SAFETY DATA SHEET

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

1.1. Product identifier

Trade name or designation of the mixture	CARULITE® 200 CATALYST
Registration number	-
Synonyms	None.
SDS number	-
Issue date	02-July-2019
Version number	04
Revision date	16-January-2024
Supersedes date	29-June-2022

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

Identified uses	Air purification media for the destruction of ozone.
Uses advised against	Use in accordance with supplier's recommendations.

1.3. Details of the supplier of the safety data sheet

Manufacturer

Company name	CARUS EUROPE S.I.
Address	Calle Rosal Nº4, 1ºB 33009 Oviedo Asturias-Spain
Telephone	+1 815 223-1500 - All other non-emergency inquiries about the product should be directed to the company
e-mail	salesmkt@carusllc.com
Website	www.carusllc.com
Contact person	Sr. Manager Global Corporate Product Stewardship, RCMS Coordinator

Supplier

Company name	CARUS EUROPE S.L.
Address	CALLE ROSAL Nº4, 1ºB 33009 OVIEDO, ASTURIAS – SPAIN
Telephone	+34 985 78 55 13
Fax	+34 985 78 55 10

1.4. Emergency telephone number	For Hazardous Materials [or Dangerous Goods] Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC at CHEMTREC®, UK (local): +(44)-870-8200418 CHEMTREC®, Other countries: 001 (703) 527-3887
General emergency	112 or 999 SDS/Product information may not be available for the Emergency Service.

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The mixture has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

Health hazards

Acute toxicity, oral	Category 4	H302 - Harmful if swallowed.
Acute toxicity, inhalation	Category 4	H332 - Harmful if inhaled.
Specific target organ toxicity - repeated exposure (inhalation)	Category 2 (Brain)	H373 - May cause damage to organs (Brain) through prolonged or repeated exposure by inhalation.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains: copper(II) oxide, manganese dioxide

Hazard pictograms

Signal word Warning

Hazard statements

H302 Harmful if swallowed.
H332 Harmful if inhaled.
H373 May cause damage to organs (Brain) through prolonged or repeated exposure by inhalation.

Precautionary statements

Prevention

P260 Do not breathe dust.
P264 Wash thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.

Response

P301 + P312 IF SWALLOWED: Call a POISON CENTRE/doctor if you feel unwell.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312 Call a POISON CENTRE/doctor if you feel unwell.
P330 Rinse mouth.

Storage Not assigned.

Disposal

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental information on the label EUH031 - Contact with acids liberates toxic gas.

A 28-day Transformation/Dissolution protocol test was conducted with this product at a 1 mg/L loading in a standard aqueous medium at pH 6. The 7 and 28 days release factors for copper were 1.82% and 4.35%, respectively. For manganese, no concentrations were measured above the validated and accredited reporting limits after 7 and 28 days of extraction (limit of 5 µg/L).

The implementation of the GHS classification system, taking into account the results of the T/Dp test, results in an Aquatic Acute 2 classification for the product; this classification is driven by the presence of copper (as CuO). Under CLP (EU-implementation of GHS) there is no environmental classification for the product.

2.3. Other hazards This product is a metal mixture and based on 28-day Transformation/Dissolution testing, does not meet the definition of environmentally hazardous.

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	Index No.	Notes
manganese dioxide	40 - 70	1313-13-9 215-202-6	01-2119452801-43-0019	025-001-00-3	#
Classification: Acute Tox. 4;H302, Acute Tox. 4;H332, STOT RE 2;H373					
copper(II) oxide	15 - 40	1317-38-0 215-269-1	01-2119502447-44-0051	029-016-00-6	
Classification: Aquatic Acute 1;H400(M=100), Aquatic Chronic 1;H410(M=100)					

List of abbreviations and symbols that may be used above

M: M-factor

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume. The full text for all H-statements is displayed in section 16.

#: This substance has been assigned Community workplace exposure limit(s).

SECTION 4: First aid measures

General information If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

4.1. Description of first aid measures

Inhalation Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.

