

Manganese, Powder



[Identification](#) | [Characterisation](#) | [Formula](#) | [Physical and chemical properties](#) |
[Toxicology / Ecotoxicology](#) | [Occupational health and first aid](#) | [Safe handling](#) | [Regulations](#) | [Links](#) |
[Literature register](#)

IDENTIFICATION

Manganese, Powder

ZVG No: 8200
CAS No: 7439-96-5
EC No: 231-105-1

CHARACTERISATION

SUBSTANCE GROUP CODE

134000 Metals

STATE OF AGGREGATION

The substance is solid.

PROPERTIES

metal powder
grey
odourless

CHEMICAL CHARACTERISATION

Flammable solid.

Can be ignited by the brief effects of exposure to sources of ignition and continues to burn when these are no longer present. The risk of ignition is greater the more finely the substance is spread.

The metal is non-flammable in compact form.

Forms flammable gases when in contact with water.

Sensitive to moisture.

Sensitive to air.

The substance is hazardous to the aquatic environment.
(see: chapter REGULATIONS).

[Substance information in Wikipedia](#)

DUST EXPLOSIVENESS

There is a risk of a dust explosion if the following conditions are met:

- The substance is given in very finely distributed form (powder, dust).
- The substance is whirled up in sufficient quantity in the air.
- An ignition source is present (flame, spark, electrostatic discharge, etc.)

Quelle: [01211 06806](#)

FORMULA

Mn

Molar mass: 54,94 g/mol

PHYSICAL AND CHEMICAL PROPERTIES

[Melting point](#) | [Boiling point](#) | [Density](#) | [Ignition temperature](#) | [Explosion data](#) | [Solubility](#) | [Hazardous reactions](#)

MELTING POINT

Melting point: 1246 °C

Reference: [00454 01211](#)

BOILING POINT

Boiling Point: 2061 °C

Different boiling points are indicated in the literature in the range from 1900 °C to 2095 °C

Reference: [00454 01211](#)

DENSITY

DENSITY

Value: 7,47 g/cm³

alpha modification

Reference: [00132](#)

IGNITION TEMPERATURE

Ignition temperature: 330 °C

Reference: [00107](#)

EXPLOSION DATA

Maximum explosion pressure:

6,3 bar

Reference: [00107](#)

SOLUBILITY IN WATER

practically insoluble in water

Reference: [01231](#)

HAZARDOUS REACTIONS

Thermal decomposition

Self-ignition possible.

Hazardous chemical reactions

Risk of explosion in contact with:
aluminium (powder)/air
ammonia nitrate
bromine pentafluoride
carbon dioxide

The substance can react dangerously with:
fluorine
oxidizing agents
phosphorus
nitric acid
nitric oxides
hydrogen peroxide
chlorine (heat)
air (manganese powder, finely disperse)
sulfur dioxide (powder)
acids -> release of hydrogen
water -> release of hydrogen

TOXICOLOGY / ECOTOXICOLOGY

TOXICOLOGICAL DATA

LD50 oral rat

Value: > 2000 mg/kg

LC50 inhalation rat

Value: > 5,14 mg/l/4 h

Reference: [07520](#)

ECOTOXICOLOGICAL DATA

EC50 Crustaceans (48 hours)

Minimum: 40 mg/l

Maximum: 40 mg/l

Median: 40 mg/l

Study number: 1

Reference for median:

Bowmer, C.T., R.N. Hooftman, A.O. Hanstveit, P.W.M. Venderbosch, and N. Van der Hoeven 1998. The Ecotoxicity and the Biodegradability of Lactic Acid, Alkyl Lactate Esters and Lactate Salts. Chemosphere 37(7):1317-1333

Reference: [02072](#)

OCCUPATIONAL HEALTH AND FIRST AID

[Routes of exposure](#) | [Toxic effects](#) |
[First Aid](#)

ROUTES OF EXPOSURE

Main routes of exposure

In the workplace, manganese (Mn) is primarily absorbed via the respiratory tract in the form of oxidic dusts or fumes. [7619]

Respiratory tract

Exposure to Mn or Mn-containing fumes/dust is most likely to occur at workplaces involving blast furnaces, foundries, ore mills and welding. The fumes generated by melting Mn and Mn alloys can contain various oxidic compounds (besides Mn oxides such as manganese(II,III) oxide (Mn₃O₄), for instance, also KMnO₂, MnFe₂O₄ or Mn₂SiO₄). [7619]

In vitro studies have revealed that Mn is sparingly soluble (about 0.02 %) in artificial alveolar fluid (no further information), however this is marginally higher than that of manganese oxides. [7520] However, absorption of particles via the respiratory tract is significantly dependent on their size: small particles (< 10 µm) can reach the alveoli, where they are deposited and absorbed, while larger particles are impeded higher up in the lungs and can enter the digestive tract via mucociliary clearance. In addition, manganese ions can directly enter the brain via the neuronal fibres of the olfactory nerve in the nose. [7520, 10534, 7619, 99999]

