

Sodium chloride

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

IDENTIFICATION

Sodium chloride

Common salt

Table salt

ZVG No: 1330
CAS No: 7647-14-5
EC No: 231-598-3

CHARACTERISATION

SUBSTANCE GROUP CODE

122200 Sodium compounds
133210 Chlorides

STATE OF AGGREGATION

The substance is solid.

PROPERTIES

crystalline
colourless
odourless

CHEMICAL CHARACTERISATION

Non-combustible substance.
Freely soluble in water.

[Substance information in Wikipedia](#)

DUST EXPLOSIVENESS

No risk of dust explosion.
Quelle: 99999

FORMULA

NaCl
ClNa

Na⁺ Cl⁻

Molar mass: 58,44 g/mol

PHYSICAL AND CHEMICAL PROPERTIES

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

MELTING POINT

Melting point: 801 °C

Reference: [00454 01211 01221](#)

BOILING POINT

Boiling Point: 1413 °C

Reference: [01211](#)

DENSITY

DENSITY

Value: 2,16 g/cm³

Temperature: 25 °C

Reference: [01211](#)

SOLUBILITY IN WATER

Concentration: 317 g/l

Temperature: 20 °C

Reference: [01211](#)

pH-VALUE

pH-value: 7

Reference: [01211](#)

HAZARDOUS REACTIONS

Hazardous chemical reactions

Risk of explosion in contact with:
alkali metals (rare)

The substance can react dangerously with:
lithium -> sodium
(Burning lithium can release the more reactive sodium from sodium chloride)

TOXICOLOGY / ECOTOXICOLOGY

TOXICOLOGICAL DATA

LD50 oral rat

Value: 3000 mg/kg

Toxicology and Applied Pharmacology. Vol. 20, Pg. 57, 1971.

LD50 dermal

Species: Rabbit

Value: > 10000 mg/kg

BIOFAX Industrial Bio-Test Laboratories, Inc., Data Sheets.Vol. 20-3/1971,

Reference: [02071](#)**ECOTOXICOLOGICAL DATA****LC50 Fish (96 hours)**

Minimum: 1000 mg/l

Maximum: 21400 mg/l

Median: 7400 mg/l

Study number: 52

Reference for median:

Adelman, I.R., and L.L. Smith Jr. 1976. Standard Test Fish Development. Part I. Fathead Minnows (*Pimephales promelas*) and Goldfish (*Carassius auratus*) as Standard Fish in Bioassays and Their Reaction to Potential Reference Toxicants. EPA-600/3-76-061A, Duluth, MN :77 p.

LC50 Crustaceans (48 hours)

Minimum: 736 mg/l

Maximum: 6030 mg/l

Median: 4660 mg/l

Study number: 18

Reference for median:

Cowgill, U.M. 1987. Critical Analysis of Factors Affecting the Sensitivity of Zooplankton and the Reproducibility of Toxicity Test Results. Water Res. 21(12):1453-1462; Arambasic, M.B., S. Bjelic, and G. Subakov 1995. Acute Toxicity of Heavy Metals (Copper, Lead, Zinc), Phenol and Sodium on *Allium cepa* L., *Lepidium sativum* L. and *Daphnia magna* St.: Comparative Investigations and the Practical Applications. Water Res. 29(2):497-503

EC50 Crustaceans (48 hours)

Minimum: 403 mg/l

Maximum: 2120 mg/l

Median: 2120 mg/l

Study number: 3

Reference for median:

Warne, M.S.J., and A.D. Schiffko 1999. Toxicity of Laundry Detergent Components to a Freshwater Cladoceran and Their Contribution to Detergent Toxicity. Ecotoxicol.Environ.Saf. 44(2):196-206

Reference: [02072](#)**OCCUPATIONAL HEALTH AND FIRST AID**

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

ROUTES OF EXPOSURE**Main routes of exposure**

The main intake pathway for sodium chloride (NaCl) is via the gastrointestinal tract with food. [454]
In the workplace additional inhalative/oral intake needs to be taken into consideration. [419]

Respiratory tract

In the workplace NaCl can be inhaled as dust or as an aerosol from solutions. [419]
Absorption via the respiratory tract is expected but information on this is not available. [99983]
Studies on volunteers showed that a part of particles inhaled are deposited in the upper airways. [220] These are at least in part subjected to the mucociliary clearance in the respiratory tract and are carried over into the gastrointestinal tract and absorbed there. [99999]

Skin

The possibility of absorption via the skin (transepidermal, not transfollicular) has been demonstrated in studies using NaCl solution on guinea pigs. [220] However, uptake through the skin is not considered to be a relevant intake pathway. [419]

Gastrointestinal tract

NaCl which reaches the gastrointestinal tract is absorbed rapidly and effectively. [454]

TOXIC EFFECTS

Main toxic effects

Acute:

Mild irritation to the mucous membranes and the skin, [220]
gastrointestinal and metabolic disturbances following oral intake of very high doses with secondary effects to the functions of organs [419, 454]

Chronic:

Damage to the skin and mucous membranes following very high exposure, influence on the blood pressure [419]