Skin contact Remove contaminated clothing. Wash off with soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops or persists.

Ingestion Rinse mouth. Do not induce vomiting without advice from poison control centre. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell. Never give anything by mouth to a victim who is unconscious or is having convulsions.

4.2. Most important symptoms and effects, both acute and delayed Dusts may irritate the respiratory tract, skin and eyes. Prolonged exposure may cause chronic effects.

4.3. Indication of any immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

SECTION 5: Firefighting measures

General fire hazards Not itself combustible but assists fire in burning materials.

5.1. Extinguishing media

Suitable extinguishing media Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media None.

5.2. Special hazards arising from the substance or mixture During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Metal oxides.

5.3. Advice for firefighters

Special protective equipment for firefighters Firefighters should wear full protective clothing including self contained breathing apparatus. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

Special fire fighting procedures Use water spray to cool unopened containers. Cool containers exposed to flames with water until well after the fire is out. Move container from fire area if it can be done without risk. In case of fire and/or explosion do not breathe fumes.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Do not breathe dust. Ensure adequate ventilation. Wear appropriate protective equipment and clothing during clean-up.

For emergency responders Do not breathe dust. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep unnecessary personnel away. Ensure adequate ventilation. Use personal protection recommended in Section 8 of the SDS. Local authorities should be advised if significant spillages cannot be contained.

6.2. Environmental precautions Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

6.3. Methods and material for containment and cleaning up Dike far ahead of spill for later disposal. Following product recovery, flush area with water. For waste disposal, see Section 13 of the SDS.

6.4. Reference to other sections For personal protection, see Section 8 of the SDS. For waste disposal, see Section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling Minimise dust generation and accumulation. Provide adequate ventilation. Handle and open container with care. Do not breathe dust/fume/gas/mist/vapours/spray. Do not taste or swallow. Do not eat, drink or smoke when using the product. Avoid prolonged exposure. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Wash contaminated clothing before reuse. Avoid release to the environment. Observe good industrial hygiene practices. Avoid contact with eye, skin and clothing.

7.2. Conditions for safe storage, including any incompatibilities

Store locked up. Store in original tightly closed container. Store in a cool, dry place out of direct sunlight. Keep out of reach of children. Use care in handling/storage. Store away from incompatible materials (See Section 10).

7.3. Specific end use(s)

Air purification media for the destruction of ozone. To avoid risks to human health and the environment, comply with the instructions for use. Observe industrial sector guidance on best practices.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. OELs. Workplace Exposure Limits (WELs) (EH40/2005 (Fourth Edition 2020)), Table 1

Components	Type	Value	Form
manganese dioxide (CAS 1313-13-9)	TWA	0.05 mg/m3	Respirable fraction.

Biological limit values

No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures

Follow standard monitoring procedures.

Derived no effect levels (DNELs)

General population

Components	Value	Assessment factor	Notes
manganese dioxide (CAS 1313-13-9)			
Long-term, Systemic, Dermal	0.002 mg/kg bw/day		
Long-term, Systemic, Inhalation	0.043 mg/m3		

Workers

Components	Value	Assessment factor	Notes
manganese dioxide (CAS 1313-13-9)			
Long-term, Systemic, Dermal	0.004 mg/kg bw/day		
Long-term, Systemic, Inhalation	0.2 mg/m3		Repeated dose toxicity

Predicted no effect concentrations (PNECs)

Components	Value	Assessment factor	Notes
copper(II) oxide (CAS 1317-38-0)			
Freshwater	7.8 µg/l	1	
Marine water	5.2 µg/l	1	
Sediment (freshwater)	87 mg/kg	1	
Sediment (marine water)	676 mg/kg	1	
Soil	65 mg/kg	1	
STP	230 µg/l	1	
manganese dioxide (CAS 1313-13-9)			
Freshwater	0 mg/l	50	
Marine water	0 mg/l	500	
Sediment (freshwater)	0.037 mg/kg	500	
Sediment (marine water)	0.004 mg/kg	5000	
Soil	0.028 mg/kg	500	
STP	100 mg/l	10	

8.2. Exposure controls

Appropriate engineering controls

Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits. Ventilate as needed to control airborne dust. Observe occupational exposure limits and minimise the risk of inhalation of dust.

