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SAFETY DATA SHEET: MANGANESE DINITRATE; MANGANESE (2+) DINITRATE

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

SECTION 1: IDENTIFICATION

1.1 Product identifier:

Substance name: Manganese dinitrate, manganese (2+) dinitrate
Other names: Mn(NO₃)₂
EINECS number: 233-828-8
CAS number: 10377-66-9
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-fertilizer products:
PC7 Base metals and alloys
PC 9a: Coatings and paints, thinners, paint removals
PC 15: Non-metal surface treatment products
PC 18: Ink and toners
PC 21: Laboratory chemicals
PC 23: Leather treatment products
PC 34: Textile dyes, and impregnating products
PC 36: Water softeners
PC 37: Water treatment chemicals
PC 39: Cosmetics, personal care products
PC 12: Used in fertilizers and fertilizers products.
PC 20: Production of other manganese-based compounds, intermediate
PC14: Use in electronics industry / metal treatment
PC 12: Widespread use of fertilisers by professional workers

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 add 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]:

Classified as; Acute Tox. 4; STOT RE 2; Eye Dam.1; Oxid solid 2; Skin Corr. 1C

2.2 Label elements:

Classification :Mn(NO₃)₂	Oxidising solid 2; Acute Tox. 4; STOT RE 2; Skin Corr. 1C; Eye Dam.1;
Pictogram GHS07, GHS08, GHS05, GHS03 respectively	
Signal word	Danger
Hazard statement	H272: May intensify fire; Oxidiser. H302: Harmful if swallowed. H314: Causes severe skin burns and eye damage. H373: May cause serious damage to the brain through prolonged or repeated exposure via inhalation.
Precautionary statement Prevention	P264, P260, P270, P273, P280, P210, P303, P221
Precautionary statement Response	P301+ P330+P331, P303+P361+P353, P301+P312
Precautionary Statement Disposal	P501
Additional labelling requirements	EUH071: Corrosive to the respiratory tract

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



Chemical name	EC No.	CAS number	Nominal % w/w	REACH Registration
Manganese dinitrate	233-828-8	10377-66-9	>95 - 100% (Amend as appropriate)	xx-xxxxxx-xx
Water	231-797-2	7732-18-15	<5%	

3.2 Mixtures: The substance is not a mixture.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures:

- 4.1.1 General Information:** Avoid contact with eyes and skin as the substance can cause severe skin burns and serious eye damage. It can cause long term effects if inhaled. In case of accident or unwellness, seek medical advice immediately.
- 4.1.2 Following inhalation:** Do not inhale. Wear an appropriate mask. The substance is corrosive, hence, will irritate the lungs. Upon prolong exposure may cause subtle neurological effects. **Include other relevant information based on your company's procedures as well as the specific mask type used.**
- 4.1.3 Following skin contact:** Wear appropriate protective equipment and avoid skin contact. Skin protection is a must. The substance causes severe skin burns. **Include information based on your company's procedures.**
- 4.1.4 Following eye contact:** Eye protection is a must. The substance causes serious eye damage. **Include information based on your company's procedures as well as the recommended specific goggle type.**
- 4.1.5 Following ingestion:** Do not ingest. **Include other relevant information based on your company's procedures.**
- 4.1.6 Self-protection of the first aider:** Full PPE is recommended – Mask, goggles and appropriate overalls. **Include other information based on your company's procedures.**

4.2 Most important symptoms and effects, both acute and delayed: The substance causes burns, therefore, avoid skin and eye contact. Avoid breathing. Effects are immediate and acute.

4.3 Indication of any immediate medical attention and special treatment needed: Upon skin or eye contact or accidental inhalation -seek medical attention immediately. **Include information based on your company's procedures.**

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing media: CO₂, dry chemical, dry sand, alcohol-resistant foam. **Include information on an appropriate extinguishing medium 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 nitrogen oxides (NO_x). **Include any other relevant information.**

5.3 Advice for fire-fighters: Avoid contact with skin and eyes. Flames could produce toxic gases, therefore wear appropriate respiratory protection equipment. Include information based on your company's procedures.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

6.1.1 For non-emergency personnel:

- a) Dusk mask, goggles and overalls are a must-see section 8 for more details.
- b) Sufficient ventilation is essential. Avoid all ignition sources.
- c) In the event of any accidental release, evacuate the area and consult trained personnel's – **Amend as per your company procedures.**



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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 – **Amend as per your company procedures.**

6.2 Environmental precautions:

Substance is not considered an environmental hazard based on available studies. However, it is advisable to keep away from drains/waterways as it could change their pH profile. Collect and reuse or dispose of according to the national laws. **Include other information based on your company's procedures.**

6.3 Methods and material for containment and cleaning up:

In the event of a spill, collect contaminated material and put in appropriate containers for disposal. Dispose of as special waste in compliance with local and national regulations.

