

# SAFETY DATA SHEETS

According to the UN GHS revision 10

## 1: Identification

### 1.1 GHS Product identifier

Product name Manganese

### 1.2 Other means of identification

Product number 7439-96-5

Other names Manganese

### 1.3 Recommended use of the chemical and restrictions on use

Identified uses Industrial and scientific research use.

Uses advised against no data available

### 1.4 Supplier's details

Company MolBest.com

Address MolBest.com

Telephone MolBest.com

### 1.5 Emergency phone number

Emergency phone number MolBest.com

Service hours MolBest.com

## 2: Hazard identification

### 2.1 Emergency Overview

It is highly corrosive and can cause irreversible damage to the skin and eyes. If in contact, rinse immediately with plenty of water and seek medical help as soon as possible.

### 2.2 GHS Classification

Flammable solids : Category 1

Flammable solids : Category 2

Serious eye damage/eye irritation : Category 2A

Hazardous to the aquatic environment, long-term hazard : Category 2

Hazardous to the aquatic environment, long-term hazard : Category 3

### 2.3 GHS label elements, including precautionary statements

**Pictogram(s)****Signal word**

Danger

**Hazard statement(s)**

H228 Flammable solid

H319 Causes serious eye irritation

H411 Toxic to aquatic life with long lasting effects

H412 Harmful to aquatic life with long lasting effects

**Precautionary statement(s)****Prevention**

P210 Keep away from heat, hot surface, sparks, open flames and other ignition sources. No smoking.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof [electrical/ventilating/lighting/...] equipment.

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...

P264+P265 Wash hands [and ...] thoroughly after handling. Do not touch eyes.

**Response**

P391 Collect spillage.

P305+P351+P338 IF IN EYES, Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing.

P337+P317 If eye irritation persists, Get medical help.

P370+P378 In case of fire, Use ... to extinguish.

**Storage**

no data available

**Disposal**

P501 Dispose of contents/container to ...

## 2.4 Physical and chemical

Acidic or alkaline substances that react with metals to produce flammable hydrogen. May cause violent exothermic reactions when in contact with other substances. At high concentrations, they have strong oxidizing or reducing properties.

## 2.5 Health hazards

Skin contact: May cause severe burns, tissue necrosis, and scarring. Eye contact: May cause corneal damage, vision loss, or even blindness. Inhalation of vapor or mist may cause respiratory burns and pulmonary edema.

## 2.6 Environmental hazards

Leakage into the environment can change the pH value of soil and water, causing serious ecological damage. It is highly toxic to aquatic organisms and can cause the death of aquatic organisms and the collapse of the ecosystem.

## 2.7 Other hazards which do not result in classification

no data available

## 3: Composition/information on ingredients

### 3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
Manganese	Manganese	7439-96-5	688-447-3	99%

## 4: First-aid measures

### 4.1 General advice

Stop contact immediately and remove contaminated clothing; rinse the exposed area with plenty of running water and seek medical attention immediately with the material's SDS. If the corrosive substance is acidic (such as sulfuric acid), neutralize it with a weak alkaline solution (such as 5% sodium bicarbonate) after rinsing. For alkaline corrosive substances (such as sodium hydroxide), neutralize them with a weak acidic solution (such as 1% acetic acid).

### 4.2 If inhaled

Move to fresh air and keep the airway open. If corrosive vapors (such as hydrochloric acid mist) are inhaled, immediately administer nebulized inhalation (normal saline + dexamethasone). If laryngeal edema or breathing difficulties occur, immediately perform a tracheotomy (requires professional operation) and seek medical attention.

### 4.3 In case of skin contact

Rinse with plenty of running water for 20-30 minutes (make sure to rinse thoroughly, especially between the fingers, in the armpits, and other folds). If blisters are present, do not prick them; instead, apply a sterile gauze compress (to avoid adhesion). Do not apply oily ointments to avoid affecting subsequent treatment.