Individual protection measures, such as personal protective equipment

General information

Use personal protective equipment as required. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

Eye/face protection

Wear dust-resistant safety goggles where there is danger of eye contact. Eye protection should meet standard EN 166.

Skin protection

- Hand protection

Wear appropriate chemical resistant gloves. Wear suitable gloves tested to EN374. In full contact: Glove material: Nitrile rubber. Layer thickness: 0.11 mm. Breakthrough time: ≥480 min. In splash contact: Glove material: Nitril rubber Layer thickness: 0.11 mm. Breakthrough time: ≥ 480 min.

- Other	Wear suitable protective clothing. Use of an impervious apron is recommended.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. Use filter type P1 according to EN 143. Seek advice from local supervisor.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
Hygiene measures	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Keep away from food and drink.
Environmental exposure controls	Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. Fume scrubbers, filters or engineering modifications to the process equipment may be necessary to reduce emissions to acceptable levels.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	
Physical state	Solid.
Form	Granular.
Colour	Brown or black.
Odour	Odourless.
Odour threshold	Not applicable.
pH	Not applicable (insoluble in water).
Melting point/freezing point	Property has not been measured.
Initial boiling point and boiling range	Property has not been measured.
Flash point	Not applicable (solid).
Evaporation rate	Not applicable (solid).
Flammability (solid, gas)	Non flammable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not applicable (solid).
Explosive limit – upper (%)	Not applicable (solid).
Vapour pressure	Not applicable (solid)
Vapour density	Not applicable (solid).
Relative density	Property has not been measured.
Solubility(ies)	
Solubility (water)	Insoluble in water.
Partition coefficient (n-octanol/water)	Not applicable, product is a mixture. .
Auto-ignition temperature	Not applicable (solid).
Decomposition temperature	704 °C (1299.2 °F)
Viscosity	Not applicable (solid).
Explosive properties	Not available.
Oxidising properties	Not available.

9.2. Other information

Bulk density	> 800 - < 900 kg/m3
Kinematic viscosity	Not applicable (solid).

SECTION 10: Stability and reactivity

10.1. Reactivity	The product is stable and non reactive under normal conditions of use, storage and transport.
10.2. Chemical stability	Stable under normal temperature conditions.
10.3. Possibility of hazardous reactions	Hazardous polymerisation does not occur. Contact with acids liberates toxic gas.
10.4. Conditions to avoid	Avoid incompatible materials and intense heat.
10.5. Incompatible materials	Oxidising material. Combustible material. Organic material. Reducing Agents. Halogenated compounds. Strong acids. Aluminium.

10.6. Hazardous decomposition products Metal oxides. Copper fumes.

SECTION 11: Toxicological information

General information Occupational exposure to the substance or mixture may cause adverse effects.

Information on likely routes of exposure

Inhalation Harmful if inhaled. Dust may irritate respiratory system or lungs. May cause damage to organs through prolonged or repeated exposure by inhalation.

Skin contact Dust may irritate skin.

Eye contact Dust in the eyes may cause irritation.

Ingestion Harmful if swallowed.

Symptoms Dust may irritate the respiratory tract, skin and eyes. Prolonged exposure may cause chronic effects.

11.1. Information on toxicological effects

Acute toxicity Harmful if inhaled or swallowed.

Components	Species	Test Results
copper(II) oxide (CAS 1317-38-0)		
Acute		
Dermal		
LD50	Rat	> 2000 mg/kg, 24 Hours (OECD Test Guideline 402)
Oral		
LD50	Rat	> 2500 mg/kg (OECD Test Guideline 423)

Skin corrosion/irritation Dust may cause skin irritation.