Skin

Absorption via the skin due to handling of Mn and its inorganic compounds is not considered to be toxicologically relevant. [7619]

Gastrointestinal tract

In-vitro studies have revealed that Mn is readily soluble in artificial gastric juice. [7520] Hence, it can be assumed that gastrointestinal absorption of manganese(II) ions from swallowed Mn particles is regulated by homeostatic mechanisms. In humans, approximately 5 % (range: 3 - 13 %) of the exposed manganese dose is usually absorbed; if manganese and iron levels in the body are low, absorption is increased. [8093, 7520]

TOXIC EFFECTS**Main toxic effects**

Acute:

sufficient information not available [99998]

Chronic:

Systemic effects of manganese ions: Central nervous system damage, local: irritation and inflammation of the respiratory tract [10534, 7619]

Acute toxicity

No specific information or findings from animal experiments are available on the acute toxicity of Mn dust/fumes. No reports from occupational exposure exist on whether the substance causes local eye or skin irritation. [99998]

In-vitro tests on eye or skin irritation and an in-vivo test on the skin of rabbits have revealed no evidence of irritation due to chemical reactivity. [7619] However, it should be expected that the substance will mechanically irritate the eye. [99999]

In a local lymph node assay (LLNA) performed in mice as per OECD Guideline 429, elemental Mn was not found to be potentially sensitising (tested as a maximum 10 % suspension in dimethyl formamide). [7520] Studies in humans and case reports involving various manganese compounds have led to the conclusion that, in general, contact allergic reactions are very rare. [7619, 99999] No data on the potential of Mn to cause acute dermal toxicity is available. [99998] In general, dermal exposure is not considered to be a typical exposure pathway for inorganic manganese compounds, as manganese ions do not readily penetrate the skin. [10534]

In the event that fumes containing high levels of Mn and Mn oxides are inhaled, due consideration should be paid to the possibility of developing metal fume fever. The symptoms of this non-specific effect are dryness of the throat, cough and fever/chills, weakness, headache, limb pain, and gastrointestinal disturbances. The onset of symptoms is usually delayed, and they typically persist for only one day. [7744] Recently formed fumes, in particular, are thought to trigger these effects, while no specific case reports involving manganese exposures exist. [7785]

An inhalation study in rats conducted as per OECD Guideline 403 which exposed the animals to 5140 mg/m³ manganese dust (particle sizes measured but not reported) found a 4-hour exposure had no effects other than transient impairment of weight gain (LC50, 4 h > 5140 mg/m³). [7520] Ingestion of metallic manganese was found to be non-toxic in rats (LD50 > 2000 mg/kg bw) in a test conducted as per OECD Guideline 420. In addition, no clinical symptoms, organ changes or body weight impairments were recorded. [7520]

Chronic toxicity

Epidemiological studies of employees exposed to Mn in the workplace together with Mn oxides or inorganic manganese compounds, mostly as mixtures, as well as animal studies with defined manganese compounds provide the following picture of the chronic toxicity of systemically available inorganic manganese compounds.

The organ most predominantly affected by manganese in humans and animals is the central nervous system; only at higher concentrations do local effects also occur in the lungs. Numerous studies on workers exposed to a variety of manganese compounds have shown that prolonged inhalative exposure to high concentrations of manganese, cause, in addition to pneumonia, chronic manganism, a disease similar to Parkinson's disease characterised by tremor, rigidity, slowed voluntary motor activity and gait disturbances. [7619]

Exposure to lower concentrations has been observed to cause preclinical neurological symptoms such as headache, memory impairment, dizziness, weakness and fatigue. These represent early signs of potential structural or functional damage of the central nervous system, which persists even after exposure has ended and which, in principle, should be regarded as irreversible. Such preclinical effects constitute the most sensitive endpoint for assessing inhalative exposure to manganese in the workplace. [7619]

Studies involving long-term exposure mainly to manganese oxides reported impairments of motor and cognitive abilities even at concentrations around 0.3 mg Mn/m³ (geometric mean, arithmetic mean: 0.75 mg Mn/m³, in each case inhalable fraction) (LOAEC). The stated concentration causing no adverse effects was 0.2 mg Mn/m³ (inhalable fraction). [7619]

The observed neurological changes are attributed to neurotoxic processes triggered by increased concentrations of manganese in the brain. [7619]