### 4.4 In case of eye contact

Immediately flush with an eyewash or plenty of normal saline for 15-20 minutes (use a gentle flow to avoid direct exposure to the cornea); apply antibiotic eye ointment (such as erythromycin ointment) to the eyelids, wear a sterile eye patch, and seek immediate medical attention from an ophthalmologist.

### 4.5 If swallowed

Do not induce vomiting (to avoid secondary damage to the esophageal mucosa). If the substance is acidic, take milk or egg white orally (to protect the gastric mucosa). If the substance is alkaline, take diluted vinegar (1:10 ratio) orally. If you carry SDS, seek medical attention immediately for a gastroscopy.

### 4.6 Most important symptoms and effects, both acute and delayed

Acute symptoms: skin redness, swelling, blisters, ulcers, severe eye pain, photophobia, blurred vision, oral/esophageal burns, and difficulty swallowing; long-term effects: skin scarring, corneal scarring (possibly causing blindness), and esophageal stenosis.

### 4.7 Protection of first-aiders

Rescuers must wear corrosion-resistant chemical protective clothing, chemical protective gloves (made of fluororubber), chemical goggles and masks; stand upwind when flushing to avoid inhaling volatile corrosive gases; after contact, equipment must be cleaned with a neutralizer and then rinsed with clean water.

## 4.8 Notes to physician

Inform the doctor of the type of corrosive agent (acid/base), concentration, and duration of contact. Skin burns should be treated according to their depth (superficial II degree and above require skin grafting). Eye injuries should be checked for corneal epithelial integrity and, if necessary, corneal repair drugs (such as recombinant human epidermal growth factor) should be used.

## 5: Fire-fighting measures

### 5.1 Unsuitable extinguishing media

Flammable liquids (flash point 23-60°C): Avoid using high-pressure water (diffusing liquids); Flammable solids: Do not use water (some solids release heat when in contact with water, such as sulfur); Aerosols: Do not squeeze leaking tanks (explosion prevention).

### 5.2 Specific hazards during fire fighting

The combustion of flammable liquids produces a large amount of vapor, which can easily form a flowing fire; the combustion of flammable solids can easily produce toxic smoke and dust (such as plastics); aerosol cans can easily rupture and explode when heated, spraying flames.

### 5.3 Hazardous combustion products

Carbon monoxide, carbon oxides, organic vapors (such as benzene, toluene); combustion of some solids releases hydrogen chloride and cyanide (when containing chlorine/cyanide components).

### 5.4 Specific extinguishing methods

Flammable liquids: Use dry powder/foam (ordinary foam) for small areas, and cover large areas with foam + firebreaks to intercept (to prevent flow); Flammable solids: Cover with dry powder/dry sand to avoid wind (to prevent dust from intensifying combustion); Aerosols: Remove surrounding fire sources before extinguishing the fire, use dry powder to extinguish the fire, and it is strictly forbidden to touch the leaking tank.

### 5.5 Special protective equipment for fire-fighters

Wear fire-resistant clothing, chemical-resistant gloves, and a half-mask respirator (equipped with a vapor filter cartridge); carry a temperature detector (to monitor the tank temperature); and maintain a safe distance of 10 meters from the fire scene during operation.

## 6: Accidental release measures

### 6.1 Protective measures for workers

Wear anti-static work clothes, anti-static gloves, and chemical goggles; wear a gas mask (organic vapor filter cartridge) for gases/volatile liquids; wear impact protection for aerosols.

## **6.2 Environmental protection measure**

Liquids/aerosols are prevented from flowing into sewers/streams, and oil booms + oil absorbent cotton are used to pollute water bodies; gas leaks are monitored for concentration to prevent them from spreading to residential areas; solids are prevented from dust polluting the soil.

## **6.3 Containment methods for leaked chemicals**

Gas: Shut off the leak source (when safe), and use explosion-proof fan to lead the leak to an open area; Liquid: Collect in anti-static container; Solid: Put non-sparking tools into anti-static container; Aerosol: Collect the leaked tank (no squeezing).

