

Silica gel

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IDENTIFICATION

Silica gel

Silicic anhydride
Amorphous silica dust
Colloidal silica

ZVG No: 1290
CAS No: 7631-86-9
EC No: 231-545-4

Related

CAS No:	112926-00-8	Silica gel
	63231-67-4	Silica gel

CHARACTERISATION

SUBSTANCE GROUP CODE

126100 Silicon dioxide, amorphous

STATE OF AGGREGATION

The substance is solid.

PROPERTIES

white
odourless

CHEMICAL CHARACTERISATION

Non-combustible substance.
Practically insoluble in water.

[Substance information in Wikipedia](#)

DUST EXPLOSIVENESS

No risk of dust explosion.
Quelle: 99999

FORMULA

SiO₂

Molar mass: 60,08 g/mol

PHYSICAL AND CHEMICAL PROPERTIES

[Melting point](#) | [Boiling point](#) | [Density](#) | [Solubility](#) | [pH-value](#) | [Hazardous reactions](#)

MELTING POINT

Melting point: 1710 °C

Reference: [00456 01211](#)

BOILING POINT

Boiling Point: 2230 °C

Reference: [00456 01211 01221](#)

DENSITY

DENSITY

Value: 2,2 g/cm³

Temperature: 25 °C

Reference: [00131 00456](#)

SOLUBILITY IN WATER

practically insoluble in water

Reference: [00131 00456 01211](#)

pH-VALUE

pH-value: ca. 7

Temperature: 20 °C

Concentration: 100 g/l

slurry

Reference: [01211](#)

HAZARDOUS REACTIONS

Hazardous chemical reactions

The substance can react dangerously with:
oxygen difluoride
hydrogen fluoride
sodium (heat)
xenon hexafluoride

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 colloidal and pyrogenic SiO₂ (SG) in the industrial context is via the respiratory tract.

The substance is also absorbed via the gastrointestinal tract, since SG serves as filler material for food and pharmaceuticals. [07619]

Respiratory tract

Exposures to SG can occur during its production and when the substance is mixed with other products. Since synthetically produced SGs are chiefly hydrophilic (provided that there is no follow-up treatment), the tendency to form dusts is quite limited (compared with hydrophobic products). [07619]

The relatively short retention period of SG in the lungs might point to an increased solubility (compared with crystalline SiO₂) that would cause a certain absorbability. [99999]
However, quantitative information on this subject is not available. [99983]

Skin

Absorption of toxicologically relevant amounts via the intact skin is assumed to be negligible (filler material in cosmetics). [99999]

Gastrointestinal tract

Due to the targeted utilisation as a food additive, it must be assumed that the amounts that can be absorbed in the gastrointestinal tract under industrial conditions do not trigger absorptive side effects. [99999]

Detailed data are not available. [99983]

TOXIC EFFECTS

Main toxic effects

Acute effects: substance-specific data are not available;

Chronic effects: ditto. [99983]

Acute toxicity

Reliable data on health-damaging or health-impairing effects are not available. [99983]

Chronic toxicity

Despite intensive examination of various collectives that had been exposed to (pyrogenic and colloidal) SG, manifest tissue damage (fibrotic reactions), just like changes in the lung functions, were not confirmed.

Reports only pertained to very minor radiologically visible initial conditions of an (interlobar) pleurisy, but only in a few persons who had been exposed to very high amounts for very long periods (up to approx. 100 mg/m³).

A connection between dysfunctions in the respiratory tract (coughing, sputum, shortness of breath and wheezing) and an exposure to SG could not be confirmed. [07619]

Inhalation experiments with rats and guinea pigs (1-2 years, > 100 mg SG/m³) only involved an accumulation of macrophages and a minor proliferation of reticular tissue fibres in the lungs. [07748]

Reproductive toxicity, mutagenicity, carcinogenicity

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.

[07908] Mutagenicity:

Genotoxic studies with amorphous SiO₂ on microorganisms and cell cultures yielded almost exclusively negative results. [07784]

Carcinogenic potential:

A carcinogenic potential is apparently absent. [07748]

Biotransformation and excretion

In animal experiments, 95% to 100% of the absorbed SG was eliminated from the respiratory tract within 5 months.

This period is much longer in the case of SiO₂ modifications.

The low histopathogenicity of pyrogenic silicic acids was also ascribed to this fact. [07619]

Annotation

This occupational health information was compiled on 06.03.1995.

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.