In an subchronic inhalation study conducted as per OECD Guideline 413 in rats, exposure (6 h/d, 5 d/week, 13 weeks) to metallic manganese in the form of inhalable dust (approximately 50 % of particles < 3 µm) resulted in a concentration-dependent increase in Mn concentration in the brain, commencing at the lowest concentration of 0.5 mg Mn/m³. This study was unable to demonstrate neurological or behavioural changes in appropriate tests, but these were found in another subchronic inhalation study in rats at the only concentration studied, 3.75 mg Mn/m³ (inhalable dust). In the first-mentioned study, the target organ proved to be the lung, in which inflammation of the alveoli and other lung tissue as well as microgranulomas occurred at 5 mg/m³ and above (NOAEC = 0.5 mg/m³). [7520]

Repeated oral uptake of elemental Mn is not likely. Epidemiological studies on oral exposure to soluble manganese compounds in drinking water suggest associations between manganese exposure and neurological effects, but these are too poorly substantiated to draw further conclusions. [10543, 10534]

Reproductive toxicity, mutagenicity, carcinogenicity

No substance-specific information is available for these endpoints [99998]. The following summarised information on water-soluble manganese compounds represents a worst case scenario. [99999]

For classifying the reproductive toxicity and mutagenic and carcinogenic potential see list in Annex VI of the CLP regulation / TRGS 905 / List of MAK values (see section REGULATIONS).

Reproductive toxicity

There is no reason to fear a risk of damage to the developing embryo or foetus when MAK and BAT values are observed.

[7619]

In studies with manganese(II) chloride in rats, doses of up to 25 mg Mn/kg bw per day administered orally (per gastric tube) resulted in no embryotoxic or foetotoxic effects (NOAEL). At 32.7 mg Mn/kg bw per day, post-implantation losses, developmental delays and unspecified malformations were recorded. In the dams, changes (relatively increased lung, brain and thymus organ weights) were detectable at dosages as low as 22 mg Mn/kg bw per day. [7619, 10535]

In studies involving mice, as little as 2.4 mg Mn/kg bw per day, administered orally per gastric tube over 43 days in the form of manganese(II) acetate, had effects on the testes (reduced sperm count, at 4.8 mg Mn/kg bw per day and above also reduced motility). However, the fertility of males with unexposed females was not affected up to the highest assessed dosage of 9.5 mg Mn/kg bw per day. [7619]

In a two-generation study in rats as per OECD Guideline 416 involving inhalative exposure to manganese(II) chloride, no histological changes were observed in the reproductive organs and no impairment of fertility could be established up to the highest tested concentration of 20 mg M./m³ in either sex. In animals of the F0 generation, the relative kidney weight was increased in the absence of histological changes at and above 10 mg/m³. At and above 5 mg/m³, minimal to moderate changes in the upper airways and bronchoalveolar region (hyper- and metaplasia, inflammatory reactions) were apparent as signs of local irritation of the respiratory tract. [7520]

Mutagenicity

In-vitro studies on the effects of manganese(II) salts on bacteria and mammalian cells have, overall, revealed no consistent evidence of genotoxic effects. In vivo, manganese(II) chloride was found not to induce clastogenic effects (induction of micronuclei) in the bone marrow of mice. [7619, 2077, 99999]

Carcinogenicity

Manganese(II) sulfate was found not to be carcinogenic in rats when administered chronically in their diet over a period of two years. In mice, hyperplasia and adenomas, but not carcinomas, were detected in the thyroid gland. On the strength of these data, no clear conclusions can be drawn on the carcinogenicity of the substance. [2077, 7985, 10534, 7619]

Biotransformation and excretion

Substance-specific data are not available. [99998]

The rate of transport of inhaled manganese compounds out of the respiratory tract has been shown to correlate with their solubility. Following inhalative exposure to manganese compounds, manganese has been found to be both absorbed via the epithelium of the respiratory tract and transported from the nose to the brain along the olfactory nerve, a process that is saturable. It is assumed that, despite anatomical differences between rats and humans, the uptake pathway via the olfactory nerve into the central nervous system is relevant in humans. [7619, 10534]

If manganese is ingested orally, soluble manganese(II) chloride is likely to form in the acidic environment of the stomach. [7520]

Oral absorption of manganese is dependent on homeostatic control, both with regard to its absorption from the digestive tract and with regard to its excretion via the gall. In the case of inhalative exposure, this control mechanism can be partially bypassed, as manganese ions can enter the brain tissue directly via the olfactory nerve (see below). [10534]

Adults are estimated to have a total of 10 - 20 mg of manganese in their bodies. Manganese is an essential trace element, a cofactor of various enzymes and is found in all tissues of the body. The highest levels are found in mitochondria-rich organs such as the liver, pancreas, kidneys and brain. [7619]

In the blood, manganese is present both as manganese(II) ions bound to albumin and globulins and as manganese(III) ions bound to transferrin following oxidation. Manganese ions undergo redox reactions in the body. [7619]

Animal studies have shown that manganese can cross the placental barrier and pass into breast milk. [10543]

