

Strontium chloride



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IDENTIFICATION

Strontium chloride

ZVG No: 491485

CAS No: 10476-85-4

EC No: 233-971-6

anhydrous

Related

CAS No: 10025-70-4

hexahydrate

CHARACTERISATION

SUBSTANCE GROUP CODE

123400 Strontium compounds

133210 Chlorides

STATE OF AGGREGATION

The substance is solid.

PROPERTIES

colourless to white

odourless

CHEMICAL CHARACTERISATION

Non-combustible substance.

Very soluble in water.

Hygroscopic.

Acute or chronic health hazards result from the substance.
(see: chapter REGULATIONS).

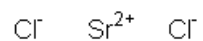
[Substance information in Wikipedia](#)

DUST EXPLOSIVENESS

No risk of dust explosion.

Quelle: [99999](#)

FORMULA



Molar mass: 158,52 g/mol

PHYSICAL AND CHEMICAL PROPERTIES

[Melting point](#) | [Density](#) | [Solubility](#) |
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MELTING POINT

Melting point: ca. 61 °C

hexahydrate

Reference: [01211](#)

DENSITY

DENSITY

Value: 1,95 g/cm³

Temperature: 20 °C

hexahydrate

Reference: [01211](#)

SOLUBILITY IN WATER

Concentration: 1062 g/l

Temperature: 0 °C

Reference: [01211](#)

Concentration: 2058 g/l

Temperature: 40 °C

Reference: [01211](#)

pH-VALUE

pH-value: 5 ... 7

Temperature: 25 °C

Concentration: 50 g/l

Reference: [01211](#)

TOXICOLOGY / ECOTOXICOLOGY

TOXICOLOGICAL DATA

LD50 oral rat

Value: 2250 mg/kg

Food Research. Vol. 7, Pg. 313, 1942.

Reference: [02071](#)

ECOTOXICOLOGICAL DATA**LC50 Fish (96 hours)**

Minimum: 2760 mg/l

Maximum: 2760 mg/l

Median: 2760 mg/l

Study number: 2

Reference for median:

Amiard, J.C. 1976. Experimental Study on the Acute Toxicity of Cobalt, Antimony, Strontium and Silver Salts in Some Crustacea and Their Larvae and Some Teleostei. Rev.Int.Oceanogr. Med. 43:79-95 (FRE) (ENG ABS)

LC50 Crustaceans (48 hours)

Minimum: 75 mg/l

Maximum: 75 mg/l

Median: 75 mg/l

Study number: 1

Reference for median:

Baudouin, M.F., and P. Scoppa 1974. Acute Toxicity of Various Metals to Freshwater Zooplankton. Bull.Environ.Contam.Toxicol. 12(6):745-751

EC50 Crustaceans (48 hours)

Minimum: 94 mg/l

Maximum: 163 mg/l

Median: 128 mg/l

Study number: 2

Reference for median:

Khangarot, B.S., and P.K. Ray 1989. Investigation of Correlation Between Physicochemical Properties of Metals and Their Toxicity to the Water Flea Daphnia magna Straus. Ecotoxicol.Environ.Saf. 18(2):109-120

Reference: [02072](#)

OCCUPATIONAL HEALTH AND FIRST AID

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

ROUTES OF EXPOSURE**Main routes of exposure**

The main route of exposure for SR chloride (SC) under occupational conditions is via the respiratory tract.[07636]

Respiratory tract

Exposure to dusts and vapours (electrolytic processes, steel production) appears possible due to the substance's broad application.

The hygroscopy of the substance might lead to the formation of aerosols during technical processes.
[99997]

Data on the resorption rate of soluble SR salts via the respiratory tract are not available.[99983]

Systemic effects confirmed during the handling of SR salts as well as analogical reasoning with regard to the physically-chemically similar barium and calcium compounds imply effective resorption via the respiratory tract.[99999]

Skin

Substance-specific information is not available.[99983]

However, it was observed that considerable amounts of SR ions can also be eliminated with the perspiration after oral toxicities.[07866]

This might point to a certain dermal resorption.[99999]

Gastrointestinal tract

Soluble SR salts are generally resorbed via the digestive tract.

