SAFETY DATA SHEET

HTZ-51

1. Identification

Product identifier

Product name: HTZ-51

Recommended use of the chemical and restrictions on use

○ **Recommended use:** Sulfur absorbent.

Supplier's details

Manufacture

Company:	Haldor Topsoe, Inc.
Address:	10010 Bayport Rd., Pasadena, TX 77507 United States of America (USA)
Telephone:	281-228-5201
Telefax:	281-228-5209
E-mail address:	catalyst-msds@topsoe.com

Emergency telephone

Chemtrec - Transportation Emergencies: 800-424-9300

2. Hazards identification

Classification of the substance or mixture

- Acute aquatic toxicity	Category 1
- Chronic aquatic toxicity	Category 1

Label elements

○ Product identifier: HTZ-51

○ Hazard pictograms

○ Signal Word: **Warning**

○ Hazard Statements

- H410: Very toxic to aquatic life with long lasting effects.

○ Precautionary Statements
- P391: Collect spillage.
- P273: Avoid release to the environment.

Other hazards which do not result in classification
No information available.

3. Composition/information on ingredients

Mixture

Ingredients	CAS-No.	EC-No.	%w/w
Zinc oxide	1314-13-2	215-222-5	>=97 - <=99
Copper(II)oxide	1317-38-0	215-269-1	>=0.5 - <=3

4. First aid measures

Description of necessary first-aid measures

○ Inhalation: Remove to fresh air. IF exposed or if you feel unwell: Call a POISON CENTER or doctor/ physician.

○ Skin contact: Take off contaminated clothing and wash it before reuse. Wash with water and soap.

○ Eye contact: Immediately flush eye(s) with plenty of water. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, consult a specialist.

○ Ingestion: Clean mouth with water and drink afterwards plenty of water. Get medical advice/ attention if you feel unwell.

Most important symptoms/effects, acute and delayed

○ Inhalation: Inhalation of excessive amounts of dust may cause irritation of the respiratory system; symptoms may include coughing and difficulty in breathing.

○ Skin contact: May cause skin irritation.

○ Eye contact: May cause eye irritation.

Indication of immediate medical attention and special treatment needed, if necessary

○ Symptoms: None known.

5. Fire-fighting measures

The product itself does not burn.

Extinguishing media

○ Suitable extinguishing media: Product is compatible with standard fire-fighting agents.

Specific hazards arising from the chemical
No hazards to be specially mentioned.

Special protective equipment and precautions for fire-fighters
Wear full protective clothing and self-contained breathing apparatus.

Further information
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Avoid breathing dust. Follow safe handling advice and personal protective equipment recommendations.

Environmental precautions
Do not flush into surface water or sanitary sewer system.

Methods and materials for containment and cleaning up
Clean up promptly by scoop or vacuum. Use approved industrial vacuum cleaner for removal.

Reference to other sections
For personal protection see section 8. For disposal considerations see section 13.

7. Handling and storage

Precautions for safe handling
Minimize dust generation and accumulation. Provide appropriate exhaust ventilation at places where dust is formed. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Handle in accordance with good industrial hygiene and safety practice. For personal protection see section 8.

Conditions for safe storage, including any incompatibilities
Keep container tightly closed. Product may be damaged by water.

8. Exposure controls/personal protection

Control parameters

Exposure controls

Exposure limits may vary. It is recommended that information about locally applicable exposure limits is obtained.

Ingredients	Exposure Limit Values		Source
Zinc oxide (1314-13-2)			
- Respirable dust	TLV-TWA	2 mg/m3	ACGIH (2016:03)
	TLV-STEL	10 mg/m3	ACGIH (2016:03)
- Total dust	PEL	15 mg/m3	OSHA_TRANS (1993:06)
- Respirable dust	PEL	5 mg/m3	OSHA_TRANS (1993:06)
- Fumes	PEL	5 mg/m3	OSHA_TRANS (1993:06)
Copper(II)oxide (1317-38-0)			
- Fumes (as Cu)	TLV-TWA	0.2 mg/m3	ACGIH (2016:03)

Individual protection measures, such as personal protective equipment

○ Eye/face protection — Safety goggles

○ Skin protection

- Hand protection — Wear protective gloves.
  Glove material: Nitrile rubber
- Body Protection — Dust impervious protective suit Safety shoes recommended when handling heavy containers.

