
SAFTEY DATA SHEET: SINTER ORE; MANGANESE ORES, REDUCED
Provided in accordance with Article 18(2) of Regulation (EC) No 1272/2008

SECTION 1: :
IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product Identifier:

Substance name: Sinter Ore, Manganese sinter
Other names: Manganese Ores, reduced.
EINECS number: 273-748-0
CAS number: 69012-49-3
REACH Registration number: **[If applicable]**
Unique formula identifier (UFI) Not applicable for this substance

1.2 Relevant Identified uses of the Substance/Mixtures and uses advised against:

SU 14: Manufacture of basic metals and including alloys–PC7: Base metals and alloys.
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 number etc): Complete as required.

1.4 Emergency Telephone: Complete as required (For EU include 112) CIAV # of receiving country.

SECTION 2: HAZARD(S) IDENTITIFCATION

2.1 Classification of the substance or mixture:

Classification according to Regulation (EC) No. 1272/2008 [EU CLP] and the UN GHS: Classified as Repro Cat 2: Suspected of damaging fertility or the unborn child route of exposure – oral route (classification is via read across from analogue substance) and Eye Irrit. 2: Causes serious eye damage

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2.2 Labelling elements:

Classification	Eye Irrit. 2 and Repr Cat 2
Pictogram	
Signal word	Warning
Hazard statement	H361d: Suspected of damaging fertility or the unborn child. H319: Causes serious eye irritation.
Precautionary statement Prevention	P201, P202, P280, P264
Precautionary statement Response	P308+P313: If exposed or concerned get medical advise/attention P305+P338+P351: If in eyes, rinse cautiously with water for several minutes….

2.3 Other Hazards:

The substance is an inorganic metallic solid. Based on the available information the substance does not meet the criteria for classification as persistent, bioaccumulative and toxic or very toxic persistent and very bioaccumulative.

Endocrine disrupting properties have not been identified from existing acute or chronic data.

It is advisable to avoid generating dust as all fine particles have the potential to explode. Long term inhalation (years) of dust from some oxides of manganese cause adverse health effects see section 11 **Include other hazards if known.**

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance(s) [Amend as appropriate]

Sinter ore is an inorganic UVCB substance. Therefore, the concentration of its components are variable based on its source material and impurities cannot be meaningfully identified

Chemical name	EC No.	CAS number	Concentration % w/w
Trimanganese tetraoxide	215-266-5	1317-35-7	Complete as per your substance
Aluminium oxide	215-691-6	1344-28-1	Complete as per your substance
Silicon dioxide	231-545-4	7631-86-9	Complete as per your substance
Iron oxide	215-570-8	1309-37-1	Complete as per your substance

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Calcium oxide	215-138-9	1305-78-8	Complete as per your substance

3.2 Mixtures: The substance is not considered a mixture according to the EU CLP.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures:

4.1.1 General Information
In the event of accidental exposure leading to unwellness, seek medical advice immediately**,**

4.1.2 Following Inhalation: Do not inhale. Wear an appropriate mask. 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 is an eye irritant; goggles are a must. Include specific goggle type- information based on your company's procedures.

4.1.5 Following Ingestion: Include other relevant 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 may cause irritation to the eyes and lungs leading to breathing difficulties and eye itchiness.. Include any useful/relevant information.

4.3 Indication of any immediate medical attention and special treatment needed: Include information based on your company's procedures.

SECTION 5: FIRE-FIGHTING MEASURES:

5.1 Extinguishing media: Include information on appropriate extinguishing media and details any unsuitable extinguishing media based on your company's procedures.

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

5.3 Advise for fire fighters: 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) Use personal protective equipment, such as dust masks are recommended to minimise inhalation. Goggles are a must as the substance is an eye irritant.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, evacuated and consult trained personnel: Amend as per your company's 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 us. Amend as per your company's procedures see section 8

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/waterways as large quantities could clog drains. Recycling is possible and encouraged. 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

6.3.1 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: Clean contaminated objects and areas thoroughly observing environmental regulations. **–** include cleaning and vacuuming techniques. Amend as per your company's procedures.