Quantitative assessments - toxicokinetic studies are apparently lacking - extend from 'no significant resorption' to 25% resorption of orally resorbed soluble salts.[99983]

The possibility of highly varying SR resorption rates in humans depending on the calcium content in the food was pointed out.[07866]

TOXIC EFFECTS

Main toxic effects

Acute effects:

Strong irritative effects on the mucosae, particularly of the eyes;[07637]

irritative effects on the skin;[99997]

gastrointestinal disorders, limb pain, cardiovascular disorders (after ingestion);[07636]

Chronic effects:

Cardiac dysfunctions;[07656]

changes in the biochemical parameters.[07647]

Acute toxicity

Compounds of stable SR isotopes only possess a slight to moderate toxicity, which led to the assumption that the effects of the salts are largely influenced by the anion.[99983]
The high radiotoxicity of the strontium-90 isotope due to its storage in the osseous substance is not considered in the following statements.[99999]
Direct contact with SC was labelled as particularly hazardous due to its irritating/corrosive potential (further data were not provided).[07637]
However, this statement must be restricted with regard to the fact that it was particularly the eye-irritating potential of both the Ca chloride and the Ba chloride solutions that was relatively low in an animal experiment (lower than the skin-irritating effects), indicating that the report described above chiefly refers to solid particles or highly concentrated solutions.[99999]
SC triggered local irritative effects on the skin of several test animals.[99997]
Until validated experimental information is available, these few data should be considered to indicate that SC and its aqueous solutions (as of an unknown concentration) are capable of inducing pronounced irritations of the mucosae of the respiratory tract and the skin of humans.[99999]
Information on a possible sensitizing potential is not available.[99983]
However, such potential is relatively improbable, given the different prophylactic or therapeutic application possibilities for SR salts that are partially still performed today (e.g. SC in tooth paste, SR in powders, SR sulphide in depilatories, SR bromide as antacid).[99999]
There is a complete lack of information on possibly occurring systemic effects after acute inhalation of SC dusts.[99983]
Several studies stated that orally resorbed SR is only slightly toxic.
This assessment can at least be verified also for SC in animal experiments with the help of LD50 values:
LD50 mice, intravenous: 147.6 mg per kg of body weight[99997] LD50 mice, intraperitoneal: > 1253 mg per kg of body weight).[00438]
According to an older study, 7 g of (orally applied) SC triggered only one single case of vomiting in a female dog, but the application of 15 g to rabbits entailed limb paralysis and then resulted in the death of the animals.[99997]
With regard to the (accidental) human ingestion of SR salts, there is only one example in a secondary literature source (without indication of the case description), indicating that gastrointestinal disorders, limb pain and, under extreme conditions, cardiac dysfunctions (myocardium) can occur; these are, however, reversible.[07636]

Chronic toxicity

Substance-specific information pertaining to humans is not available [99983].
The handling of Sr and Sr compounds triggered cardiac dysfunctions (changes in the ECG) in workers, allegedly involving a correlation of the Sr levels in the blood.[07656]
A cardiotropic potential of SC was found in dogs in which an infarction was triggered by the ligation of a coronary artery. The circulatory changes were diminished by intravenous application of SC. [99997]
Further studies on dogs confirmed the influence of Sr ions on the cardiac action that might act directly on the heart muscle (positively inotropic effect).[07866]
Moreover, biochemical changes (reduction of the cholinesterase and acetylcholinesterase activities) were confirmed in workers exposed to Sr.[07647]
The confirmation of such possibly neurotropic active components of the Sr ion was also provided by animal experiments that demonstrated that Sr increases the neurotransmitter releases in the myoneural switching points at low calcium concentrations (substitution effect), and decreases the neurotransmitter releases at higher Ca concentrations.[07866]
These data only apply to the general understanding of the biological activity of Sr. However, according to present information depth, these data do not provide a basis for the derivation of the risk of a chronic inhalation of SC in the form of a threshold value.[99999]

Reproductive toxicity, mutagenicity, carcinogenicity

Reproductive toxicity:

Sufficient data are not available; very high concentrations of soluble Sr compounds triggered an inhibition of the calcification of the skeletons of the offspring of mice. Teratogenic effects were not evidenced.[99997]

Relevant information pertaining to humans is not available.[99983]

Mutagenicity:

In animal experiments, oral application of different SC doses triggered chromosomal aberrations in the bone marrow of mice.[07866]

Information pertaining to humans is not available.

Carcinogenic potential:

Relevant information is not available.[99983]

Biotransformation and excretion

Ninety-nine per cent of the Sr contained in the human organism is deposited in the bones. Further accumulations that are normal with increasing age (nutritional factors) are found – to a substantially lower extent – only in the lungs and in the aorta. In the metabolic process, calcium can be temporarily displaced by massive chronic Sr application (-> sclerotizing bone diseases). In this regard Sr triggers two effects in the bones: it reduces the Ca transportation, and decreases the calcification in the cartilage and the bones.[99997]

Orally resorbed Sr is chiefly excreted via the intestines. Humans eliminate approx. 11% via the kidney, and a further portion with the perspiration.[07866]

Elimination with the breast milk is also possible (as confirmed in animal experiments directly performed with SC).[99997]

Sr retention in the human organism after oral intake of 5 to 250 mg amounted to approx. 20% after 2 weeks, and approx. 10% after 1 month.[07866]

Annotation

This occupational health information was compiled on 06.09.1996.