Acute toxicity

The ions of NaCl play an essential role in the organism and can be tolerated by humans in high doses. The potential to cause local irritation is also only minor. [99983]

An isotonic NaCl solution (0.9%) is tolerated without any problems by the mucous membranes of the eye. NaCl solutions from 0.9% - 10% also do not have any effect on the permeability of the cornea (below 0.9% the permeability is increased). There is slight stinging in the eye when the NaCl concentration exceeds that of the tear liquids. [7979]

20% NaCl solution was not irritating in a test on rabbits' eyes (irritation index 0 on a scale up to 110). [419]

Crystalline NaCl (instillation of 10 or 100 mg) in tests on rabbits' eyes caused mild or moderate irritation. [419, 220]

On the skin the crystalline salt caused either no or only very minor irritation. [419]

This was confirmed by tests on the skin of rabbits (mild irritation following contact with 50 or 500 mg for 24 hours). [220]

Experience and physiological knowledge indicates that NaCl does not cause sensitization.

There is no danger of poisoning following application to the skin (dermal LD50 on rabbits of > 10 g/kg bw).

Exposure to dust or mist from aqueous solutions could lead to slight irritation in the nose and throat but there is no acute danger. [419]

The 1h LC50 for NaCl in an inhalative test on rats was above 42 000 mg/m³ (no information on symptoms or findings). [419, 438]

NaCl was well tolerated in high doses as oral intake with foods. A salty taste of solutions was noticed at NaCl concentrations above about 550 mg/l. [220]

Swallowing of high doses of the crystalline salt or concentrated solutions can cause nausea, vomiting, strong thirst, irritation to the oral mucosa and possibly even damage to the mucous membranes in the gastrointestinal tract. [419] NaCl solutions caused vomiting starting at concentrations of about 10 g/l. [220]

Systemic effects caused by excessive intake of NaCl were disturbances in the electrolyte balances. The increased concentration in the blood led to an increase in the blood volume with simultaneous dehydration of the tissue and disturbances of the kidney function (reduction in the excretion of liquids). This could lead to muscle weakness, congestion in the blood vessels and in the brain, changes in blood coagulation, increase in blood pressure, further cardiovascular reactions and nervous disorders. In serious cases there could be collapse, cramps, cerebral edema and pulmonary edema. [454, 419]

The first toxic effects in healthy adults are supposed to appear following the intake of 8.2 g/kg bw, [454] but toxic effects have also been stated following much lower doses (0.5 - 1 g/kg bw).

Oral LD50 values of 3 - 5.8 mg/kg bw were found in animal studies on rats and mice. [220, 419]

Chronic toxicity

From occupational exposure it is known that prolonged and repeated skin contact with crystalline NaCl or concentrated solutions can cause ulcerous skin inflammation. These effects were seen in workers in salt mines or in those who had constant contact with brine (during the conservation of meat and fish). [419]

Workers in salt mines suffered from the formation of ulcers on the mucous membranes in the nose through to perforation of the nasal septum. [220] Information on the conditions which caused this local damage is not available [99983] but the exposure must have been massive. [99999]

There are also indications that high occupational exposure can influence the blood pressure.

A cross-sectional study was carried out on "salt workers" who were either inhalatively exposed to dry NaCl dust (n=474) or handled NaCl solution (brine) (n=284). The exposure to the dry dust was 376 mg/m³ for an average of 8.7 years while the workers who handled brine worked there for around 11.4 years. The "salt workers" exposed to dust showed significantly higher blood pressure than those who worked with brine. In addition the prevalence of those suffering from pathologically high blood pressure (>139 mm Hg/> 90 mm Hg) was significantly higher. A significant reduction of the blood pressure was achieved by wearing respiratory protection. [419]

Under the current conditions in workplaces, the exposure is so low that hardly noticeable in the comparison of the intake with food. [99999]

The usual intake of NaCl by adults in Europe in their food is estimated to be 8 - 10 g/d.

When animals received NaCl with the feed or with drinking water, damage was seen only at very high dosages.

Rats which received feed containing 4% NaCl for 2 years, showed inflammation and ulcerous lesions in the stomach, sometimes also damage to the kidneys and arteries. Dogs tolerated up to 12% NaCl in their feed for the whole of their lives without any influence on body weight, blood pressure or the biochemical parameters which characterize the function of the organs. [220]

Reproductive toxicity, mutagenicity, carcinogenicity

Reproductive toxicity:

There are no indications that NaCl has any developmental toxic effects or influences fertility in humans.

Epidemiological or animal studies on this using standardized methods are not available. In a limited study on rats, the offspring showed increased blood pressure when the mother received high NaCl doses in their drinking water (approx. 2 g/kg bw) during pregnancies. [419, 220]

Mutagenicity:

There are no indications that NaCl has any mutagenic effects.