6.3.3 Other information: Include other information based on your company's procedures such as cleaning up techniques/materials never to be used.

6.4 Reference to other sections: 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. Wear personal protective clothing (see Section 8). Include other information based on your company's procedures.

b) Avoid handling with incompatible substances/mixtures (List incompatible substances if known**)**

c) Avoid dust generating operations or could be carried out in properly ventilated area and wear appropriate PPE

d) Capture dust, if possible, if generated, vacuum and compress into pellets to minimize environmental exposure and recycle if possible- Amend as per company procedure

7.1.2 Advice on general occupational hygiene:

a) Do not eat, drink or smoke in work area.

b) Wash hands before and after use and keep them dry.

c) Remove contaminated clothing and PPE before entering eating areas.

Include other information based on your company's procedures.

7.2 Conditions for safe storage, including any incompatibilities.

7.2.1 Specific storage requirements

a) Risk associated with physical and chemical properties

i) Explosive atmosphere: The substance is not explosive; however, it must be stored away from potential explosive materials.

ii) Corrosive conditions: The substance does not corrode metal hence; no adverse corrosive effects are expected.

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iii) Flammability hazard: The substance is not flammable, however, keep away from flammable materials

iv) Incompatible substances or mixtures. None known (List if known) Include information based on company's procedure.

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 humid-Amend as per your company's procedure.

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

d) Other advise:

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

ii) Specific designs for storage: Keep/store only in original containers/packaging –Include other information based on company's procedure

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

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

7.3 Specific end use(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 of 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 0.5mg/m3 respirable

8.1.1.3 Any other national limit values: Include if available.

8.1.1.4 Union biological limit values: No union biological limits values exist for inorganic manganese.

8.1.1.5 Any other national biological values: Include if available.

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

8.1.4 Derived no effects limits (DNELs) Predicted no effects concentrations (PNECs)

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Hazard conclusions for workers: Derived No Effect Levels (DNEL's)

Route	Type of effect	Hazard conclusion	Most sensitive endpoint
Inhalation	Systemic effects - Long-term	DNEL (Derived No Effect Level) 0.27mg/m³	developmental toxicity / teratogenicity (Oral)
Inhalation	Systemic effects - Acute	no hazard identified	
Inhalation	Local effects - Long-term	no hazard identified	
Inhalation	Local effects - Acute	no hazard identified	
Dermal	Systemic effects - Long-term	DNEL (Derived No Effect Level) 0.08mg/kg bw/day	developmental toxicity / teratogenicity (Oral)
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	no hazard identified	

Hazard assessment conclusion for the environmental: Predicated No Effects Concentration (PNEC)

Compartment	Hazard conclusion	Remarks/Justification
Freshwater	PNEC aqua (freshwater): 0.064mg/L Intermittent releases: 0.32mg/L	Assessment factor: 50 Extrapolation method: assessment factor PNEC aqua (freshwater) Two chronic NOEC values in algae and Daphnia (read-across from FeMn slag). NOEC = 3.2 mg/l

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		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:** Lowest L(E)C50 value from fish, daphnia and algal studies (includes read-across from FeMn slag). EyC50 = 32 mg/l
Marine water	PNEC aqua (marine water): 0.006mg/L Intermittent releases:	Assessment factor: 500 Extrapolation method: assessment factor PNEC aqua (marine water) Two chronic NOEC values in algae and Daphnia (read-across from FeMn slag), with further 10 x factor for freshwater to marine. NOEC = 3.2 mg/l
Sediments (freshwater)	PNEC sediment (freshwater): 63.8mg/kg sediment dw	Assessment factor: 50 Extrapolation method: assessment factor PNEC sediment (freshwater) Equilibrium partitioning based on freshwater aquatic PNEC and Kd value of 994 ml/g
Sediments (marine water)	PNEC sediment (marine water): 6.38mg/kg sediment dw	Assessment factor: 500 Extrapolation method: assessment factor PNEC sediment (marine water) Equilibrium partitioning based on marine aquatic PNEC and Kd value of 994 ml/g

