IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

Magnesium nitrate

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

IDENTIFICATION

Magnesium nitrate

ZVG No:	570176	
CAS No:	10377-60-3	anhydrous
EC No:	233-826-7	

Related

CAS No:	15750-45-5	dihydrate
	13446-18-9	hexahydrate

CHARACTERISATION

SUBSTANCE GROUP CODE

123200 Magnesium compounds
128500 Nitrates

STATE OF AGGREGATION

The substance is solid.

PROPERTIES

crystalline
white
odourless

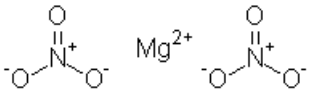
CHEMICAL CHARACTERISATION

Oxidizing solid.
The substance itself does not burn, but in contact with combustible substances it increases the risk of fire and can fuel any existing fire substantially.
Soluble in water.
Hygroscopic.

Substance information in Wikipedia

FORMULA

$Mg(NO_3)_2$
MgN_2O_6



Molar mass: 148,32 g/mol

PHYSICAL AND CHEMICAL PROPERTIES

Melting point | Density | Solubility |
Hazardous reactions

MELTING POINT

The substance decomposes when heated (see decomposition temperature).
Reference: 99999

DENSITY

DENSITY
Value: 2,32 g/cm³
anhydrous
Reference: 00454 07520

DENSITY
Value: 1,456 g/cm³
dihydrate
Reference: 01211

DENSITY
Value: 1,464 g/cm³
hexahydrate
Reference: 01211

SOLUBILITY IN WATER

Concentration: 71,2 g/100 g H2O
Temperature: 25 °C
Reference: 00454

Concentration: 420 g/l
Temperature: 20 °C
Reference: 01211 01221 01231

HAZARDOUS REACTIONS

Decomposition temperature: 330 °C

Thermal decomposition

Hexahydrate loses water of crystallization at 89 °C.
Dihydrate loses water of crystallization at 100 °C.

Decompositon products
Nitrogen oxides
magnesium oxide

Hazardous chemical reactions

Risk of explosion in contact with:
alkyl esters

The substance can react dangerously with:
combustible substances
phosphorus
reducing agents
dimethyl formamide
metal powders

TOXICOLOGY / ECOTOXICOLOGY

TOXICOLOGICAL DATA

LD50 oral rat
Value: 5440 mg/kg
Unknown

Reference: 02071

OCCUPATIONAL HEALTH AND FIRST AID

Routes of exposure | Toxic effects | First Aid

ROUTES OF EXPOSURE

Main routes of exposure
Data providing information on the main route of exposure for magnesium nitrate (M) in the occupational context are not available. [99998]

Respiratory tract
Possible exposure and absorption via the respiratory tract in the form of dusts and aqueous aerosols must be assumed. [419, 99999]
Maximum inhalative absorption of 50% is assumed for M. [7520]
However, specific studies on the kinetic behaviour in the respiratory tract are lacking. [99998]

Skin
Experimental data on the systemic absorption of M during skin contact are lacking. [99998]
Due to its good solubility in water and the low molecular mass, M is assumed to be generally absorbed via the skin (up to a maximum of 50%). [7520]
At the skin, nitrate dusts can dissolve in sweat and thus contribute to an increased dermal absorption. Compared with oral absorption, dermal absorption of magnesium ions from salts is considered to be insignificant. [7520, 99999]

Gastrointestinal tract

Absorption of magnesium ions from the gastrointestinal tract usually range between 30% and 40%. In this regard, there are no significant differences in the bioavailability of magnesium from different compounds. [10108, 10113]
Nitrate ions are rapidly and completely absorbed in the gastrointestinal tract. [454, 99999]

TOXIC EFFECTS

Main toxic effects

Acute effects:
irritative effects on the eyes and the respiratory tract, disorders of the CNS, disorders and irritations of the gastrointestinal tract, susceptible populations or high concentrations might involve disorders of the blood function (formation of methaemoglobin [MetHb]) [7520, 7639, 7649, 8101]
Chronic effects:
deterioration of the general condition caused by nitrates; in case of high doses: Disorders of the blood function (MetHb formation);
high oral magnesium doses: neuromuscular as well as cardiac disorders (hypermagnesaemia) [10112, 99999]