Corrosivity

manganese dioxide (CAS 1313-13-9)	OECD 404, EU Method B.4 Result: Not irritating. Species: Rabbit
copper(II) oxide (CAS 1317-38-0)	OECD Test Guideline 404 Result: Not irritating. Species: Rabbit

Serious eye damage/eye irritation Dust may cause eye irritation.

Eye

manganese dioxide (CAS 1313-13-9)	OECD 405, EU Method B.5 Result: Not irritating. Species: Rabbit
copper(II) oxide (CAS 1317-38-0)	OECD Test Guideline 405 Result: Not irritating. Species: Rabbit

Respiratory sensitisation Not classified.

Skin sensitisation Not classified.

Skin Sensitisation

copper(II) oxide (CAS 1317-38-0)	OECD Test Guideline 406 Result: Not sensitizing. Species: Guinea pig

Germ cell mutagenicity Not classified.

Carcinogenicity Not classified.

Reproductive toxicity Not classified.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure May cause damage to the following organs through prolonged or repeated exposure: Brain.

Aspiration hazard Not classified.

Mixture versus substance information Not known.

Other information

Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in “manganism,” a disease of the central nervous system similar to Parkinson’s Disease, gait impairment, muscle spasms and behavioral changes. Frequent inhalation of dust over a long period of time increases the risk of developing asthma, chronic lung diseases, and skin irritation. Prolonged exposure, usually over many years, to manganese oxide fume/dust can lead to chronic manganese poisoning, chiefly affecting the central nervous system.

SECTION 12: Ecological information

12.1. Toxicity

A 28-day Transformation/Dissolution protocol test was conducted with this product at a 1 mg/L loading in a standard aqueous medium at pH 6. The 7 and 28 days release factors for copper were 1.82% and 4.35%, respectively. For manganese, no concentrations were measured above the validated and accredited reporting limits after 7 and 28 days of extraction (limit of 5 µg/L).

The implementation of the GHS classification system, taking into account the results of the T/Dp test, results in an Aquatic Acute 2 classification for the product; this classification is driven by the presence of copper (as CuO). Under CLP (EU-implementation of GHS) there is no environmental classification for the product.

Components		Species	Test Results
manganese dioxide (CAS 1313-13-9)			
Other			
Other	EC50	Activated sewage sludge	> 1000 mg/l, 3 hr
	NOEC	Activated sewage sludge	1000 mg/l

12.2. Persistence and degradability

The product solely consists of inorganic compounds which are not biodegradable.

12.3. Bioaccumulative potential

The product contains inorganic compounds which are not biodegradable.

Partition coefficient n-octanol/water (log Kow)

Not applicable, product is a mixture.

Bioconcentration factor (BCF)

Not available.

12.4. Mobility in soil

Not available.

Mobility in general

The product is insoluble in water.

12.5. Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6. Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste

Dispose in accordance with all applicable regulations. Do not allow this material to drain into sewers/water supplies.

Contaminated packaging

Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

EU waste code

The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Disposal methods/information

Dispose of contents/container in accordance with local/regional/national/international regulations.

Special precautions

Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

14.1. - 14.6.: Not regulated as dangerous goods.

RID

14.1. - 14.6.: Not regulated as dangerous goods.

ADN

14.1. - 14.6.: Not regulated as dangerous goods.

IATA

14.1. - 14.6.: Not regulated as dangerous goods.

IMDG

14.1. - 14.6.: Not regulated as dangerous goods.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

This product is not intended to be transported in bulk.

SECTION 15: Regulatory information

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

Retained direct EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and II, as amended

Not listed.

Regulation (EU) 2019/1021 On persistent organic pollutants (recast), as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 1 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 2 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex I, Part 3 as amended

Not listed.

Regulation (EU) No. 649/2012 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended

copper(II) oxide (CAS 1317-38-0)

Regulation (EC) No. 1907/2006, REACH Article 59(10) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use, as amended - Conditions of restriction given for the associated entry number should be considered

manganese dioxide (CAS 1313-13-9)

Other regulations

This Safety Data Sheet is compiled in accordance with REACH Regulation (EC) No 1907/2006, as amended by UK REACH Regulations SI 2019/758. This product is classified and labelled in accordance with the retained CLP Regulation (EU) No 1272/2008, as amended for Great Britain.

