the Prevention of Pollution from Ships NOAEL – No Observed Adverse Effect Level NOEL – No Observed Effect Level OEL – Occupational Exposure Limit PNEC – Predicted No Effect Concentration PBT – Persistent, Bioaccumulative, Toxic REACH – Registration, Evaluation, Authorisation, and restriction of Chemicals - Regulation (EC) No. 1907/2006 STOT– Specific Target Organ Toxicity TWA – Time Weighted Average vPvB – Very Persistent and Very Bioaccumulative</p>
c) Literature references and sources of data	<p>IFA: GESTIS - International limit values for chemical agents https://chem.echa.europa.eu/100.029.172/dossier-list/reach/dossiers/active?searchText=232-089-9</p>
d) Classification derivation	<p>The classification of the substance is based on data on substance itself or other analogue substances</p>
e) Precautionary notes	<p>During melting, pickling and welding stages (strongly oxidizing conditions), water soluble hexavalent manganese and oxides of metals may be present in the effluent fumes. Suitable precautions should be taken to minimize exposure of personnel to such fumes. Any moisture in the material should be regarded as an explosion hazard if it is to be used in high temperature environment.</p>
f) Disclaimer	<p>This substance does meet the EU Regulation No. 1907/2006 requirements for a mandatory safety data sheet. It acts as a template for MARA members. To the best of our knowledge, the information contained herein is accurate and reliable as of the date of publication, however we do not assume any liability whatsoever for the accuracy and completeness of such information.</p>



For more information contact

reach@manganese.org

ANNEX 1: EXPOSURE SCENERIOS (Include ES)