Acute toxicity

Dissociation of the M salt in aqueous solutions involves the liberation of magnesium and nitrate ions. Zinc ions have greater toxicological relevance. [7636, 7647] Very few data are available on the acute potential of M. [99998] Therefore, information on comparable magnesium salts or nitrates is considered to be transferable to M. [99999]
In rabbit eyes, M hexahydrate caused irritation of the conjunctiva (reddening, oedema and discharge) and effects on the cornea (turbidity) and the iris, which, however, subsided completely within 14 days. The substance required no labelling. [7520]
An older secondary source indicated an irritant potential of M for eyes, mucosa and skin, without providing further details. [454, 7520]
In a trial conducted in accordance with OECD test directive 404, the comparable ammonium nitrate caused no skin irritations in rabbits. [7520]
In a test on mice conducted in accordance with OECD directive, M hexahydrate showed no sensitising potential. [7520]
In rats, the dermal toxicity for the comparable potassium nitrate after occlusive application was minor (LD50 value › 2000 mg per kg of body weight). [7520]
Systemic effects after skin contact with nitrates were only observed in extreme cases (contact with large areas of pre-damaged skin). [454]
Toxic lung oedema can occur during the handling of heated nitrates (formation of nitrous gases at 130°C) (potentially with considerable delay). [419]
The inhalation of extreme nitrate amounts can entail cyanosis, promoted by reduced gas exchange and methaemoglobinaemia as well as the development of a toxic pulmonary oedema. In up to 50% of the severe cases, chemical pneumonitis and a lung oedema can result in the development of obliterative bronchiolitis and pulmonary fibrosis in the further course. [7639]
For the acute oral toxicity, an LD50 value › 2000 mg per kg of body weight was determined for M hexahydrate in rats. At day 1, signs of toxic effects occurred in the form of unspecific symptoms (bent posture and goose bumps). [7520]
In general, high oral nitrate ion doses cause pronounced symptoms including gastrointestinal disorders (e.g. bloody vomiting, diarrhoea), vertigo, reduced heart rate, hypotension, initially skin reddening, followed by grey-brown skin discolourations, blue mucosae, possibly spasms, loss of consciousness and death due to circulatory collapse. [8101, 99999]
Single intake of 4–50 g nitrate (equivalent to 67–833 mg nitrate per kg of body weight) can be fatal for humans. Even nitrate amounts as low as 2–9 g (corresponding to 33–150 mg nitrate per kg of body weight) must be expected to cause the formation of toxicologically relevant methaemoglobin amounts (suffocation risk as of 60%–80 % methaemoglobin). Particularly pregnant women, infants and individuals with glucose-6-phosphate dehydrogenase deficiencies or reduced gastric acid levels are much more susceptible to this effect. [660, 8101, 99999]
The irritated condition of the intestinal mucosa may promote magnesium absorption or, in the case of kidney dysfunction, delay the elimination, thus severely reducing the threshold concentration of a toxic magnesium effect. Symptoms usually observed from serum levels above 1.7–2.6 mmol Mg/l include nausea, vomiting, flush, severe drop of the blood pressure, urinary retention, ileus, lethargy, muscle weakness, shortness of breath and, at very high values (above 10–20 mmol/l), irregular heart rates and cardiac arrest. [7649, 10113]
Oral intake of very large doses of magnesium salts is generally prevented due to their bitter taste. [7647, 99999]