The elimination half-life of manganese from the brain has been determined to be 53 days in humans following prior intravenous administration of radiolabelled manganese. Studies in rhesus monkeys have shown that manganese is eliminated from different regions of the brain with different half-lives following inhalative exposure to manganese(II) sulfate: most rapidly from the olfactory bulb (5 days) and most slowly from the cerebellum (32 days). In another study in rhesus monkeys, significantly longer elimination half-lives for manganese in the range of 250 days were found following a single inhalative exposure to manganese(II) chloride. [7619]

Manganese is primarily eliminated from the blood in the liver, where it is transferred into the bile. This is then released into the small intestine and the manganese it contains excreted in the faeces. Studies in humans have shown that following inhalation, 40 - 70 % of the manganese ions absorbed in the form of inhaled manganese(II) chloride were eliminated via the faeces within four days. Only a small percentage (0.01 %) is eliminated with the urine. Only traces of manganese are excreted via sweat, tears, hair and nails. [8093, 10202, 7637, 7619, 10543]

Occupational exposure to manganese and manganese compounds can be assessed by measuring the concentration of manganese in whole blood. Such assessment should also take into account the background exposure of individuals not occupationally exposed to manganese. In adults not occupationally exposed to manganese, the background exposure of individuals in the 95th percentile has been reported to be 15 µg/l. [7620]

Annotation

This occupational health information was compiled on 30.04.2022.

It will be updated if necessary.

This information was translated from German into English by Übersetzungsdienst Proverb.

FIRST AID

Eyes

Rinse the affected eye with widely spread lids for 10 minutes under running water whilst protecting the unimpaired eye.

Arrange medical treatment.

[2001]

Skin

Cleanse the affected skin areas thoroughly with soap under running water.

[2001]

Respiratory tract

Whilst protecting yourself remove the casualty from the hazardous area and take him to the fresh air.
Lay the casualty down in a quiet place and protect him against hypothermia.
In the case of breathing difficulties have the casualty inhale oxygen.
Arrange medical treatment.
[2001, 99999]

Swallowing

Rinse the mouth and spit the fluids out.
If the casualty is conscious have him drink 1 glass of water (ca 200 ml).
Lay the casualty down in a quiet place and protect him against hypothermia.
Do not make the casualty vomit.
Arrange medical treatment.
[2001, 99999]

Information for physicians

- Symptoms of acute poisoning
Eyes: mechanical irritation [99999]
Skin: generally no skin irritation, absorptive-toxic effect unlikely [99999]
Inhalation: Respiratory irritation possible, coughing, inflammation of lung tissue cannot be ruled out following massive exposure, and in the event of massive exposure to smoke, dusts or the vapour, metal fume fever may develop [7744, 8101, 2001, 10576].
Ingestion: GI tract irritation possible, abdominal pain, nausea, systemic effects unlikely [10575, 2001, 99999]
Absorption: no absorptive-toxic effects are likely in the event of acute exposure. [10534]

- First medical assistance
Following eye contact: following eye rinsing, consult an ophthalmologist [99999].
After skin contact: after rinsing with soap and water, no further measures are usually required [99999]
Following inhalation: administration, as required, of a short-acting β -2 sympathomimetic spray and inhalation of a muscarinic receptor antagonist such as ipatropium bromide, symptomatic therapy [10014, 99999]
Following ingestion: if required, gastroscopy and symptomatic therapy [8101, 99999]

Recommendations

Provide the physician information about the substance/product and treatment already administered.

Annotation

This first aid information was compiled on 10.07.2022.
It will be updated if necessary.
This information was translated from German into English by Übersetzungsdienst Proverb.

SAFE HANDLING

[Handling](#) | [Storage](#) | [Fire and explosion protection](#) | [Organisational measures](#) | [Personal protection](#) | [Disposal considerations](#) | [Accidental release measures](#) | [Fire fighting measures](#)

TECHNICAL MEASURES - HANDLING

Workplace

Provision of good ventilation in the working area.
The floor should not have a floor drain.
Washing facility at the workplace required.
When handling excessive amounts of the substance an emergency shower is required.

Equipment

Use closed apparatus if possible.
If release of the substance cannot be prevented, then it should be suctioned off at the point of exit.

Consider emission limit values, a purification of waste gases if necessary.
Label containers and pipelines clearly.

Advice on safer handling

Take care to keep workplace clean and dry.

The substance must not be present at workplaces in quantities above that required for work to be progressed.

Do not leave container open.

Sufficient ventilation must be guaranteed for refilling, transfer, or open use.

Avoid spillage.

Fill only into labelled container.

Avoid rising dust.

Cleaning and maintenance

Avoid dust formation. Dust formation that cannot be avoided must be collected regularly.

Use tested industrial vacuum cleaners or suction systems for areas with a high risk of explosion.

Do not raise dust while cleaning.

Use of a blower for cleaning is not permitted.

Alternative: clean damp.