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

6.3.3 For cleaning up: Clean contaminated objects and areas thoroughly observing environmental regulations – **Amend as per company procedures-Include cleaning and vacuuming techniques.**

6.3.4 Other information: **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 generating dust as dust can easily enter the eyes or touch the skin. Wear personal protective clothing (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 as the substance may intensify fire (it is an oxidizer)
 - iv) Incompatible substances or mixtures: Acids **(List any if known) Include information based on company's procedures**
 - v) Evaporative conditions: The substance does not evaporate. Avoid storage around organic evaporative materials/substances.
 - vi) Potential ignition sources: Keep away from ignition sources as the substance may intensify fire.
- b) How to control effects from environmental conditions: (i) Weather conditions, (ii) ambient pressure, (iii) varying temperatures, (v) humidity and (vi) vibration do not affect the integrity

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of the substance. However, store in a cool dry environment and protected from (iv) sunlight – the substance is an oxidizer. – **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. Stabilisers and antioxidants are not required, however, store protected from sunlight.

e) Other advice

i) Ventilation requirements: Ensure adequate ventilation and store in a cool dry place.

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: Keep in original containers and packaging. **Include information based on your national laws.**

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 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-threshold effect and/or no dose-response information available	
Inhalation	Local effects - Long-term	no-threshold effect and/or no dose-response information available	
Inhalation	Local effects - Acute	no-threshold effect and/or no dose-response information available	
Dermal	Systemic effects - Long-term	DNEL (Derived No Effect Level) 0.004mg/kg bw/day	
Dermal	Systemic effects - Acute	no-threshold effect and/or no dose-response information available	
Dermal	Local effects - Long-term	no-threshold effect and/or no dose-response information available	

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Dermal	Local effects - Acute	no-threshold effect and/or no dose-response information available	
Eyes	Local effects	high hazard (no threshold derived)	

Hazard assessment conclusion for the environment: PNECs

Compartment	Hazard conclusion	Remarks/Justification
Freshwater	PNEC aqua (freshwater): 0.036mg/L Intermittent releases: 0.104mg/L	Assessment factor: 50 Extrapolation method: assessment factor PNEC aqua (freshwater) The lowest NOEC value from the dataset was obtained in the brook trout study (Davies & Brinkman 1998). This study was conducted on MnSO ₄ and the NOEC was 0.55 mg Mn/L. This is equivalent to 1.790 mg/L of Mn(NO ₃) ₂ when a molecular weight correction is made. PNEC intermittent release hazard assessment conclusion: PNEC aqua (intermittent releases) PNEC intermittent release assessment factor: 100.0 PNEC intermittent release extrapolation method: assessment factor PNEC intermittent release justification: The lowest acute L(E)C ₅₀ value from the dataset was obtained in the rainbow trout (Davies & Brinkman 1998). This study was conducted on MnSO ₄ and the LC ₅₀ was 3.2 mg Mn/L. This is equivalent to 10.41 mg/L of Mn(NO ₃) ₂ when a molecular weight correction is made.
Marine water	PNEC aqua (marine water): 0mg/L Intermittent releases:	Assessment factor: 50 Extrapolation method: assessment factor PNEC aqua (marine water) Based on the long-term NOEC from a study on the marine species; Pacific oyster (NOEC of 0.02 mg Mn/L).
Sediments (freshwater)	PNEC sediment (freshwater): 0.011mg/kg sediment dw	Assessment factor: 50 Extrapolation method: assessment factor PNEC sediment (freshwater) Based on the lowest endpoint (NOEC of 0.57 mg Mn/kg sediment dwt) from studies on two sediment dwelling organisms
Sediments (marine water)	PNEC sediment (marine water): 0.001mg/kg sediment dw	Assessment factor: 500 Extrapolation method: equilibrium partitioning method PNEC sediment (marine water) Based on the freshwater endpoints with an increased AF factor.
Sewage treatment plant	PNEC STP: 56mg/L	Assessment factor: 10 Extrapolation method: assessment factor PNEC STP Activated sludge respiration/inhibition test; NOEC = 560 mg MnSO ₄ /L
Soil	PNEC soil: 25.1mg/kg soil dw	Assessment factor: 10 Extrapolation method: assessment factor PNEC soil

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		Based on the lowest NOEC (251 mg Mn/kg soil d.w.) from a range of long-term studies.
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 measures 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. Wastewater is collected for treatment and recycled. **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: Eye protection is a must. **Complete as per your company procedures e.g type of goggles and mask**

b) Skin protection: Overalls, gloves and boots are mandatory and good industrial hygiene is a must. (Please specify type of overall, gloves, boots including the thickness of material).