Chronic toxicity

Case reports or animal experiments on repeated exposures to M are not available. [99998] After 1-year inhalative exposure of rats (6 hours per day) to magnesium sulphate hydroxide fibre crystals ("long whisker" length 12 µm, diameter 1.8 µm, concentration 1.4 mg/m³; "short whisker" length 4.9 µm, diameter 1.5 µm, concentration 1.1 mg/m³), changes of the body or the organ weights versus the control group were found neither immediately after termination of the exposure nor one year later. [10107]
Given the possible methaemoglobin formation, a deterioration of the general condition cannot be ruled out after long-term exposures to nitrate. [99999] High nitrate concentrations cause competitive inhibition of the iodine absorption. In cases of simultaneous iodine deficiency, such inhibited iodine absorption might result in disturbances of the thyroid function. [660]
In a combined screening study on the toxicity involved in repeated administration and on the reproduction toxicity conducted with potassium nitrate in accordance with OECD directive 422, rats showed no systemic-toxic effects up to the highest administered dose of 1000 mg per kg of body weight per day after oral administration (via gavage) of the salt before and during breeding (4 weeks in total) and thereafter during gestation until day 4 of the lactation period (only females were exposed). [7520]
In exceptional cases, toxicities with lethal outcome were described after repeated oral administration of very high doses of bioavailable magnesium compounds. In one case, the serum level of a 2.5-year old child was in the range of 8 mmol Mg/l (normal range 0.75 to 0.95 mmol/l) after several-day administration of about 2400 mg magnesium oxide per day. The initial systemic (neuromuscular) symptoms were similar to those observed after acute toxicity; death occurred after cardiac arrest. [10112]

Reproductive toxicity, mutagenicity, carcinogenicity

Reproductive toxicity:
substance-specific information is not available. [99998]
In a combined screening study on the toxicity involved in repeated administration and on the reproduction toxicity conducted with potassium nitrate in accordance with OECD directive 422, rats showed neither effects on the reproductive capacity or the fertility nor on the development of the offspring up to the highest administered dose of 1500 mg per kg of body weight per day after oral administration of the salt as hexahydrate before and during breeding (4 weeks in total) and thereafter during gestation until day 4 of the lactation period (only females were exposed). [7520]
Reprotoxic effects caused by nitrates in animal experiments were generally not described or were only found after exposures to very high doses (e.g. 30 g potassium nitrate/litre of drinking water). [99999]
Neither epidemiological studies nor animal experiments with comparable magnesium salts (magnesium sulphate, magnesium chloride) revealed developmental-toxic effects or an impairment of the fertility in the relevant non paternal-toxic dose range. [7520, 10109]

Mutagenicity:
In an in-vitro study, M-hexahydrate triggered no mutagenic effects in bacteria. [7520]
Likewise, nitrates in general showed no mutagenic potential in in-vitro trials on bacteria and mammalian cells. [630]
In an in-vivo study, magnesium sulphate showed no genotoxic potential on the bone marrow of mice. [435, 7520]
Carcinogenicity:
substance-specific information is not available. [99998]
Epidemiological studies only revealed weak associations, if any, between exposures to or absorption of nitrate and a carcinogenic potential on humans. Animal experiments demonstrated that nitrate does not have any carcinogenic potential. Very high nitrite doses proved to possess a carcinogenic potential. In the organism, nitrate can be reduced to nitrite, which can contribute to the formation of nitrosamines with secondary amines some of which have a carcinogenic potential. [630, 660]
Chronic inhalative or oral exposure to magnesium salts (magnesium sulphate or magnesium chloride) yielded no indication of substance-induced tumours in rodents. [7520, 10107]

Biotransformation and excretion

Some proportions (approx. 5%) of orally absorbed nitrate is reduced to nitrite even before absorption by oral or gastrointestinal microflora and is re-oxidised to nitrate under the formation of methaemoglobin after absorption into the blood. Nitrate (and nitrite) also occurs endogenously (oxygen-dependent reaction of L-arginine). In rats, nitrite passes the placental barrier and caused methaemoglobinaemia in the foetuses. Approx. 60%–75 % of the nitrate in the plasma are eliminated via the kidneys in unchanged condition during the first 24 hours. About 25% of the nitrate are actively transported to the saliva and then re-absorbed in the form of nitrate or nitrite. Elimination of nitrate and nitrite with the faeces is minor. [630]
Magnesium in the form of divalent magnesium ions is an essential element for humans. As a cofactor in more than 300 enzymes, magnesium ions play a significant role in numerous biochemical reactions and regulations of metabolic processes, e.g. in the energy production from ATP and thus for muscle contraction, the synthesis of nucleic acids and proteins or the regulation of blood glucose levels and the blood pressure. There are interactions with the metabolism of calcium and phosphate ions. The organism of an adult individual contains approx. 25 g magnesium, 50–60% of which are found in the bones and 30% in the muscles. The majority is located intracellularly or bound in the bone matrix. The normal magnesium concentration in the serum ranges between 0.75 and 0.95 mmol/l. It correlates only slightly with the concentration in the tissues or the total magnesium content in the organism and accounts for less than 1% of the total magnesium ions in the body. Both, deficiency symptoms (hypomagnesaemia) and excessive magnesium levels (hypermagnesaemia) result in clinical symptoms. [10113]
Elimination of magnesium usually ranges around 120 mg per day and is subject to homeostatic regulation; deviations of the magnesium level from the physiological state in the organism are therefore rare. Elimination occurs almost exclusively via the kidneys with the urine. Individuals with impaired kidney functions run an increased risk of magnesium toxicity. [10113]