○ Respiratory protection — Suitable mask with particle filter P3 (European Norm 143)

○ Other protection — Wash hands thoroughly after handling. Change working clothes after each work-shift.

9. Physical and chemical properties

Property	Value
Appearance	
○ Physical state:	solid
○ Form:	Pellets or large crystals
○ Color:	white
Odor:	odorless
Odor Threshold:	Not relevant.

pH:	Not applicable
Melting point/freezing point:	> 1,900 °C / > 3,450 °F
Initial boiling point and boiling range:	No data available
Flash point:	Not relevant.
Evaporation rate:	Not relevant.
Flammability (solid, gas):	The product is not flammable.
Upper/lower flammability or explosive limits	
○ Lower explosion limit / Lower flammability limit:	Not explosive
○ Upper explosion limit / Upper flammability limit:	Not relevant.
Vapor pressure:	Not applicable
Vapor density:	Not relevant.
Density:	No data available
Solubility(ies)	
○ Water solubility:	Negligible – metals leaching may occur.
○ Solubility in other solvents:	Not relevant.
Partition coefficient: n-octanol/water:	Not applicable
Autoignition temperature:	Not applicable
Decomposition temperature:	No information available.
Viscosity:	Not relevant.
Explosive properties:	Not explosive
Oxidizing properties:	The substance or mixture is not classified as oxidizing.
Other information	

10. Stability and reactivity

Reactivity
Stable under normal conditions.

Chemical stability
Stable under normal conditions.

Possibility of hazardous reactions
No dangerous reaction known under conditions of normal use.

Conditions to avoid
None known.

Incompatible materials
Water and moisture for catalyst integrity.

Hazardous decomposition products
None known.

11. Toxicological information

Information on likely routes of exposure

○ Inhalation:	Inhalation of dust may cause shortness of breath, tightness of the chest, a sore throat and cough.
○ Eye contact:	Dust contact with the eyes can lead to mechanical irritation.
○ Skin contact:	May cause skin irritation.
○ Ingestion:	Ingestion may cause irritation of the mouth and throat and may cause discomfort.
○ Long term effects:	Prolonged or repeated inhalation may cause damage to the lungs.

Acute toxicity

Assessment:	Not classified based on available information.Not classified based on available information.

» Oral

Zinc oxide:	LD50 Oral(Rat): > 5,000 mg/kg *Method*: OECD Test Guideline 401
Copper(II)oxide:	LD50(Rat): > 2,500 mg/kg *Method*: OECD Test Guideline 423

» Dermal

Zinc oxide:	LD50(Rat): > 2,000 mg/kg *Method*: OECD Test Guideline 402
Copper(II)oxide:	LD50(Rat): > 2,000 mg/kg *Method*: OECD Test Guideline 402

» Inhalation

Zinc oxide:	LC50(Rat, 4 h): > 5.7 mg/l *Method*: OECD Test Guideline 403
Copper(II)oxide:	Not applicable

Repeated dose toxicity

Zinc oxide:	NOAEL (No observed adverse effect level): 13.3 mg/kg bw/day *Routes of exposure*: Oral *Exposure time*: 91 d *Method*: OECD Test Guideline 408 *Target Organs*: Cardiovascular, digestive system, Pancreas *Remarks*: Read-across (Analogy)

NOAEL (No observed adverse effect level): 1.5 mg/m³
Routes of exposure: Inhalation
Test atmosphere: aerosol
Exposure time: 90 d
Method: OECD Test Guideline 413
Target Organs: Lungs

LOAEL (Lowest observed adverse effect level): 75 mg/kg bw/day
Routes of exposure: Dermal
Exposure time: 28 d
Method: OECD Test Guideline 410
Target Organs: Skin

Copper(II)oxide:

NOAEL (No observed adverse effect level): 1000 ppm
Routes of exposure: Oral
Exposure time: 92 d
Method: Regulation (EC) No. 440/2008, Annex, B.26
Remarks: Read-across (Analogy)

NOAEL (No observed adverse effect level): 2 mg/m³
Routes of exposure: Inhalation
Exposure time: 28 d
Method: OECD Test Guideline 412

Skin corrosion/irritation

Assessment: Not classified based on available information.Not classified based on available information.

Zinc oxide:

Result: No skin irritation
Species: Rabbit
Exposure time: 24 h
Method: OECD Test Guideline 404

Copper(II)oxide:

Result: No skin irritation
Species: Rabbit
Exposure time: 72 h
Method: OECD Test Guideline 404
Remarks: Not classified due to data which are conclusive although insufficient for classification.