Only conduct maintenance and other work on or in the vessel or closed spaces after obtaining written permission.

TECHNICAL MEASURES - STORAGE

Storage

Do not use any food containers - risk of mistake.

Containers have to be labelled clearly and permanently.

Store in the original container as much as possible.

Keep container tightly closed in a cool, dry and well-ventilated place.

Store apart from sources of ignition and heat.

Substance is sensitive to air, protect from air/oxygen.

Protect from moisture.

Conditions of collocated storage

Storage class 4.1 B (Flammable solid or desensitized substances)

Only substances of the same storage class should be stored together.

Collocated storage with the following substances is prohibited:

- Pharmaceuticals, foods, and animal feeds including additives.
- Infectious, radioactive und explosive substances.
- Gases.
- Aerosols (spray bottles).
- Flammable liquids of storage class 3.
- Strongly oxidizing substances of storage class 5.1A.
- Ammonium nitrate and preparations containing ammonium nitrate.
- Non combustible acutely toxic substances of storage class 6.1B.

Under certain conditions the collocated storage with the following sub-stances is permitted (For more details see [TRGS 510](#)):

- Other explosive substances of storage class 4.1A.
- Pyrophoric substances.
- Substances liberating flammable gases in contact with water.
- Oxidizing substances of storage class 5.1B.
- Organic peroxides and self reactive substances.
- Combustible acutely toxic substances.
- Noncombustible toxic or chronically acting substances of storage class 6.1D.

The substance should not be stored with substances with which ha-zardous chemical reactions are possible.

TECHNICAL MEASURES - FIRE AND EXPLOSION PROTECTION

Technical, constructive measures

The substance is combustible in a finely distributed form (powder, dust).

Finely divided manganese dust can be pyrophoric and may self ignite at room temperature.

Fire fighting equipment must be available.

If there is a risk of a dust explosion due to the dust-like distribution and the quantities used, measures according to [TRGS 722](#) (prevention of formation), 723 (prevention of ignition) and [TRGS 724](#) (constructive explosion protection) may become necessary.

Precaution on handling

Area with fire risk.

Areas in which the substance can arise as a dust in such quantities that a dust explosion could occur are to be considered as at a risk of explosion.

Keep away from sources of ignition (e.g. open flames, heat sources and sparks).

Observe the smoking prohibition!

Absolutely no welding in the working area.

Only work with vessels and lines after these have been thoroughly rinsed and inerting.

Work done with fire or open flame should only be carried out with written permission if the risk of fire or explosion cannot be completely eliminated.

ORGANISATIONAL MEASURES

Instruction on the hazards and the protective measures using instruction manual ([TRGS 555](#)) are required with signature if just more than one minor hazard was detected.

Instruction must be provided before employment and then at a minimum of once per annum thereafter.

An escape and rescue plan must be prepared when the location, scale, and use of the work-site so demand.

It must be assured that the workplace limit values are being maintained. If the limit values are exceeded, additional protection measures are necessary.

The measurements must be recorded and kept on file.

Observe the restrictions on juvenile employment as defined in the "Jugendarbeitsschutzgesetz".

PERSONAL PROTECTION

Body protection

Wear flameproof, antistatic protective clothing.

Respiratory protection

In an emergency (e.g.: unintentional release of the substance, exceeding the occupational exposure limit value) respiratory protection must be worn. Consider the maximum period for wear.

Respiratory protection: Particle filter P1, colour code white.

Eye protection

Sufficient eye protection should be worn.

Wear glasses with side protection.

Hand protection

The use of resistant protective gloves is recommended.

Skin protection cremes do not protect as effectively against the substance as protective gloves. Therefore suitable protective gloves should be preferred as far as possible.

Currently there is no information available regarding suitable glove materials.

Experience says that polychloroprene, nitrile rubber, butyl rubber, fluoro-caoutchouc, and polyvinyl chloride are suitable as glove materials for protection against un-dissolved solids.

Occupational hygiene

Take heed of usual occupational hygiene measures when handling chemical substances, especially wash the skin with soap and water before breaks and at the end of work and apply fatty skin-care products after washing.

Avoid inhalation of dust.

DISPOSAL CONSIDERATIONS

Hazardous waste according to Waste Catalogue Ordinance (AVV).

If there is no way of recycling it must be disposed of in compliance with the respective national and local regulations.

Collection of small amounts of substance:

Residues should be recycled.

Collect in container for recyclable metal residues. All metals should be collected separately.

Collection vessels must be clearly labelled with a systematic description of their contents. Store the vessels in a well-ventilated location. Entrust them to the appropriate authorities for disposal.

ACCIDENTAL RELEASE MEASURES

Shut off all sources of ignition.

Evacuate area. Warn affected surroundings.

Wear a dust mask.

Pick up without creating dust.

Use non-sparking tools.

Afterwards ventilate area and wash spill site.