Annotation

This occupational health information was compiled on 04.10.2019.
It will be updated if necessary.
This information was translated from German into English by Übersetzungsbüro Branco.

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.
[454]

Skin

Remove contaminated clothing while protecting yourself.
Cleanse the affected skin areas thoroughly with soap under running water.
In case of irritant effects:
Arrange for medical treatment.
[454, 99999]

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.
If the casualty has stopped breathing give mouth to nose resuscitation. If this is not possible use mouth to mouth resuscitation. Keep his respiratory tract clear.
Arrange medical treatment.
[454, 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).
In case of spontaneous vomiting, keep the patient in a prone position with the head lower than the chest to effectively prevent the vomit from penetrating the respiratory tract.
Arrange medical treatment.
[10339, 454, 99999]

Information for physicians

In addition to typical symptoms of a magnesium toxicity, the nitrate anion can trigger methaemoglobinaemia. Significantly more toxic nitric oxides may be liberated at high temperatures! [10339, 454, 99999]

- Symptoms of acute toxicity:
Eyes: mucosal irritation [454]
Skin: reddening, skin irritations; pain is possible. [454]
Inhalation: coughing, mucosal irritation [454]
Ingestion: nausea and vomiting; diarrhoea; abdominal pain. [8122, 10113, 99999]
Absorption: only after massive oral intake: hypermagnesaemia (clouded consciousness; hyporeflexia; paralysis; respiratory depression; hypotension; bradycardia; PQ, QRS and QT prolongation; cardiac arrest); electrolyte disorders; methaemoglobinaemia (headaches; disorientation; tachycardia; shortness of breath; cyanosis) [10339, 8113, 8122]

- Notes on first aid
Eye contact requires thorough rinsing. Presentation of the casualty to an ophthalmologist [454, 99999]
Rinsing of the skin is sufficient after skin contact, possibly supplemented by symptomatic treatment. [454, 99999]
Symptomatic treatment is performed after inhalation. Exposure to heated nitrates requires the same procedure as exposure to nitrogen dioxide. [99999]
After ingestion of large quantities, the patient must undergo inpatient monitoring due to possible hypermagnesaemia and methaemoglobinaemia. Patients with impaired kidney functions are particularly at risk of developing hypermagnesemia. The blood electrolytes including magnesium and the kidney values should be checked; moreover, the methaemoglobin level should be determined. Activated charcoal is not indicated. Symptomatic patients must be monitored with an ECG monitor. Symptom-oriented treatment is recommended. Respiratory depression may require artificial respiration. To accelerate renal excretion of magnesium, physiological saline solution and, if necessary, furosemide can be administered. Haemodialysis is effective but should only be used in cases of severe toxicities. Calcium gluconate should also only be used as an antidote in cases of severe toxicities.
Methaemoglobinaemia requires oxygen supply. Methylene blue or toluidine blue as well as ascorbic acid can be administered as an antidote. [7978, 8113, 8122, 99999]

Recommendations

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

Annotation

This first aid information was compiled on 28.09.2020.
It will be updated if necessary.
This information was translated from German into English by Übersetzungsbüro Branco.

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.
Washing facility at the workplace required.
When handling excessive amounts of the substance an emergency shower is required.

Equipment

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.

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.
Substance is hygroscopic, protect from moisture.
Keep contents under inert gas.

Conditions of collocated storage

Storage class 5.1 B (Oxidizing 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).
- Other explosive substances of storage class 4.1A.
- Pyrophoric substances.
- Substances liberating flammable gases in contact with water.
- Organic peroxides and self reactive substances.