It will be updated if necessary.

This information was translated from German into English by Übersetzungsbüro Branco.

FIRST AID

Eyes

As soon as possible:

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

Then, immediately transport the casualty to an eye doctor / to hospital.

Continue rinsing during the transport with isotonic saline solution, alternatively with water.

[07637, 99999]

Skin

Remove contaminated clothing while protecting yourself.

Rinse the affected skin areas for at least 10 to 20 minutes under running water.

Under no circumstances should alcohol, gasoline or other solvents be used.

Arrange for medical treatment.

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.

Swallowing

Rinse the mouth and spit the fluids out.

Have the casualty drink some water in small sips.

Have the casualty drink 1 % - 5 % sodium sulphate solution as soon as possible and repeatedly.

Sodium sulphate solution acts at the same time as an antidote (formation of hardly soluble Sr sulphate) and as a laxative.

In the meantime, summon an emergency physician to the scene of the accident.[99999]

Information for physicians

Substance-specific experiences from toxicity cases are lacking.

Therefore, the following descriptions are based on therapy measures that proved to be successful in toxicity cases with other soluble Sr compounds or with the more effective barium compounds. It is generally assumed that the oral toxicity of Sr salts is relatively low and that systemic effects occurring after exposure to non-extreme doses can in general be reversible.[99983]

- Symptoms of acute toxicity:

Eyes: Severe damage might occur probably due to pronounced irritative/corrosive effects (detailed data are lacking);[07637]

Skin: Possibly strong irritative effects (findings from an animal experiment);[99997] possibly dermatitis, ulceration (analogue to Ba chloride?);[99999]

Inhalation: Substance-specific information is lacking;[99983] irritations of nasal and bronchial mucosae are very probable; resorptive effects must only be considered after accidental high exposure;[99999]

Ingestion: gastrointestinal disorders;

Absorption: Cardiovascular disorders, limb pain;[07636] possibly muscle dysfunctions (also of the respiratory muscles).[99999]

- First medical assistance:

Every eye contact with SC or its solutions requires (in keeping with the warning indicating danger) immediate examination of the casualty by an ophthalmologist after the completion of the first aid measures.[07637]

Rinsing with phosphate buffers (isogutt) should be avoided due to possible precipitation of Sr as phosphate and because of possible additional disorders of the Ca cell metabolism; rinsing should instead be performed with physiological saline solution.

Skin injuries that might occur following intensive contact can be treated with a dermatocorticoid foam spray.

Despite possibly only minor irritations the casualty should be admitted to hospital after the exposure to the inhalation of high SC dust concentrations to ensure early recognition and treatment of possibly occurring resorptive symptoms. Monitoring of the cardiovascular and respiratory parameters should also include radiological examinations.

Known or assumed massive resorption following Sr ingestion requires gastric irrigation with sodium sulphate (approx. 20 g).[99999]

A calcium therapy was recommended to accelerate the elimination of resorbed SR via the kidneys. [99997]

Analogous to the procedure performed in cases of barium toxicities, the patient can undergo repeated intravenous injection of individual 10 ml doses of 10% calcium gluconate (up to a total daily dose of 60 ml).[07637]

Recommendations

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

A series of studies was performed with regard to the efficiency of antidotes against systemic effects of resorbed SR aiming in the first line at the elimination of radiotoxic 90-Sr.[99999]

Another possibility of increasing elimination of Sr practised directly on humans is the oral application of ammonium chloride solution (9 g per day for several days) and adherence to a constant analysed low-calcium diet (200 mg of Ca and 750 mg of P per day), which generates acidosis and promotes diuresis.[07866]

Sodium alginate was effective in increasing the excretion of Sr via the kidneys (in rats).[07647]

A newer study on rats revealed that orally applied EDTA practically does not influence the Sr content of bones, liver, kidney and brain tissues as well as blood and plasma, while nitrilotriacetate causes only a strong decrease of the Sr levels in the duodenum.

Sodium polyphosphate decreased the Sr level in the plasma by only 10%.[99997]

These data indicate that a conventional chelation therapy is not very promising in cases of Sr toxicities.[99999]

The application of BAL does not produce any impact on the resorption, distribution and overall reduction of Sr.[07866]

Annotation

This first aid information was compiled on 06.09.1996.

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.

Eye bath required. These locations must be signposted clearly.

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.

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

Use protective equipment while cleaning if necessary.

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

Use a tested industrial vacuum cleaner or suction device.

Do not raise dust while cleaning.