Endangerment of watert:

Distinct hazard to waters. Prevent penetration into water, drainage, sewer, or the ground. Inform the responsible authorities about penetration of larger quantities.

FIRE FIGHTING MEASURES

Classes of fires

D combustible metals

Suitable extinguishing media

Metal fire extinguisher

Sand

Unsuitable extinguishing media

Water

Foam

Carbon dioxide

Instructions

Seek immediate cover in case of sudden release and raising of large quantities of dust.

If possible, take container out of dangerous zone.

Shut off sources of ignition.

Use only explosion proved equipment.

Do not allow runoff to get into the sewage system.

Special protective equipment

Wear self-contained breathing apparatus.

REGULATIONS

EUROPEAN GHS CLASSIFICATION AND LABELLING

Classification

Flammable solids, Category 2; H228



Signal Word "Warning"

Hazard Statement - H-phrases

H228: Flammable solid.

Precautionary Statement - P-phrases

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

Manufacturer's specification by Thermo Fisher Scientific

Reference: [01231](#)

State: 2018

Checked: 2019

The metal in compact form is not classified as a hazardous substance.

Reference: [01231](#)

Watch your step! In the registration dataset at the ECHA under "Flammability" is indicated "Manganese is not flammable". However, the end point "Flammable solids" was not tested, but the end point "Pyrophoric solids".

Reference: [99999](#)

WORKPLACE LABELLING ACCORDING TO GERMAN [ASR A1.3](#)

Prohibition label



No open flame; fire, open ignition sources and smoking prohibited



Do not extinguish with water



No admittance for unauthorized persons

Warning label



Caution - inflammable material

Precept label



Use safety goggles

GERMAN WATER HAZARD CLASS

Substance No: 9369

WGK 2 - distinct hazard to waters

Classification according to the announcement of the list of substances hazardous to water in the Federal Register of 10.08.2017, last update 24.11.2023

TECHNICAL INSTRUCTIONS ON AIR QUALITY CONTROL ([TA LUFT](#))

Chapter 5.2.2 Inorganic dusts

Class III

Also with the presence of several substances of the same class, the following values are in all not allowed to be exceeded in the exhaust gas:

Mass flow: 5 g/hr

or

Mass conc.: 1 mg/m³

Specified as Mn.

TRANSPORT REGULATIONS

UN Number: 3089

Shipping name: Metal powder, flammable,
n.o.s.

Hazard Identification Number: 40

Class: 4.1 (Flammable solids)

Packing Group: III (low danger)

Danger Label: 4.1



[Classification code](#): F3

Tunnel restrictions:

Passage forbidden through tunnels of category E.

Reference: [01231](#)

[TRGS 900 - GERMAN OCCUPATIONAL EXPOSURE LIMIT VALUES](#)

0,02 mg/m³

with reference to the respirable fraction

0,2 mg/m³

with reference to the inhalable fraction

Peak limitation: Excursion factor 8

Duration 15 min, mean; 4 times per shift; interval 1 hour

Category II - Substances with systemic effects

There is no reason to fear a risk of damage to the developing embryo or foetus when AGW and BGW are adhered to.

Source: DFG, EU

EC OCCUPATIONAL EXPOSURE LIMIT VALUES

Directive 2017/164/EU

Recommended indicative occupational exposure limit value for the European Union

A national occupational exposure limit value has to be set.

8 hours limit value: 0,2 mg/m³ (inhalable fraction)

8 hours limit value: 0,05 mg/m³ (alveolar fraction)

RECOMMENDATIONS OF MAK-COMMISSION

This data is recommended by scientific experience and is not established law.

0,02 mg/m³

with reference to the respirable fraction

Peak limitation: Excursion factor 8

Duration 15 min, mean; 4 times per shift; interval 1 hour

Category II - Substances with systemic effects

0,2 mg/m³

with reference to the inhalable fraction

Peak limitation: Excursion factor 8

Duration 15 min, mean; 4 times per shift; interval 1 hour

Category II - Substances with systemic effects

Pregnancy: Group C

There is no reason to fear damage to the embryo or foetus when MAK and BAT values are observed.

GERMAN BIOLOGICAL EXPOSURE INDICES

Parameter: Manganese

Assay material: Whole blood

Sampling time: for long-term exposure: at end of shift after several shifts
end of exposure/end of shift

There is at present insufficient data for the derivation of a BAT value; however, documentation for this substance has been published.

Reference: 08112

RESTRICTIONS OF USE / BANS OF USE

REACH Regulation (EC) No 1907/2006 Annex XVII

Annex XVII, Point 40

Shall not be used, as substance or as mixtures in aerosol dispensers where these aerosol dispensers are intended for supply to the general public for entertainment and decorative purposes such as the following:

- metallic glitter intended mainly for decoration,
- artificial snow and frost,
- “whoopie” cushions,
- silly string aerosols,
- imitation excrement,
- horns for parties,
- decorative flakes and foams,
- artificial cobwebs,
- stink bombs.