Follow the requirements of the Control of Substances Hazardous to Health Regulations 2002 [SI 2002/2677], as amended, when using this material.

15.2. Chemical safety assessment	No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

List of abbreviations

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.
ADN: European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways.
IARC: International Agency for Research on Cancer.
IMDG: International Maritime Dangerous Goods.
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail.

References	HSDB® - Hazardous Substances Data Bank Registry of Toxic Effects of Chemical Substances (RTECS)
Information on evaluation method leading to the classification of mixture	The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available.
Full text of any statements, which are not written out in full under sections 2 to 15	H302 Harmful if swallowed. H332 Harmful if inhaled. H373 May cause damage to organs through prolonged or repeated exposure. H400 Very toxic to aquatic life. H410 Very toxic to aquatic life with long lasting effects.
This SDS contains revisions in the following section(s):	1, 2, 3, 4, 7, 8, 9, 11, 12, 14, 15, 16.
Training information	Follow training instructions when handling this material.

Disclaimer

The information contained herein is accurate to the best of our knowledge. However, data, safety standards and government regulations are subject to change and, therefore, holders and users should satisfy themselves that they are aware of all current data and regulations relevant to their particular use of product. CARUS LLC DISCLAIMS ALL LIABILITY FOR RELIANCE ON THE COMPLETENESS OR ACCURACY OR THE INFORMATION INCLUDED HEREIN. CARUS LLC MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTIABILITY OR FITNESS FOR PARTICULAR USE OR PURPOSE OF THE PRODUCT DESCRIBED HEREIN. All conditions relating to storage, handling, and use of the product are beyond the control of Carus LLC, and shall be the sole responsibility of the holder or user of the product.

Annex to the extended Safety Data Sheet (eSDS)

Table of contents

1. ES 1: Formulation & (re)packing of substances and mixtures

1.1. Title section

ES Name: Formulation & (re)packing of substances and mixtures

Environment		
1:	Filling of reactors or canister with MnO2 mixtures for air treatment	ERC5
Worker		
2:	Transfer of substance	PROC8a
3:	Transfer of substance	PROC8b
4:	Transfer of substance	PROC9

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Filling of reactors or canister with MnO2 mixtures for air treatment (ERC5)

Product (article) characteristics

Solid, low dustiness

Covers concentrations up to 80 %

Amount used (or contained in articles), frequency and duration of use/exposure

Annual amount per site <= 50 tonnes/year

Daily amount per site <= 0,17 tonnes/day

Emission days: 300 days per year

Intermittent release

Conditions and measures related to treatment of waste (including article waste)

No waste water generated in the process.

Residues which cannot be recycled are disposed off as chemical waste.

1.2.2. Control of worker exposure: Transfer of substance (PROC8a)

Product (article) characteristics

Solid, low dustiness

Covers concentrations up to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Duration: Covers use up to > 240 min

Technical and organisational conditions and measures

Local exhaust ventilation Inhalation - minimum efficiency of 90 %

1.2.3. Control of worker exposure: Transfer of substance (PROC8b)

Product (article) characteristics

Solid, low dustiness

Covers concentrations up to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Duration: Covers use up to > 240 min

Technical and organisational conditions and measures

Local exhaust ventilation Inhalation - minimum efficiency of 95 %

1.2.4. Control of worker exposure: Transfer of substance (PROC9)

Product (article) characteristics

Solid, low dustiness

Covers concentrations up to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Duration: Covers use up to > 240 min

Technical and organisational conditions and measures

Local exhaust ventilation Inhalation - minimum efficiency of 90 %

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: Filling of reactors or canister with MnO2 mixtures for air treatment (ERC5)

Release rate	Release rate	Release estimation method
Water	0 kg/day	Estimated release factor