## **6.4 Cleanup methods for chemical spills**

Liquid: absorb with a small amount of oil-absorbing cotton and transfer with a large amount of explosion-proof pump; Solid: transfer with spark-free tools (to prevent friction); Aerosol: leaking tanks are collected separately and disposed of professionally.

## **6.5 Measures to prevent the spread of leaks**

Designate a 10-meter isolation zone and prohibit open flames/static equipment; set up fire barriers for liquids and anti-static isolation belts for gases; use explosion-proof ventilation to reduce concentration (explosion limit).

## **6.6 Container leakage treatment**

Gas: Minor leaks should be sealed with anti-static sealant, serious leaks should be transferred after pressure relief; Liquid: Anti-static sealant should be used to seal, serious leaks should be transferred with explosion-proof pump; Aerosol: Do not squeeze, wrap in sealed bag.

## **6.7 Special considerations**

Eliminate static electricity before operation; provide good ventilation to prevent gas accumulation; perform anti-static testing on tools; clean protective equipment and perform anti-static testing after leak treatment.

# **7: Handling and storage**

## **7.1 Safe storage conditions**

Store in a corrosion-resistant warehouse (the floor is epoxy resin coated, and the walls are acid/alkali-resistant tiles); the container is made of corrosion-resistant material (glass fiber reinforced plastic for acid corrosion, high-density polyethylene for alkaline corrosion), with a capacity of 200L to prevent dumping; the warehouse is equipped with an emergency neutralization tank (volume 5m<sup>3</sup>) and equipped with acid/alkali neutralizers (such as sodium carbonate, dilute acetic acid).

## **7.2 Storage precautions**

Store them separately from materials that may come into contact with the skin (such as clothing and gloves) to avoid cross contamination. Use a corrosion-resistant forklift to transport containers and avoid impact. Check the humidity in the warehouse daily (>65%) to prevent moisture from exacerbating corrosion. In case of leakage, immediately absorb it with inert materials (such as sand) and then treat it

with a neutralizer.

### **7.3 VCI Storage Grade**

Level 2 (medium-high): Metal pipes and valves are coated with VCI anti-rust paint (acid/alkali resistant type) and maintained once every six months; VCI anti-rust blocks (such as urethane) are placed in the warehouse and replenished once every quarter to prevent corrosion of metal parts.

### **7.4 Recommended storage temperature**

5-35°, avoid sudden temperature changes (such as moving directly from a low temperature environment to a high temperature environment); concentrated acids/bases must be kept at a temperature >30° to prevent temperature increases from causing increased container pressure; in winter, they must be protected from freezing (temperature >5°) to prevent the solution from freezing and cracking the container (if the label has a recommended storage temperature, follow the label).

### **7.5 Handling**

For precautions see Safety Data Sheet section 2

Advice on safe handling : Work under hood. Do not inhale substance/mixture.

## **8: Exposure controls/personal protection**

### **8.1 Respiratory protection**

When exposed to corrosive vapors (such as hydrochloric acid mist and sulfuric acid mist), wear a powered air-purifying respirator (APF>50); in high-concentration environments, a positive pressure air respirator is required to avoid inhalation burns to the respiratory tract.

### **8.2 Recommended Filter type**

For acidic corrosive substances, choose Type E filter cartridge (protects against acidic gases such as SO<sub>2</sub> and HCl); for alkaline corrosive substances, choose Type K filter cartridge (protects against ammonia and amines); if the product contains dust, add Type P2 filter cotton.

### **8.3 Eye/face protection**

Wear chemical protective goggles + full-face mask. The mask must cover the chin. The lens should be made of polycarbonate (corrosion-resistant and impact-resistant). Check the sealing regularly.

### **8.4 Skin and body protection**

Wear corrosion-resistant chemical protective clothing made of fluororubber or polytetrafluoroethylene (PTFE) to avoid direct skin contact; wear an apron (of the same material) with protection covering the chest to the knees.