Further information on prohibitions and exceptions can be taken from the regulation.

Annex XVII to Regulation (EC) No 1907/2006, [consolidated version](#) (BAUA) (only in German)

TECHNICAL RULES FOR HAZARDOUS SUBSTANCES

[TRGS 201](#)

Einstufung und Kennzeichnung bei Tätigkeiten mit Gefahrstoffen; Ausgabe Februar 2017, zuletzt geändert und ergänzt April 2018

[TRGS 400](#)

Gefährdungsbeurteilung für Tätigkeiten mit Gefahrstoffen; Ausgabe Juli 2017

[TRGS 555](#)

Betriebsanweisung und Information der Beschäftigten; Ausgabe Februar 2017

[TRGS 600](#)

Substitution; Ausgabe Juli 2020

[TRGS 402](#)

Ermitteln und Beurteilen der Gefährdungen bei Tätigkeiten mit Gefahrstoffen: Inhalative Exposition; Ausgabe September 2023

[TRGS 500](#)

Schutzmaßnahmen; Ausgabe September 2019

[TRGS 509](#)

Lagern von flüssigen und festen Gefahrstoffen in ortsfesten Behältern sowie Füll- und Entleerstellen für ortsbewegliche Behälter; Ausgabe Juni 2022

[TRGS 510](#)

Lagerung von Gefahrstoffen in ortsbeweglichen Behältern; Ausgabe Januar Dezember 2020

[TRGS 800](#)

Brandschutzmaßnahmen; Ausgabe Dezember 2010

[TRGS 720](#)

Gefährliche explosionsfähige Gemische - Allgemeines; Ausgabe Juli 2020, zuletzt berichtigt März 2021

[TRGS 721](#)

Gefährliche explosionsfähige Gemische - Beurteilung der Explosionsgefährdung; Ausgabe Oktober 2020, zuletzt berichtigt Dezember 2020

[TRGS 722](#)

Vermeidung oder Einschränkung gefährlicher explosionsfähiger Atmosphäre, Ausgabe Februar 2021

[TRGS 723](#)

Gefährliche explosionsfähige Gemische - Vermeidung der Entzündung gefährlicher explosionsfähiger Gemische; Ausgabe Juli 2019, zuletzt geändert Oktober 2020

[TRGS 724](#)

Gefährliche explosionsfähige Gemische - Maßnahmen des konstruktiven Explosionsschutzes, welche die Auswirkung einer Explosion auf ein unbedenkliches Maß beschränken, Ausgabe Juli 2019

REGULATIONS OF GERMAN ACCIDENT INSURERS

[DGUV Regel 112-190](#)

Benutzung von Atemschutzgeräten, Ausgabe November 2021
(in German only)

LINKS

[International Limit Values](#)

[The MAK Collection for Occupational Health and Safety](#)

[DGUV Information 213-098: List of substances - lesson in schools \(in German only\)](#)

REFERENCES

Quelle: 00001

IFA: Erfassungs- und Pflegehandbuch der GESTIS-Stoffdatenbank (nicht öffentlich)
Data acquisition and maintenance manual of the GESTIS substance database (non-public)

Quelle: 00107

Sorbe "Sicherheitstechnische Kenndaten chemischer Stoffe" ("Safety-related characteristics of chemical substances"), ecomed Sicherheit, Landsberg, 07/2015

Quelle: 00132

The Merck-Index; 15th Edition 2013

Quelle: 00454

Hazardous Substances Data Bank (HSDB)

Quelle: 00501

RÖMPP Online ab 2008

Quelle: 01211

GHS-Sicherheitsdatenblatt, Merck
GHS Material Safety Data Sheet, Merck

Quelle: 01221

GHS-Sicherheitsdatenblatt, Sigma-Aldrich
GHS Material Safety Data Sheet, Sigma-Aldrich

Quelle: 01231

GHS-Sicherheitsdatenblatt, Thermo Fisher Scientific
GHS Material Safety Data Sheet, Thermo Fisher Scientific

Quelle: 02001

International Chemical Safety Cards (ICSC)

Quelle: 02072

Ecotoxicological Data, compiled by the US Environmental Protection Agency (EPA), selected and distributed by Technical Database Services (TDS), New York, 2009

Quelle: 02077

National Industrial Chemicals Notification and Assessment Scheme (NICNAS), Australia

<https://www.nicnas.gov.au/>

Quelle: 02140

Australian Industrial Chemicals Introduction Scheme (AICIS)

<https://www.industrialchemicals.gov.au/>

Quelle: 05300

[TRGS 510](#) "Lagerung von Gefahrstoffen in ortsbeweglichen Behältern" Ausgabe Dezember 2020