Air	0 kg/day	Estimated release factor
Soil	0 kg/day	Estimated release factor

1.3.2. Worker exposure: Transfer of substance (PROC8a)

Route of exposure and type of effects	Exposure estimate	Method	RCR
inhalative, systemic, long-term	3,2E-2 mg/m³	MEASE	= 0,16
dermal, systemic, long-term	4,35E-7 mg/kg bw/day	MEASE	<0,01
combined routes, systemic, long-term			= 0,16

1.3.3. Worker exposure: Transfer of substance (PROC8b)

Route of exposure and type of effects	Exposure estimate	Method	RCR
inhalative, systemic, long-term	3,2E-3 mg/m³	MEASE	= 0,02
dermal, systemic, long-term	2,16E-7 mg/kg bw/day	MEASE	<0,01
combined routes, systemic, long-term			= 0,02

1.3.4. Worker exposure: Transfer of substance (PROC9)

Route of exposure and type of effects	Exposure estimate	Method	RCR
inhalative, systemic, long-term	6,3E-3 mg/m³	MEASE	= 0,03
dermal, systemic, long-term	2,16E-7 mg/kg bw/day	MEASE	<0,01
combined routes, systemic, long-term			= 0,03

1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

No environmental exposure scenarios were calculated. Filling occurs at room temperature and without the use of water. In combination with the low dustiness and the low water solubility of the granules, emissions to air, water and soil are considered negligible. Should a downstream user have emissions to air, water or soil he should perform his own assessment.

2. ES 2: Service life (consumer) – Use of air treatment equipment

2.1. Title section

ES Name: Service life (consumer) – Use of air treatment equipment

Environment

1:	Service life (consumer): Use of air treatment equipment	ERC11a

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Service life (consumer): Use of air treatment equipment (ERC11a)

Product (article) characteristics

Solid, low dustiness

Amount used (or contained in articles), frequency and duration of use/exposure

Depending on the final application an article can contain up to a few tons of MnO2 for large reactors treating industrial gases or only a few grams for small canisters treating small amounts of gasses.

Conditions and measures related to treatment of waste (including article waste)

External recovery and recycling of waste should comply with applicable local and/or national regulations. The MnO2 mixture should not come into contact with water and therefore no emissions to the STP are expected.

Other conditions affecting environmental exposure

Indoor use

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: Service life (consumer): Use of air treatment equipment (ERC11a)

Release rate	Release rate	Release estimation method
Water	0 kg/day	
Air	0 kg/day	
Soil	0 kg/day	

2.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The use of the air treatment articles occurs at room temperature and without the use of water. In combination with the low dustiness and the low water solubility of the granules, emissions to air and water are considered negligible. The MnO2 mixtures is contained in articles and the air leaving the air purification system is filtered before being rejected. In this regard it is unlikely that consumers or general population would be exposed to elevated concentrations of MnO2. No environmental exposure scenarios were calculated. Should a downstream user have emissions to air or water he should perform his own assessment. Consumers should not break open the canisters containing the MnO2 mixtures.

3. ES 3: Use of MnO2 in the catalyst sector

3.1. Title section

ES Name: Use of MnO2 in the catalyst sector

Environment		
1:	Use of MnO2 in the catalyst sector	ERC6b
Worker		
2:	Manufacture or formulation	PROC3
3:	Chemical production with exposure	PROC4
4:	Mixing operations	PROC5
5:	Industrial spraying	PROC7
6:	Material transfers	PROC8b
7:	Small packaging	PROC9

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Use of MnO2 in the catalyst sector (ERC6b)

Product (article) characteristics

Solid, low dustiness

Covers concentrations up to 80 %

Amount used (or contained in articles), frequency and duration of use/exposure

Annual amount per site <= 50 tonnes/year

Daily amount per site <= 17 tonnes/day

Emission days: 300 days per year

Intermittent release

Conditions and measures related to treatment of waste (including article waste)

No waste water generated in the process. Residues which cannot be recycled are disposed off as chemical waste.

3.2.2. Control of worker exposure: Manufacture or formulation (PROC3)

Product (article) characteristics

Solid, low dustiness

Covers concentrations up to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Duration: Covers use up to 240 min

Technical and organisational conditions and measures

Local exhaust ventilation Inhalation - minimum efficiency of 78 %

Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable respiratory protection.