Serious eye damage/eye irritation

Assessment:	Not classified based on available information.Not classified based on available information.
Zinc oxide:	*Result*: No eye irritation *Species*: Rabbit *Exposure time*: 72 h *Method*: OECD Test Guideline 405 *Remarks*: Not classified due to data which are conclusive although insufficient for classification.
Copper(II)oxide:	*Result*: Mild eye irritation *Species*: Rabbit *Method*: OECD Test Guideline 405 *Remarks*: Not classified due to data which are conclusive although insufficient for classification.

Respiratory sensitization

Assessment:	Not classified based on available information.Not classified based on available information.
Zinc oxide:	*Routes of exposure*: Inhalation *Remarks*: Not classified due to lack of data.
Copper(II)oxide:	*Routes of exposure*: Inhalation *Remarks*: Not classified due to lack of data.

Skin sensitization

Assessment:	Not classified based on available information.Not classified based on available information.
Zinc oxide:	*Routes of exposure*: Dermal *Test Type*: Maximization Test *Species*: Guinea pig *Result*: Not a skin sensitizer. *Method*: OECD Test Guideline 406
Copper(II)oxide:	*Routes of exposure*: Dermal *Test Type*: Maximization Test *Species*: Guinea pig *Result*: Not a skin sensitizer. *Method*: OECD Test Guideline 406

Germ cell mutagenicity

Assessment:	Not classified based on available information.Not classified based on available information.
Zinc oxide:	Genotoxicity in vitro Result: negative *Test Type*: Ames test *Test material*: Salmonella typhimurium *Method*: OECD Test Guideline 471 Genotoxicity in vivo

Result: negative
Test Type: Chromosome aberration test in vitro
Species: Rat
Method: OECD Test Guideline 474

Copper(II)oxide:

Genotoxicity in vitro
Result: negative
Test Type: Ames test
Test material: Salmonella typhimurium
Method: OECD Test Guideline 471

Genotoxicity in vivo
Result: negative
Test Type: unscheduled DNA synthesis assay
Species: Rat
Method: OECD Test Guideline 486
Remarks: Read-across (Analogy)

Carcinogenicity

Assessment: Not classified based on available information.Not classified based on available information.

Zinc oxide: NOAEL (No observed adverse effect level): 22,000 mg/l
Application Route: Oral
Species: Mouse
Remarks: Read-across (Analogy)

Copper(II)oxide: *Application Route*: Oral
Species: Rat
Result: No evidence of carcinogenicity in animal studies.
Remarks: Read-across (Analogy)

Reproductive toxicity

Assessment: Not classified based on available information.Not classified based on available information.

Zinc oxide:

Reproductive Toxicity/Fertility

NOAEL: 7.2 mg Zn/kg bw/day
Result: Animal testing did not show any effects on fertility.
Test Type: Two-generation study
Species: Rat
Application Route: Oral
Remarks: Read-across (Analogy)

Reproductive Toxicity/Development/Teratogenicity

NOAEC: 7.5 mg/m³
Result: No effects on fertility and early embryonic development were detected.
Test Type: Pre-natal
Species: Rat
Application Route: Oral

Remarks: Read-across (Analogy)

Copper(II)oxide:

Reproductive Toxicity/Fertility

Result: Animal testing did not show any effects on fertility.
Test Type: Two-generation study
Species: Rat
Application Route: Oral
Remarks: Read-across (Analogy)

Reproductive Toxicity/Development/Teratogenicity

NOAEL: 6 mg/kg bw/day
Result: No effects on fertility and early embryonic development were detected.
Test Type: Pre-natal
Species: Rat
Application Route: Oral
Remarks: Read-across (Analogy)

Specific target organ systemic toxicity - single exposure

Assessment:	Not classified based on available information.Not classified based on available information.
Zinc oxide:	Assessment: No significant health effects observed in animals at concentrations of 20 mg/l/4h or less Routes of exposure: Inhalation
Copper(II)oxide:	Assessment: No significant health effects observed in animals at concentrations of 20 mg/l/4h or less Routes of exposure: Inhalation

Specific target organ systemic toxicity - repeated exposure

Assessment:	Not classified based on available information.Not classified based on available information.
Zinc oxide:	*Assessment*: No significant health effects observed in animals at concentrations of 0.2 mg/l/6h/d or less. *Routes of exposure*: Inhalation
Copper(II)oxide:	*Assessment*: No significant health effects observed in animals at concentrations of 0.2 mg/l/6h/d or less. *Routes of exposure*: Inhalation

Aspiration hazard

Assessment:	Not classified based on available information.Not classified based on available information.