Quelle: 05350

[TRGS 900](#) "Arbeitsplatzgrenzwerte" Ausgabe Januar 2006, zuletzt geändert und ergänzt Juni 2023

Quelle: 06002

L. Roth, U. Weller

"Gefährliche Chemische Reaktionen" Loseblattsammlung mit Ergänzungslieferungen, ecomed-Verlag
("Dangerous chemical reactions" loose-leaf collection with supplement deliveries)

Quelle: 06806

GESTIS-STAU-EX-Datenbank des IFA www.dguv.de/ifa/gestis-staub-ex

Quelle: 07520

Europäische Chemikalienagentur ECHA: Informationen über registrierte Substanzen

European Chemicals Agency ECHA: Information on registered substances

Quelle: 07580

Bekanntmachung der Liste der wassergefährdenden Stoffe im Bundesanzeiger vom 10.08.2017, zuletzt geändert 24.11.2023

Quelle: 07619

DFG Deutsche Forschungsgemeinschaft: The MAK-Collection for Occupational Health and Safety, nach Veröffentlichungsdatum zu finden unter:

bis 2002 Verlag Chemie

ab 2002 Online: <http://onlinelibrary.wiley.com/book/10.1002/3527600418/topics?filter=#>

ab 2020 Online:

<https://series.publisso.de/en/pgseries/overview/mak/dam/allContents/alphabetical>

Quelle: 07620

DFG: Arbeitsmedizinisch-toxikologische Begründungen von BAT-Werten; Verlag Chemie

Quelle: 07637

S. Moeschlin "Klinik und Therapie der Vergiftungen" 7. Auflage, Thieme-Verlag, Stuttgart 1986

Quelle: 07744

NIOSH OSHA "Occupational Health Guidelines for Chemical Hazards" Cincinnati 1988

Quelle: 07785

M. Sittig "Handbook of Toxic and Hazardous Chemicals and Carcinogenes" Second edition, 1985, Noyes Publications, Park Ridge, New Jersey, USA

Quelle: 07985

IPCS: CICADs - Concise International Chemical Assessment Documents. WHO, Genf, Serie ab 1998

Quelle: 08093

E. Bingham, B. Cohrssen (Edts.) "Patty's Toxicology" Sixth Edition, John Wiley & Sons, New York 2012

Quelle: 08101

Reinhard Ludewig, Ralf Regenthal:
Akute Vergiftungen und Arzneimittelüberdosierungen,
11. Auflage,
Wissenschaftliche Verlagsgesellschaft Stuttgart, 2015

Quelle: 08112

DFG Deutsche Forschungsgemeinschaft: MAK- und BAT-Werte-Liste 2023, Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe, Mitteilung 59; GMS PUBLISSO

Quelle: 10014

Walker et al.
Diagnosis and management of inhalation injury: an updated review.
Critical Care (2015) 19:351

Quelle: 10202

G.F. Nordberg, B.A. Fowler, M. Nordberg: Handbook on the toxicology of metals. 4rd ed. Elsevier, Amsterdam 2015

Quelle: 10534

ATSDR: Toxicological profile for Manganese. U.S. Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry, Atlanta, Georgia, 2012, pp. 556. Online: <http://www.atsdr.cdc.gov/ToxProfiles/tp151.pdf>

Quelle: 10535

WHO (2021) Manganese in drinking-water. Background document for development of WHO Guidelines for drinking-water quality -
<https://apps.who.int/iris/bitstream/handle/10665/350933/WHO-HEP-ECH-WSH-2021.5-eng.pdf?sequence=1&isAllowed=y>

Quelle: 10543

Health Canada: Guidelines for Canadian Drinking Water Quality (Guideline Technical Document): Manganese. 2019, pp. 114. Online: <https://www.canada.ca/content/dam/hc-sc/documents/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-guideline-technical-document-manganese/pub-manganese-0212-2019-eng.pdf>

Quelle: 10575

World Health Organization. Regional Office for Europe. (2001). Air quality guidelines, 2nd ed. -
https://www.euro.who.int/__data/assets/pdf_file/0003/123078/AQG2ndEd_6_8Manganese.pdf

Quelle: 10576

New Jersey Department of Health, Hazardous Substance Fact Sheet, 2012:
<https://nj.gov/health/eoh/rtkweb/documents/fs/1155.pdf>

Quelle: 99998

Liste arbeitsmedizinisch-toxikologischer Standardwerke (3)

Quelle: 99999

Angabe des Bearbeiters
Indication of the editor

[Identification](#) | [Characterisation](#) | [Formula](#) | [Physical and chemical properties](#) |
[Toxicology / Ecotoxicology](#) | [Occupational health and first aid](#) | [Safe handling](#) | [Regulations](#) | [Links](#) |
[Literature register](#)

This material data sheet was carefully compiled. However no liability can be assumed for the data content, whatever the legal cause may be.