Under certain conditions the collocated storage with the following sub-stances is permitted (For more details see TRGS 510):
- Flammable liquids of storage class 3.
- Flammable solid substances or desensitized substances of storage class 4.1B.
- Ammonium nitrate and preparations containing ammonium nitrate.
- Combustible and non combustible acutely toxic substances of stora-ge classes 6.1A and 6.1B.
- Combustible toxic or chronically acting substances of storage class 6.1C.
- Noncombustible toxic or chronically acting substances of storage class 6.1D.
- Combustible corrosive substances of storage class 8A.
- Combustible liquids of storage class 10.
- Combustible solids of storage class 11.

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

Substance has an oxidizing effect.
Fire fighting equipment must be available.

Precaution on handling

Keep away from open flames.
Observe the smoking prohibition!
Absolutely no welding in the working area.
Only work with vessels and lines after these have been thoroughly rinsed.

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.

Keep away from combustible materials.

Filter the solutions only with glass wool, glass chips, or ceramic filters. Do not use any filtration materials made of paper which risks ignition after drying. Do not leave any cleaning rags lying in the open.

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.

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

PERSONAL PROTECTION

Body protection

Wear flameproof protective clothing.

Respiratory protection

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

Respiratory protection: Particle filter P2, 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.

The following information is valid for aqueous, saturated solutions of the salt.

The following materials are suitable for protective gloves (Permeation time >= 8 hours):

Natural rubber/Natural latex - NR (0,5 mm) (use non-powdered and allergen free products)

Polychloroprene - CR (0,5 mm)

Nitrile rubber/Nitrile latex - NBR (0,35 mm)

Butyl rubber - Butyl (0,5 mm)

Fluoro carbon rubber - FKM (0,4 mm)

Polyvinyl chloride - PVC (0,5 mm)

The times listed are suggested by measurements taken at 22 °C and constant contact. Temperatures raised by warmed substances, body heat, etc. and a weakening of the effective layer thickness caused by expansion can lead to a significantly shorter breakthrough time. In case of doubt contact the gloves' manufacturer. A 1.5-times increase / decrease in the layer thickness doubles / halves the breakthrough time. This data only applies to the pure substance. Transferred to mixtures of substances, these figures should only be taken as an aid to orientation.

Occupational hygiene

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

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:
Collect in container for inorganic solids.
Neutral solutions (pH-control):
Place in a collection container for salt solutions, adjust for a pH value of 6-8.
Do not put/place waste into sink or dust bin.
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

Evacuate area. Warn affected surroundings.
Pick up without creating dust.
Afterwards ventilate area and wash spill site.

Endangerment of watert:
Low hazard to waters. Inform the responsible authorities when very large quantities get into water, drainage, sewer, or the ground.

FIRE FIGHTING MEASURES

Instructions
Substance is non-combustible, but has an oxidizing effect.
Cool surrounding containers with water spray.
If possible, take container out of dangerous zone.
Rise in pressure and risk of bursting when heating.

Special protective equipment
In the case of inclusion in an ambient fire hazardous substances can be released.
Nitrous gases (nitric oxides)
Metal oxide fume
Wear self-contained breathing apparatus and special tightly sealed suit.

REGULATIONS

GHS Classification/Labelling | Workplace labelling | Water hazard class | Air quality control | Transport Regulations | Seveso III | Technical rules | Regulations of accident insurers

EUROPEAN GHS CLASSIFICATION AND LABELLING

Classification
Oxidising solids, Category 3; H272

Signal Word "Danger"

Hazard Statement - H-phrases
H272: May intensify fire; oxidiser.

Precautionary Statement - P-phrases

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P220: Keep away from clothing and other combustible materials.
P221: Take any precaution to avoid mixing with combustibles.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P370+P378: In case of fire: Use ... for extinction.
P501: Dispose of contens / container in accordance with local / regional / national / international regulations.

Registration entry of the manufacturer on the ECHA website

Reference: 07520
State: 2019
Checked: 2019

GESTIS advice:
Magnesium nitrate hexahydrate is not classified as a hazardous substance.