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Sewage treatment plant	PNEC STP: 100mg/L	Assessment factor: 10 Extrapolation method: assessment factor PNEC STP Activated sludge Respiration/inhibition test. NOEC = 1000mg/l
Soil	PNEC soil: 63.6mg/kg soil dw	Assessment factor: 50 Extrapolation method: assessment factor PNEC soil Equilibrium partitioning based on aquatic PNEC and Kd value of 994 ml/g
Air	no hazard identified:	
Secondary poisoning	no potential for bioaccumulation:	Bioaccumulation via the food change is not expected due to the nature of the substance. Furthermore assigning a PNEC oral value is very difficult due to the homeostatic mechanism and essentiality of Mn.

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; water is collected for treatment and recycled. Complete as per your company 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: complete as per your company procedures e.g., specific type of goggles

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b) Skin protection: Overalls, gloves and boots are mandatory as the substance is not a skin irritant, However, they are encouraged for good industrial hygiene.

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. Avoid dust generation, See Annex1 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	Black powder
Odour	Odourless
Melting point (Mpt) / Freezing point	>723 K (>450°C), Regulation (EC) No. 440/2008, Annex, A1
Boiling point/boiling range	Melting pt >300°C, hence study not applicable
Flammability of solids Lower and upper explosion limits	Not flammable, Regulation (EC) No. 440/2008, Method A10 Not applicable to solids
Flash Point	Not required for inorganic substances
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	Insoluble: ≤ 1.0E-05 g/l of manganese in solution at 20±0.5°C., Regulation (EC) No. 440/2008, Annex A6
Partition Coefficient/n_octanol/water	Not applicable for inorganic substances
Vapour pressure	Study not conducted as Mpt >300°C
Density/Relative density	4.22°C, Regulation (EC) No. 440/2008, Annex, A3
Particle characteristics	Include PSD study results
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

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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
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.

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:

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:

Not irritating in rabbits (one study according to OECD guideline 404 and EU method B.4, GLP), applied to the intact skin for 24-, 48- 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:

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Irritating to the rabbit (one study according to OECD guideline 405 and EU method B. 5, GLP); undiluted test material applied to the right eye of three animals. Max group mean score of 27. Not fully reversible within 48hrs.

d) Respiratory or skin sensitization:

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 respiratory sensitization. However, it is predicted not to be a respiratory sensitizer.

e) Germ cell mutagenicity:

Data lacking for the substance as such. However, data on MnC12- 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 Cytoxicity: 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:

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:

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

NOEL: 1000mg/kg/bw - Prenatal developmental study (PND) in rat, to GLP on analogue substance FeMn slag

NOAEL: less than 100mg/kg/day - Prenatal developmental study (PND) in the rabbit, to GLP on analogue substance FeMn slag - effects seen hence the classification in section 1.2.

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 on analogue substance SiMn slag (subchronic 90 days study), the classification criteria are not met. However, some epidemiological studies from some manganese-based smelters have highlighted the possibility of adverse health effects via repeated, long-term inhalation of dust in excess of exposure limits.

j) Aspiration hazard:

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Data lacking

11.1 Information on other hazards

11.1.1 Endocrine disrupting properties: The substance is not considered an endocrine disruptor based on available literature – Data lacking.