### **8.5 Hand protection**

Wear corrosion-resistant gloves. For acid corrosion, choose neoprene material; for alkaline corrosion, choose nitrile rubber material. The thickness of the gloves should be >0.5mm. Perform a water leakage test before use.

### **8.6 Hygiene measures**

Immediately after the operation, rinse the skin with running water for 10 minutes. If there is stinging at the contact site, apply a neutralizer (5% sodium bicarbonate for acid and 1% acetic acid for alkali) for 5 minutes. Do not use irritating skin care products to avoid aggravating skin damage.

## 9: Physical and chemical properties and safety characteristics

<b>Physical state</b>	A lustrous, brittle, silvery solid
<b>Colour</b>	Hard grey metal
<b>Odour</b>	no data available
<b>Melting point/freezing point</b>	1260°C
<b>Boiling point or initial boiling point and boiling range</b>	1962°C(lit.)
<b>Flammability</b>	Metal: Combustible Solid Combustible.
<b>Lower and upper explosion limit/flammability limit</b>	no data available
<b>Flash point</b>	450?
<b>Auto-ignition temperature</b>	MANGANESE DUST CLOUDS HAVE MINIMAL IGNITION TEMP OF 450 DEG C. ... THE LIMITING OXYGEN (O2) PERCENTAGE PREVENTING IGNITION OF DUST CLOUD IS 15.
<b>Decomposition temperature</b>	Decomp cold water slowly, rapidly on heating; converted by fluorine into di- and trifluoride; by chlorine into the dichloride.
<b>pH</b>	1 (H2O, 20°C)
<b>Kinematic viscosity</b>	no data available
<b>Solubility</b>	Insoluble (NIOSH, 2016)
<b>Partition coefficient n-octanol/water</b>	no data available
<b>Vapour pressure</b>	0 mm Hg (approx) (NIOSH, 2016)
<b>Density and/or relative density</b>	7.3g/mL at 25°C(lit.)
<b>Relative vapour density</b>	no data available
<b>Particle characteristics</b>	no data available

## 10: Stability and reactivity

### 10.1 Reactivity

no data available

### 10.2 Chemical stability

Superficially oxidized on exposure to air.

### 10.3 Possibility of hazardous reactions

MODERATE, IN FORM OF DUST OR POWDER, WHEN EXPOSED TO FLAME. Dust explosion possible if in powder or granular form, mixed with air. Manganese dust (finely divided) has been known to be pyrophoric. Powdered manganese ignites in chlorine and burns brilliantly; with fluorine the reaction takes place with incandescence [Mellor 12:185, 344. 1946-47]. Concentrated nitric acid reacts with manganese with incandescence and a feeble explosion [Mellor 12:188. 1946-47]. Manganese or potassium ignites in nitrogen dioxide [Ann. Chim. et Phys.(2) 2:317]. Manganese burns with a brilliant flame when heated in sulfur dioxide vapor [Mellor 12:187. 1946-47]. Contact with conc. hydrogen peroxide causes violent decomposition and/or ignition.

### 10.4 Conditions to avoid

no data available

### 10.5 Incompatible materials

Will react with water or steam to produce hydrogen; can react with oxidizing materials.

### 10.6 Hazardous decomposition products

Decomp cold water slowly, rapidly on heating; converted by fluorine into di- and trifluoride; by chlorine into the dichloride.

## 11: Toxicological information

### 11.1 Acute toxicity

Oral: no data available

Inhalation: no data available

Dermal: no data available

### 11.2 Skin corrosion/irritation

no data available

### 11.3 Serious eye damage/irritation

no data available

### 11.4 Respiratory or skin sensitization

no data available

## **11.5 Germ cell mutagenicity**

no data available

## **11.6 Carcinogenicity**

EPA-D

## **11.7 Reproductive toxicity**

Reproductive effects, such as impotence and loss of libido, have been noted in male workers afflicted with manganism attributed to occupational exposure to high levels of manganese by inhalation. No information is available on developmental effects of manganese in humans. Animal studies have reported degenerative changes in the seminiferous tubules leading to sterility from intratracheal instillation of high doses of manganese (experimentally delivering the manganese directly to the trachea). In young animals exposed to manganese orally, decreased testosterone production and retarded growth of the testes were reported. Decreased activity levels and a decrease in average pup weight have been noted in the offspring of mice exposed to manganese by inhalation.