Reference: 07520 99999

WORKPLACE LABELLING ACCORDING TO GERMAN ASR A1.3

Prohibition label

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

Warning label

Caution - oxidizing material

Precept label

Use safety goggles

GERMAN WATER HAZARD CLASS

Substance No: 363
WGK 1 - low 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 17.08.2021

TECHNICAL INSTRUCTIONS ON AIR QUALITY CONTROL (TA LUFT)

Chapter 5.2.1 Overall Dust, including fine dust
The emissions of dust in the exhaust gas are not allowed to exceed the following values:

Mass flow: 0,20 kg/hr

or

Mass conc.: 20 mg/m³

The mass per unit volume of 0,15 g/m3 in exhaust gas is not allowed to be exceeded also on observance or lower deviation of a mass flow of 0,20 kg/h.

TRANSPORT REGULATIONS

UN Number: 1474
Shipping name: Magnesium nitrate
(Magnesium nitrate hexahydrate does not subject to the regulations of the ADR.)
Hazard Identification Number: 50
Class: 5.1 (Oxidizing Agents)
Packing Group: III (low danger)
Danger Label: 5.1

Classification code: O2

Tunnel restrictions:
Passage forbidden through tunnels of category E.

Reference: 07902

DIRECTIVE 2012/18/EU (Seveso III)

Annex I Part 1 Section: P8
Oxidising liquids or solids, Category 1, 2 or 3
Qualifying quantity for the application of
Lower-tier requirements: 50 t
Upper-tier requirements: 200 t

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 500
Schutzmaßnahmen; Ausgabe September 2019

TRGS 509
Lagern von flüssigen und festen Gefahrstoffen in ortsfesten Behältern sowie Füll- und Entleerstellen für ortsbewegliche Behälter; Ausgabe September 2014, zuletzt berichtigt, geändert und ergänzt Oktober 2020

TRGS 510
Lagerung von Gefahrstoffen in ortsbeweglichen Behältern; Ausgabe Januar Dezember 2020

TRGS 800
Brandschutzmaßnahmen; Ausgabe Dezember 2010

REGULATIONS OF GERMAN ACCIDENT INSURERS

DGUV Regel 112-190
Benutzung von Atemschutzgeräten, Ausgabe Dezember 2011
http://publikationen.dguv.de/dguv/pdf/10002/r-190.pdf
(in German only)

DGUV Regel 112-195
Benutzung von Schutzhandschuhen, Aktualisierte Nachdruckfassung Oktober 2007
http://publikationen.dguv.de/dguv/pdf/10002/bgr195.pdf
(in German only)

LINKS

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: 00132
The Merck-Index; 15th Edition 2013

Quelle: 00419
CHEMINFO - Chemical Profiles Created by CCOHS

Quelle: 00435
Organisation for Economic Cooperation and Development (OECD) "Screening Information Data Set for High Production Volume Chemicals (SIDS)", http://www.inchem.org/pages/sids.html

Quelle: 00454
Hazardous Substances Data Bank (HSDB)

Quelle: 00630
US Department of health and human services, Public health services,
Agency for Toxic Substances and Diseases Registry (ATSDR),
Toxicological Profiles
https://www.atsdr.cdc.gov/toxprofiledocs/index.html

Quelle: 00660
WHO
Guidelines for Drinking-water Quality.

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: 02071
Toxicological Data, compiled by the National Institute of Health (NIH), USA, selected and distributed by Technical Database Services (TDS), New York, 2009

Quelle: 05300
TRGS 510 "Lagerung von Gefahrstoffen in ortsbeweglichen Behältern" Ausgabe Dezember 2020

Quelle: 06002
L. Roth, U. Weller
"Gefährliche Chemische Reaktionen" Loseblattsammlung mit Ergänzungslieferungen
"Dangerous chemical reactions" loose-leaf collection with supplement deliveries
ecomed-Verlag

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 17.08.2021

Quelle: 07635
AUERDATA 98

Quelle: 07639
J. Konietzko, H. Dupuis (Hrsg.) "Handbuch der Arbeitsmedizin, Arbeitsphysiologie, Arbeitspathologie, Prävention" Loseblattausgabe, ecomed-Verlagsgesellschaft mbH, Landsberg ab 1989

Quelle: 07647
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