c) Respiratory protection: N95 Mask (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. See Annex I, Exposure scenarios (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	
State	Solid
Colour	Pink
Odour	Odourless
Melting point (Mpt) / Freezing point	308 +/-1K, Regulation (EC) No. 440/2008, Annex, A1
Boiling point or initial boiling point/boiling range	Decomposed from 396K at 101.87kPa, Regulation (EC) No. 440/2008
Flammability of solids	Not flammable, Regulation (EC) No. 440/2008, Method A10
Lower and upper explosion limit	Not applicable to solids
Flash Point	Study scientifically unjustified
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

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Water content	27.1 %w/w: Solubility – Very soluble: Regulation (EC) No. 440/2008, Annex A6
Partition Coefficient	Study scientifically unjustified
Vapour pressure	2.7 x 10 ⁻² Pa at 25°C, Method B4
Density/Relative density	2.11 at 20.8°C, Regulation (EC) No. 440/2008, Annex, A3
Relative Vapour density	Not applicable to solids
Particle characteristics	study technically not feasible
9.2 Other information	No additional information relevant to the safe use of the substance
9.2.1 Physical hazard classes	
Explosives properties	Not 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	Oxidizer, 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	750-950 kg/m ³
9.2.2 Other	None

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.
- 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:** 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 met
- Acute oral toxicity: Harmful if ingested (LD50: >300 mg/kg bw)
- Acute dermal toxicity: Corrosive to the rabbit skin



Acute inhalation toxicity: For ethical reasons, study cannot be conducted on corrosive substances.

b) Skin corrosion/irritation: Based on available data, the classification criteria are met

The substance is corrosive to the skin (EPISKIN and Epidermal in-vitro test)

c) Serious eye damage/irritation: Based on available data, the classification criteria are met

The substance causes severe eye irritation based on skin corrosivity evaluation.

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 no information available for respiratory 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 due to its corrosivity nature. However, data on MnCl₂ – a very soluble salt considered as a worse-case evaluation concludes – No concerns on mutagenicity based on studies below:

- 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. However, carcinogenicity report (NTP, 1993) on analogue substance MnSO₄ and an expert review by Jenkinson, 2009 on genotoxicity as well as peer review article (Assem et al, 2011) concluded – no concerns, carcinogenicity in humans is not expected.

g) Reproductive toxicity: Based on available data, the classification criteria are not met

No reproductive studies exist on this substance, possibly due to its corrosive nature. However, a two generation reprotoxicity study on the male/female rats using MnCl₂ (an analogue substance) 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 not specified at 15 mg/m³ (Dettwiler M, 2016).

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 available data, the classification criteria are met

Based on published literature inhalation exposure to the substance or its analogues is expected to cause harm upon repeated exposure over long periods of time. The analogue substance MnSO₄ has a harmonized classification as STOT RE 2, exposure via inhalation-target organ the brain. This classification is therefore read-across to Mn(NO₃)₂.

j) Aspiration hazard: Data lacking

11.2 Information on other hazards

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

11.2.2 Neurotoxicity:

Evidence of neurotoxicity is observed in rodents following oral or inhalation exposure to MnCl₂ and MnSO₄ – analogue substances. No data is available on Mn(NO₃)₂ itself. A proposed classification for oral or inhaled Mn(NO₃)₂ is STOT RE Category 2, target organ the brain based on readacross.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity: Based on available data, the classification criteria are not met Acute (short-term):

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Aquatic vertebrates:

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

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 read-across)

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 read-across)

Chronic (long-term) toxicity:

Aquatic vertebrates:

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

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

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

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 read-across)

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 read-across)

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 read-across)

Other Environmental studies

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

Based on available studies conducted at different trophic levels, the substance is not harmful to aquatic life.

12.2 Persistence and degradability: Not persistent based on knowledge of the constituent substances

12.3 Bioaccumulative potential: Not bioaccumulative based on knowledge of the constituent substances

12.4 Mobility in soil: Insignificant solubility in water, immobile

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

12.6 Endocrine disrupting properties: A thorough review of the regulatory weight of evidence indicates no adverse effect on endocrine modality.

12.7 Other adverse effects: The substance is an inorganic metallic salt 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: Recycle when possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. The product is not hazardous, and waste may be disposed of by landfill.

13.1.1 Physical/chemical properties that affect waste treatment options: Generally, solid waste should be separated and reused. Recycling is encouraged.

13.1.2 Sewage disposal: Sewage disposal is discouraged. **Include other information based on your company's procedures.**

13.1.3 Precautions for recommended waste treatment options: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

13.1.4 Other relevant provisions related to waste: Handle contaminated packages in the same way as the product itself. **Include other information based on your company's procedures as well as national laws.**

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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: The material is not classified as hazardous for transport (ADR, RID, UN RTDG, IMO, IATA/ICAO).