Skin

It is enough:

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

Respiratory tract

Whilst protecting yourself remove the casualty from the hazardous area and take him to the fresh air.

Only after massive inhalation:

In the case of breathing difficulties have the casualty inhale oxygen.

Arrange medical treatment.

Swallowing

Rinse the mouth and spit the fluids out.

If the casualty is conscious have him drink 1 glass of water (ca 200 ml).

Further first aid measures are usually not required.

Information for physicians

Symptoms of acute (i.e. < on work shift) exposures:

Particulate SG matters scarcely causes any eye damage; larger particles can trigger a mechanically-irritative foreign matter effect with sand grain feeling, lacrimation, reddening of the conjunctiva. Skin contact is neither toxic nor irritative. [99992]

Acute damage of the respiratory tract through substance inhalation with perceivable instant effects is not mentioned in any of the relevant sources. [99983]

At most, very massive inhalation might trigger short-term and reversible impacts on the bronchial lumen and the lung volume .

SG dusts that entered the gastrointestinal tract with the saliva or due to the bronchial clearance triggers only insignificant digestive disorders, if any. [99992]

First medical assistance:

Rinse affected eyes again, remove visible particles with cotton swabs, as required; the casualty must be examined by an ophthalmologist.

Further medical measures are usually not required. [99999]

Recommendations

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

Annotation

This first aid information was compiled on 30.04.1995.

It will be updated if necessary.

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

SAFE HANDLING

TECHNICAL MEASURES - HANDLING

Workplace

Select ventilation measures according to the other used substances.

If there is a chance that dusts may be released, then the work room must provide adequate ventilation.

Washing facility at the workplace required.

Equipment

Use closed apparatus if possible.

Suction off dust at the point of exit.

Consider emission limit values, a purification of waste gases if necessary.

Containers are to be marked 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.

Fill only into clearly marked containers.

Avoid rising dust.

Cleaning and maintenance

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.

Alternative: clean damp.

TECHNICAL MEASURES - STORAGE

Storage

Do not use any food containers - risk of mistake.

Containers have to be marked clearly and permanently.

Keep container tightly closed.

Store in a dry place.

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.

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.

PERSONAL PROTECTION

Body protection

Wear an apron or a lab coat.

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

Wear glasses with side protection.

Hand protection

Select hand protection according to the other used substances.

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

Non-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.

ACCIDENTAL RELEASE MEASURES

Wear a dust mask.

Pick up without creating dust.

Afterwards ventilate area and wash spill site.

Endangerment of water:

No hazards to sources of water are to be feared if released 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](#) | [Water hazard class](#) | [Air quality control](#) | [Transport Regulations](#) | [Threshold limit values](#) | [MAK recommendations](#) | [Technical rules](#) | [Regulations of accident insurers](#)

EUROPEAN GHS CLASSIFICATION AND LABELLING

Not a dangerous substance according to GHS.
Registration entry of the manufacturer on the ECHA website

Reference: [07520](#)

State: 2021

Checked: 2021

GERMAN WATER HAZARD CLASS

Substance No: 849

non-hazardous to waters

Scope: silicon dioxide

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: [01211](#)

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

4 mg/m³

with reference to the inhalable fraction

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

Scope:

colloidal amorphous silica including pyrogenic and wet process silica

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

Pregnancy: Group C

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

colloidal amorphous silica including pyrogenic and wet process silica

TECHNICAL RULES FOR HAZARDOUS SUBSTANCES

[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

REGULATIONS OF GERMAN ACCIDENT INSURERS

[DGUV Regel 112-190](#)

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

LINKS

[International Limit Values](#)

[OECD Screening Information DataSet \(SIDS\)](#)

[OECD Screening Information DataSet \(SIDS\)](#)

[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: 00131

The Merck-Index; 14th Edition 2006

Quelle: 00456

Hazardous Substances Data Bank (HSDB) in PubChem

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: 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: 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: 07748
American Conference of Governmental Industrial Hygienists "Documentation of the threshold limit
values and biological exposure indices Loseblattsammlung mit Ergänzungslieferungen

Quelle: 07784
M.L. Richardson, S. Gangolli "The Dictionary of Substances and their Effects" Royal Society of
Chemistry, 1992

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 toxicology (2)

Quelle: 99992
Projektgebundene Literatur zur Ersten Hilfe
(Project related bibliographical references regarding first aid)

Quelle: 99999
Angabe des Bearbeiters
Indication of the editor

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