SECTION 12: ECOLOGICAL INFORMATION:

12.1 Toxicity: No environmental concerns

a) Acute (short-term) toxicity:

Fish: OECD guideline 203, EU method C1 and GLP. LD50 (96h) for freshwater fish: >100 mg/L; NOEC (96h) 100mg/L via Read across

b) Crustacean: OECD guideline 202, EU method C2 and GLP. EC50/LC50 (48h) for freshwater invertebrates: >100 mg/L; NOEC (48h): 100mg/L

c) Algae/aquatic plants: OECD 201, EU method C3 and GLP. EC50/LC50 (72h): >90 mg/L; NOEC (72h): 10 mg/L via Read across

d) ASRI (Activated sludge respiratory inhibition): OECD guideline 209, EU method C11 and GLP. EC50: >1000 mg/L; NOEC (>3h):1000 mg/L via Read across

e) Chronic (long-term) toxicity:

Crustacean- Daphnia reproductive test: OECD guideline 211 and GLP. EL50 (8days): 6.5-20 mg/L; LOEC (8d): 10mg/L via read across

12.2 Persistence and degradation	No potential for persistence	According to the Guidance on information requirements and chemical safety assessment, Chapter R.11: PBT assessment, "the PBT and vPVB criteria of Annex XIII to the regulation do not apply to inorganic substances". Therefore, Sinter ore is not considered to require any further assessment of PBT properties.
12.3 Bioaccumulative potential	No potential for bioaccumulation	According to the Guidance on information requirements and chemical safety assessment, Chapter R.11: PBT assessment, "the PBT and vPVB criteria of Annex XIII to the regulation do not apply to inorganic substances". Therefore, Sinter ore is not considered to require any further assessment of PBT properties.
12.4 Mobility in soil	No potential to move into ground water	Data lacking

12.5 Results of PBT and vPvB assessment:

According to the Guidance on information requirements and chemical safety assessment, Chapter R.11: PBT assessment, "the PBT and vPVB criteria of Annex XIII to the regulation do not apply to inorganic substances". Therefore, Sinter ore is not considered to require any further assessment of PBT properties.

12.6 Endocrine disrupting properties:

The substance is not considered an endocrine disruptor based on available literature – Data lacking.

12.7: Other adverse effects: None known

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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

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. Sinter ore meets this criterion, hence a SDS according to 453/2010/EC is needed – this template is designed to meet these 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 out for this substance.

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SECTION 16: OTHER INFORMATION:

a) If using this template to develop your company's SDS in the case of a revised safety data sheet, a clear indication of where changes have been made to the previous version of the safety data sheet is required in this section, unless such indication is given elsewhere in the safety data sheet, with an explanation of the changes, if appropriate. A supplier of a substance or mixture shall be able to provide an explanation of the changes upon request.

b) A key/legend to abbreviations and acronyms used in the SDS should be added in this section

c) Key Literature:

1. Assem, F. L., et al, (2011); The Mutagenicity and carcinogenicity of inorganic manganese compounds: A synthesis of the evidence, Journal of toxicology and environment, part B
2. Atwal SS and Tremain SP (2009). Sinter Ore: Determination of Melting/Freezing Temperature and Oxidising Properties (Solids). Testing laboratory: Harlan Laboratories Limited, Shardlow Business Park, Shardlow, Derbyshire, DE72 2GD, UK. Report no.: 2702-0021. Owner Company: International Manganese Institute, 17 Rue Duphot, 75001 Paris, FRANCE. Report date: 2009-09-14.
3. Butler RE and O'Connor BJ (2009). Sinter Ore: Determination of Flammability (Solids). Testing laboratory: Harlan Laboratories Limited, Shardlow Business Park, Shardlow, Derbyshire, DE72 2GD. Report no.: 2702-0047. Owner Company: International Manganese Institute, 17 Rue Duphot, 75001 Paris, FRANCE. Report date: 2009-09-14.
4. Ferroatlantica (2003a). Analysis of slag SiMn. Testing laboratory: Ferroatlantica. Report no.: 2.289. Owner Company: Ferroatlantica.
5. Ferroatlantica (2003b). Mutagenicity Activity Test (Ames Test) on SiMn slag. Testing laboratory: Ferroatlantica. Owner Company: Ferroatlantica. Report date: 2003-02-18.
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ANNEX 1: EXPOSURE SCENERIOS (Include ES)

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