14.2 UN proper shipping name: The material is not classified as hazardous for transport (ADR, RID, UN RTDG, IMO, IATA/ICAO).

14.3 Transport hazard class: The material is not classified as hazardous for transport (ADR, RID, UN RTDG, IMO, IATA/ICAO).

14.4 Packaging group: The material is not classified as hazardous for transport (ADR, RID, UN RTDG, IMO, IATA/ICAO).

14.5 Environmental hazard: The material is not classified as hazardous for transport (ADR, RID, UN RTDG, IMO, IATA/ICAO).

14.6 Special precautions for users: The material is not classified as hazardous for transport (ADR, RID, UN RTDG, IMO, IATA/ICAO).

14.7 Transport in bulk according to Annex II of MARPOL73/78 and ISBC code: The material is not classified as hazardous for transport (ADR, RID, UN RTDG, IMO, IATA/ICAO).

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

<p>15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture</p>	<p>Labelling is required. See section 2.</p> <p>UN GHS - UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS): According to Chapter 1.5.2 of the UN Globally Harmonized System of Classification and Labelling 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 this criterion.</p> <p>EU CLP – Classification Labelling 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 harmonised criteria for physical, health or environmental hazards. This substance meets this criterion.</p> <p>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.</p>
<p>15.2 Chemical Safety Assessment</p>	<p>A chemical safety assessment has been carried out because the substance is classified as hazardous – see section 2. Exposure scenarios are mandatory and available</p>

SECTION 16: OTHER INFORMATION

<p>a) Updated sections</p>	<p>Main changes: 2.2 Updated precautionary statements</p>
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	<p>2.3 Updated to include new hazard classes (PMT, vPvM, ED)</p> <p>8 Updated PNECs</p> <p>11.2 Updated to include further information on new hazard classes (PMT, vPvM, ED)</p> <p>12.5 Updated to include further information on new hazard classes (PMT, vPvM)</p> <p>12.6 Updated to include further information on new hazard class (ED)</p>
<p>b) A key/legend to abbreviations and acronyms used in the SDS should be added in this section</p>	<p>ADN – European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterway</p> <p>ADR – European Agreement concerning the International Carriage of Dangerous Goods by Road</p> <p>BCF – Bioconcentration Factor</p> <p>CAS – Chemical Abstract Service</p> <p>CL – Concentration limits</p> <p>CLP – Classification, Labelling and Packaging Regulation (EC) No. 1272/2008</p> <p>DMEL – Derived Minimal Effect Level</p> <p>DNEL – Derived No Effect Level</p> <p>EC – European Commission</p> <p>ED Endocrine Disruption</p> <p>EL50 - Half maximal effect loading rate (Loading rate halfway between the maximum and baseline of an effect)</p> <p>EC50 – Half maximal effect concentration (Concentration halfway between the maximum and baseline of an effect)</p> <p>ErC50 – Half maximal effect concentration growth rate (Concentration halfway between the maximum and baseline of an effect)</p> <p>ECHA – European Chemicals Agency</p> <p>GHS – Globally Harmonized System of Classification and Labelling of Chemicals</p> <p>IATA – International Air Transport Association</p> <p>IBC – Intermediate Bulk Carrier</p> <p>IMDG – International Maritime Dangerous Good</p> <p>LC50 – Median lethal concentration (Concentration which causes 50 % mortality of the test population)</p> <p>LD50 – Median lethal dose (Dose which causes 50 % mortality of the test population)</p> <p>LL50 – Median Lethal Load (Dose which causes 50 % mortality of the test population)</p> <p>MARPOL – International Convention for the Prevention of Pollution from Ships</p> <p>NOAEL – No Observed Adverse Effect Level</p> <p>NOEL – No Observed Effect Level</p> <p>OEL – Occupational Exposure Limit</p> <p>PNEC – Predicted No Effect Concentration</p> <p>PBT – Persistent, Bioaccumulative, Toxic</p> <p>REACH – Registration, Evaluation, Authorisation, and restriction of Chemicals - Regulation (EC) No. 1907/2006</p> <p>STOT – Specific Target Organ Toxicity</p> <p>TWA – Time Weighted Average</p> <p>vPvB – Very Persistent and Very Bioaccumulative</p>
<p>c) Literature references and sources of data</p>	<p>https://chem.echa.europa.eu/100.030.741/dossier-list/reach/dossiers/active?searchText=233-828-8</p>



d) Classification derivation	The classification of the substance is based on the available data on the substance itself.
e) Precautionary notes	During melting, pickling and welding stages (strongly oxidizing conditions), oxides of several 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.
f) Disclaimer	This substance meets the EU Regulation No. 1907/2006 requirements for a mandatory safety data sheet. This information sheet 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.
For more information contact	reach@manganese.org

ANNEX 1: EXPOSURE SCENERIOS (Include ES)