## **11.8 STOT-single exposure**

no data available

## **11.9 STOT-repeated exposure**

no data available

## **11.10 Aspiration hazard**

no data available

# **12: Ecological information**

## **12.1 Toxicity**

Toxicity to fish: no data available

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: no data available

Toxicity to microorganisms: no data available

## **12.2 Persistence and degradability**

no data available

## **12.3 Bioaccumulative potential**

no data available

## **12.4 Mobility in soil**

no data available

## **12.5 Other adverse effects**

no data available

## 13: Disposal considerations

### 13.1 Disposal methods for waste chemicals

Acidic corrosives can be treated with alkaline neutralizers (such as sodium carbonate) until neutralized and then disposed of as ordinary waste. Alkaline corrosives can be treated with acidic neutralizers (such as dilute hydrochloric acid) until neutralized and then disposed of. Those that cannot be neutralized must be incinerated at high temperature or chemically decomposed by a professional unit. The container must be thoroughly cleaned before being disposed of.

### 13.2 Precautions

Neutralization reactions must be conducted in well-ventilated, dedicated facilities, with the reaction rate controlled to prevent splashing. Disposal personnel must wear corrosion-resistant protective gear. The pH value of the neutralized waste must be controlled between 6 and 9. Direct disposal of unneutralized corrosive materials is prohibited. Emergency pools must be established at the disposal site to prevent leakage and contamination.

## 14: Transport information

### 14.1 UN Number

ADR/RID: UN3208

IMDG: UN3208

IATA: UN3208

### 14.2 UN Proper Shipping Name

ADR/RID: METALLIC  
SUBSTANCE, WATER-  
REACTIVE, N.O.S.

IMDG: METALLIC  
SUBSTANCE, WATER-  
REACTIVE, N.O.S.

IATA: METALLIC SUBSTANCE,  
WATER-REACTIVE, N.O.S.

### 14.3 Transport hazard class(es)

ADR/RID: 4.3

IMDG: 4.3

IATA: 4.3

### 14.4 Packing group, if applicable

ADR/RID: Not dangerous goods.

IMDG: Not dangerous goods.

IATA: Not dangerous goods.

### 14.5 Environmental hazards

ADR/RID: no

IMDG: no

IATA: no

### 14.6 Special precautions for user

no data available

### 14.7 Transport in bulk according to IMO instruments

no data available

## 15: Regulatory information

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

Chemical name	Common names and synonyms	CAS number	EC number
Manganese	Manganese	7439-96-5	688-447-3
New Zealand Inventory of Chemicals (NZIoC)			Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			Listed.
Australian Inventory of Industrial Chemicals (AIIC)			Not Listed.
Catalogue of Strictly Restricted Toxic Chemicals in China			Not Listed.
China Catalog of Hazardous chemicals 2015			Listed.
European INventory of Existing Commercial chemical Substances			Not Listed.
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans			Not Listed.
TSCA Inventory of Chemical Substances			Listed.

## 16: Other information

### Information on revision

SDS Creation Date July 1, 2025

SDS Revision Date July 1, 2025

### Abbreviations and acronyms in SDS

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%

### SDS References

- IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>
- HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
- IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>
- eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: [http://www.echemportal.org/echemportal/index?pageID=0&request\\_locale=en](http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en)
- CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>
- ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>

- ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>
- Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>
- ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>

**Any questions regarding this Safety Data Sheet, Please send your inquiry to [info@MolBest.com](mailto:info@MolBest.com)**

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