Use of a blower for cleaning is not permitted.

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.

Protect from moisture.

Conditions of collocated storage

Storage class 10 - 13 (Other liquids and solids)

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.
- Strongly oxidizing substances of storage class 5.1A.

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

- Gases.
- Flammable liquids of storage class 3.
- 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.
- Ammonium nitrate and preparations containing ammonium nitrate.
- Organic peroxides and self reactive substances.
- Combustible and non combustible acutely toxic substances of storage classes 6.1A and 6.1B.

The substance should not be stored with substances with which hazardous chemical reactions are possible.

TECHNICAL MEASURES - FIRE AND EXPLOSION PROTECTION

Technical, constructive measures

Substance is non-combustible. Select fire and explosion prevention measures according to the other used substances.

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.

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

PERSONAL PROTECTION

Body protection

Wear an apron or a lab coat.

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.

Use insulating device for concentrations above the usage limits for filter devices, for oxygen concentrations below 17% volume, or in circumstances which are unclear.

Eye protection

Sufficient eye protection must be worn.

Wear chemical safety goggles.

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 contact with eyes. In case of contact rinse the affected eye(s).

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.

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.

The hazardous area may only be entered once suitable protective measures are implemented. Only then can the hazardous situation be removed (see chapter Personal Protection).

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 incombustible. Select fire fighting measures according to the surrounding conditions.

REGULATIONS

[GHS Classification/Labelling](#) | [Workplace labelling](#) | [Water hazard class](#) | [Air quality control](#) | [Transport Regulations](#) | [MAK recommendations](#) | [Technical rules](#) | [Regulations of accident insurers](#)

EUROPEAN GHS CLASSIFICATION AND LABELLING

Classification

Serious eye damage, Category 1; H318



Signal Word "Danger"

Hazard Statement - H-phrases

H318: Causes serious eye damage.

Precautionary Statement - P-phrases

P280: Wear eye protection/face protection.

P305+P351+P338+P310: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.

Manufacturer's specification by Sigma-Aldrich

Reference: 01221

State: 2019

Checked: 2020

GHS-CLASSIFICATION OF MIXTURES

The classification of mixtures containing this substance results from Annex 1 of Regulation (EC) 1272/2008.

Reference: [99999](#)

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

Warning label



Caution - corrosive material

Precept label



Use safety goggles

GERMAN WATER HAZARD CLASS

Substance No: 843

WGK 1 - low hazard to waters

Scope: Strontium chloride, hexahydrate

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

Substance No: 9292

WGK 1 - low hazard to waters

Scope: Strontium chloride

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 5.2.1 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

Not subject to transport regulations.

Reference: [01221](#)

RECOMMENDATIONS OF [MAK-COMMISSION](#)

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

II b) substances, for which (still) no MAK-values can be established

Strontium and its inorganic compounds

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 Juni 2022

[TRGS 510](#)

Lagerung von Gefahrstoffen in ortsbeweglichen Behältern; Ausgabe Januar Dezember 2020

REGULATIONS OF GERMAN ACCIDENT INSURERS

[DGUV Regel 112-190](#)

Benutzung von Atemschutzgeräten, Ausgabe November 2021
(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: 00438

Registry of Toxic Effects of Chemical Substances (RTECS)

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: 02071

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

Quelle: 02072

Ecotoxicological Data, compiled by the US Environmental Protection Agency (EPA), 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: 07580

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

Quelle: 07636

L. Parmeggiani (Edt.) "Encyclopedia of Occupational Health and Safety" 3. Auflage, International Labour Office, Genf 1983

Quelle: 07637

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

Quelle: 07647

H.G. Seiler, H. Sigel, A. Sigel "Handbook on toxicity of inorganic compounds" Marcel Dekker, Inc., New York 1980

Quelle: 07656

D. Walsh (Hrsg.) "Chemical Safety Data Sheets; Vol. I Solvents, Vol. II Metalls, Vol. III Corrosives and Irritants, Vol. IV Toxic Chemicals, Vol.V Flammable Chemicals" University of Technology, Loughborough 1990

Quelle: 07866

G.D. Clayton, F.E. Clayton (edt.) "Patty's Industrial Hygiene and Toxicology" Volume II "Toxicology" Fourth Edition, John Wiley & Sons, New York 1993

Quelle: 08112

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

Quelle: 99983

Liste arbeitsmedizinisch-toxikologischer Standardwerke (2)

List of standard references regarding occupational health and toxikology (2)

Quelle: 99997

Projektgebundene arbeitsmedizinisch-toxikologische Literatur (1)

Project related bibliographical references regarding occupational health and toxikology (1)

Quelle: 99999

Angabe des Bearbeiters

Indication of the editor

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