Wear suitable gloves tested to EN374.

3.2.3. Control of worker exposure: Chemical production with exposure (PROC4)

Product (article) characteristics

Solid, low dustiness

Covers concentrations up to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Duration: Covers use up to 240 min

Technical and organisational conditions and measures

Local exhaust ventilation Inhalation - minimum efficiency of 78 %

Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable respiratory protection.

Wear suitable gloves tested to EN374.

3.2.4. Control of worker exposure: Mixing operations (PROC5)

Product (article) characteristics

Solid, low dustiness

Covers concentrations up to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Duration: Covers use up to 240 min

Technical and organisational conditions and measures

Local exhaust ventilation Inhalation - minimum efficiency of 78 %

Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable respiratory protection.
Wear suitable gloves tested to EN374.

3.2.5. Control of worker exposure: Industrial spraying (PROC7)

Product (article) characteristics

Solid, low dustiness
Covers concentrations up to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Duration: Covers use up to 240 min

Technical and organisational conditions and measures

Local exhaust ventilation Inhalation - minimum efficiency of 78 %

Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable respiratory protection.
Wear suitable gloves tested to EN374.

3.2.6. Control of worker exposure: Material transfers (PROC8b)

Product (article) characteristics

Solid, low dustiness
Covers concentrations up to 100 %

Amount used (or contained in articles), frequency and duration of use/exposure

Duration: Covers use up to 240 min

Technical and organisational conditions and measures

Local exhaust ventilation Inhalation - minimum efficiency of 78 %

Conditions and measures related to personal protection, hygiene and health evaluation

Wear suitable respiratory protection.
Wear suitable gloves tested to EN374.

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: Use of MnO2 in the catalyst sector (ERC6b)

Release rate	Release rate	Release estimation method
Water	0 kg/day	
Air	0 kg/day	
Soil	0 kg/day	

3.3.2. Worker exposure: Manufacture or formulation (PROC3)

Route of exposure and type of effects	Exposure estimate	Method	RCR
inhalative, systemic, long-term	6,3E-4 mg/m³	MEASE	<0,01
dermal, systemic, long-term	< 1E-4 mg/kg bw/day	MEASE	<0,01
combined routes, systemic, long-term			<0,01

3.3.3. Worker exposure: Chemical production with exposure (PROC4)

Route of exposure and type of effects	Exposure estimate	Method	RCR
inhalative, systemic, long-term	4,4E-3 mg/m³	MEASE	= 0,02
dermal, systemic, long-term	< 1E-3 mg/kg bw/day	MEASE	<0,01
combined routes, systemic, long-term			= 0,02

3.3.4. Worker exposure: Mixing operations (PROC5)

Route of exposure and type of effects	Exposure estimate	Method	RCR
inhalative, systemic, long-term	= 4,4E-3 mg/m³	MEASE	= 0,02
dermal, systemic, long-term	< 1E-3 mg/kg dry weight	MEASE	<0,01
combined routes, systemic, long-term			= 0,02

3.3.5. Worker exposure: Industrial spraying (PROC7)

Route of exposure and type of effects	Exposure estimate	Method	RCR
inhalative, systemic, long-term	8,2E-3 mg/m³	MEASE	= 0,04
dermal, systemic, long-term	3,8E-8 mg/kg bw/day	MEASE	<0,01
combined routes, systemic, long-term			= 0,04

3.3.6. Worker exposure: Material transfers (PROC8b)

Route of exposure and type of effects	Exposure estimate	Method	RCR
inhalative, systemic, long-term	6,3E-4 mg/m³	MEASE	<0,01
dermal, systemic, long-term	1,3E-8 mg/kg bw/day	MEASE	<0,01
combined routes, systemic, long-term			<0,01

3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

No environmental exposure scenarios were calculated, as emissions to air, water and soil are considered negligible. Should a downstream user have emissions to air, water or soil he should perform his own assessment.