Further information

Product:	No information available.

12. Ecological information

Ecotoxicity

Very toxic to aquatic life with long lasting effects.

» Acute toxicity

• Toxicity to fish

Zinc oxide:	LC50: 0,169 mg Zn/l *Exposure time:* 96 h *Species:* Oncorhynchus mykiss (rainbow trout) *Test Type:* static test *Test Method:* ASTM E729 - 96 *Remarks:* Read-across (Analogy)
Copper(II)oxide:	LC50: 38,4 µg Cu/l *Exposure time:* 96 h *Species:* Pimephales promelas (fathead minnow) *Test Type:* flow-through test *Remarks:* Read-across (Analogy)

• Toxicity to aquatic invertebrates

Zinc oxide:	EC50: 413 µg Zn/l *Exposure time:* 48 h *Species:* Ceriodaphnia dubia (water flea) *Test Type:* static test *Test Method:* EPA 821-R-02-012 *Remarks:* Read-across (Analogy)
Copper(II)oxide:	EC50: 33,8 µg Cu/l *Exposure time:* 48 h *Species:* Daphnia magna (Water flea) *Test Type:* static test *Test Method:* OECD Test Guideline 202 *Remarks:* Read-across (Analogy)

» Chronic toxicity

• Toxicity to fish

Zinc oxide:	NOEC: 0,044 mg Zn/l *Exposure time:* 30 d *Species:* Oncorhynchus mykiss (rainbow trout) *Test Type:* flow-through test *Remarks:* Read-across (Analogy)
Copper(II)oxide:	NOEC: 66 µg Cu/l *Exposure time:* 270 d *Species:* Pimephales promelas (fathead minnow) *Test Type:* flow-through test *Test Method:* OECD Test Guideline 204 *Remarks:* Read-across (Analogy)

• Toxicity to aquatic invertebrates

Zinc oxide:	NOEC: 0,058 mg Zn/l *Exposure time:* 21 d *Species:* Daphnia magna (Water flea) *Test Type:* semi-static test *Test Method:* OECD Test Guideline 211
Copper(II)oxide:	NOEC: 6,3 µg Cu/l *Exposure time:* 7 d *Species:* Ceriodaphnia dubia (water flea) *Test Type:* semi-static test *Test Method:* OECD Test Guideline 202

» Other organisms relevant to the environment

• Toxicity to aquatic plants

Zinc oxide:	EC50: 0,042 mg Zn/l *Exposure time:* 72 h *Species:* Pseudokirchneriella subcapitata (green algae) *Test Type:* static test *Test Method:* OECD Test Guideline 201
	NOEC: 0,17 mg Zn/l *Exposure time:* 72 h *Species:* Pseudokirchneriella subcapitata (green algae) *Test Type:* static test *Test Method:* OECD Test Guideline 201
Copper(II)oxide:	EC50: 33,9 µg Cu/l *Exposure time:* 72 h *Species:* Pseudokirchneriella subcapitata (green algae) *Test Type:* static test *Test Method:* OECD Test Guideline 201 *Remarks:* Read-across (Analogy)
	NOEC: 15,7 µg Cu/l *Exposure time:* 72 h *Species:* Pseudokirchneriella subcapitata (green algae) *Test Type:* static test *Test Method:* OECD Test Guideline 201 *Remarks:* Read-across (Analogy)

• Aquatic Compartment (including sediment)

Copper(II)oxide:	NOEC: 18.3 mg Cu/kg sediment dw *Duration:* 28 d *Species:* Chironomus riparius (Midge larvae) *Test Type:* static test *Test Method:* OECD Test Guideline 218 *Remarks:* Read-across (Analogy)

Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

Bioaccumulative potential

Zinc oxide:	Does not significantly accumulate in organisms.
Copper(II)oxide:	Does not significantly accumulate in organisms.

Mobility in soil

Zinc oxide:	log Kd: 3.78 *Test Type*: Adsorption/Soil *Medium*: Soil
Copper(II)oxide:	log Kd: 3.3 - 3.68 *Test Type*: Adsorption/Soil *Medium*: Soil

Results of PBT and vPvB assessment

Zinc oxide:	Not applicable
Copper(II)oxide:	Not applicable

Other adverse effects

Product:	No information available.

13. Disposal considerations

Waste treatment methods

Can be offered for metal recovery.
Dispose of waste in accordance with applicable Federal, State and Local regulations. Haldor Topsoe, Inc. takes no responsibility for the classification of used or contaminated material.

Consult federal, state and local regulations regarding proper disposal of container.

14. Transport information

UN number:	3077
Proper shipping name:	Environmentally hazardous substance, solid, n.o.s. (Zinc oxide)

Transport hazard class(es)

ADR/RID:	Class: 9; Labels: 9
IMDG:	Class: 9; Labels: 9
IATA:	Class: 9; Labels: 9
49 CFR:	Class: 9
TDG:	Class: 9; Labels: 9

Packing group:	III

Environmental hazards

ADR/RID:	Environmentally hazardous
IMDG:	Marine Pollutant
IATA:	Environmentally hazardous
49 CFR:	Marine pollutant
TDG:	Environmentally hazardous

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable for product as supplied.

Special precautions for user: No special precautions are needed in handling this material.

Further information for transport

The classification as “Marine Pollutant” according to IMDG applies ONLY for international transportation of dangerous goods by sea and does not apply for inland transportation by road or rail in United States and Canada.

ADR/RID:	Tunnel restriction code:	(E)
IMDG:	EmS:	F-A, S-F
IATA:	Packing instruction (cargo aircraft) :	956
	Packing instruction (passenger aircraft) :	956

15. Regulatory information

Safety, health and environmental regulations specific for the product in question

Federal Regulations

○ **TSCA Section 12(b) Export Notification**
No substances are subject to TSCA 12(b) export notification requirements.

○ **OSHA Special Regulated Substances (29 CFR 1910.1001-1050)**
No component of this product present at levels greater than or equal to 0.1% is on OSHA’s list of regulated carcinogens.

○ **Emergency Planning and Community Right-To-Know Act (EPCRA)**

- Section 302 - Extremely Hazardous Substances
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

- Section 304 - Emergency Release Notification
This material does not contain any components with a section 304 EHS RQ.

- Section 313 - Toxic Chemicals
The following components are subject to reporting levels established by SARA Title III, Section 313:

Ingredients	Note

Zinc oxide (1314-13-2):	De minimis concentration: 1.0 % Reporting threshold for manufacturing and processing: 25000 lbs Reporting threshold for other uses: 10000 lbs Chemical Category Code: N982
Copper(II)oxide (1317-38-0):	De minimis concentration: 1.0 % Reporting threshold for manufacturing and processing: 25000 lbs Reporting threshold for other uses: 10000 lbs Chemical Category Code: N100

- Section 311/312 - Chemical Reporting
No SARA Hazards

○ **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)**

- Hazardous Substances (40 CFR 302.4)
This material does not contain any components with a CERCLA RQ.

○ **Clean Air Act**

- Section 112 r Accidential Relase Prevention (40 CFR 68.130)
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

○ **Clean Water Act**

- Section 311 Hazardous Substances (40 CFR 117.3)
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.

States Regulations

○ **California Proposition 65**
This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

16. Other information

Material safety datasheet sections which have been updated:

11. Toxicological information, 12. Ecological information

Key or legend to abbreviations and acronyms used in the safety data sheet

○ DNEL Derived No Effect Level
○ PNEC Predicted No Effect Concentration

- ACGIH — US. ACGIH Threshold Limit Values
- OSHA_TRANS — US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
- PEL — Permissible exposure limit
- TLV-STEL — Threshold limit value - Short-term exposure limit
- TLV-TWA — Threshold limit value - Time weighted average

Key literature references and sources for data

- RTECS (Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, 4676 Columbia Pkwy., Cincinnati, Ohio 45226, USA).
- HSDB (Hazardous Substances Data Bank - TOXNET (Toxicology Data Network)).
- IUCLID (European Commission, Joint Reserch Centre, Institute for Health and consumer Protection, European Chemicals Bureau).
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NFPA 704: National Fire Protection Association

Health	1	Fire	0	Reactivity	0

0= minimal hazard, 1=slight hazard, 2=moderate hazard, 3=severe hazard,4=extreme hazard