NaCl solutions of very low concentrations have been used as solvents for test substances in a variety of mutagenicity tests (because of their inactivity). Positive reactions found in isolated cases on cultivated mammalian cells or in microorganisms were probably caused by osmotic effects and are not attributable to mutagenicity. [419]

Carcinogenicity:

There are no indications that NaCl has any carcinogenic effects. [99983]

However, a higher incidence of stomach cancer was seen in some populations which had a higher consumption of salt. In an animal study, the oral administration of high NaCl doses following the administration of a carcinogen (e.g. N-methyl-N'-nitro-N-nitrosoguanidine) was shown to lead to a higher incidence of tumors in the stomach and windpipe. [419, 220]

There is a need to investigate the possibility of tumor promoting effects resulting from inhalative exposure to NaCl aerosols. [7619]

Biotransformation and excretion

Sodium and chloride ions are important minerals/electrolytes which are maintained at high concentrations in the organism and comprehensively integrated into physiological processes. [99983]

The excretion takes place mainly with the urine and also with the sweat and feces. Because of the physiological importance of the electrolytes, the excretion via the kidneys involves a homeostatic mechanism which includes re-absorption in various functional parts of the kidneys. The regulation of the excretion of Na ions is closely connected with the regulation of the blood pressure.

Irrespective of this, sweating can also lead to a substantial excretion of NaCl. [454]

Annotation

This occupational health information was compiled on 10.11.2011.

It will be updated if necessary.

FIRST AID

Eyes

Following contact with dust or concentrated solutions:

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

If irritation persists:

Arrange medical treatment.

[419]

Skin

Remove contaminated clothing while protecting yourself.

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

If irritation appears:

Arrange for medical treatment.

[419]

Respiratory tract

Whenever irritation or complaints appear:

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

Arrange medical treatment.

[419]

Swallowing

If concentrated solutions or large amounts of the salt have been swallowed:

Rinse the mouth and spit the fluids out.

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

Spontaneous vomiting is likely: hold the head of the casualty low with the body in a prone position in order to avoid aspiration.

Arrange medical treatment.

[419, 99999]

Information for physicians

- Symptoms of acute poisoning:

Eyes/Skin: slight to moderate irritation (mainly due to the crystalline salt), mostly no irritation on the skin, absorptive effects not expected [220, 419]

Inhalation: salty taste, mild irritation in the nose and throat, systemic effects unlikely [419]

Ingestion: caused by high doses of the salt/concentrated solutions: vomiting, nausea, thirst, irritation to the oral mucosa, possibly irritation to the mucous membranes in the stomach and intestine, systemic effects

Absorption: caused by very high doses: disturbances in electrolyte balances (hypernatremia) -> dehydration of the tissues, disturbances of the kidney function, muscular weakness, congestion in organs, increase in blood pressure, disturbances of blood coagulation, nervous disorders, in extreme cases collapse, cramps, cerebral edema, pulmonary edema. [454, 419]

- Medical advice:

Rinse again thoroughly if the solid or concentrated solutions have gotten into the eye. Consult an ophthalmologist if the irritation persists.

Following skin contact, thorough rinsing is normally sufficient. [419] Irritated areas can be treated in the usual way. [99999]

If massive amounts of dust are inhaled, take the casualty into the fresh air and observe him. Treat symptomatically as necessary. [419] Inhalation of water vapor could be helpful to treat irritation in the nose/throat, reduce the salt concentration on mucous membranes and help remove the salt more quickly. [99999]

The swallowing of overdoses of NaCl as a salt or a concentrated solution mostly causes immediate vomiting. [419]

In any case the casualty should be observed in hospital, at least for a short time.

It is of primary concern to check the cardiovascular function (check of blood pressure), renal function, electrolyte balance and blood parameters. [454, 419]

Recommendations

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

It needs to be taken into account that commercial products (such as road salt, salt for cattle) contain impurities or additives, so these can have stronger effects than those caused by NaCl alone. [99999]

Annotation

This first aid information was compiled on 10.11.2011.
It will be updated if necessary.

SAFE HANDLING

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

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

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

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.

Storage temperature: Without any limitation.

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.

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 P1, colour code white.

Eye protection

Wear glasses with side protection.

Hand protection

If protective gloves are used, the following materials are recommended:

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

The following materials are suitable for protective gloves (Permeation time \geq 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, especially 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

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.

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

Wear a dust mask.

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](#) | [Water hazard class](#) | [Air quality control](#) | [Transport Regulations](#) | [Technical rules](#) | [Regulations of accident insurers](#)

EUROPEAN GHS CLASSIFICATION AND LABELLING

Not a dangerous substance according to GHS.
Manufacturer's specification by Merck

Reference: [01211](#)

State: 2021

Checked: 2022

GERMAN WATER HAZARD CLASS

Substance No: 270

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 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](#)

TECHNICAL RULES FOR HAZARDOUS SUBSTANCES

[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](#)

[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: 00220

IUCLID-CD-ROM, Year 2000 edition; European Commission, Joint Research Centre, Institute for Health and Consumer Protection, European Chemicals Bureau; Ispra, Italy

Quelle: 00419

CHEMINFO - Chemical Profiles Created by CCOHS

Quelle: 00438

Registry of Toxic Effects of Chemical Substances (RTECS)

Quelle: 00454

Hazardous Substances Data Bank (HSDB)

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

Quelle: 06002

L. Roth, U. Weller

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

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: 07795

H. Geerßen "GloSaDa 2000 Plus - Glove Safety Data"

Quelle: 07979

W.M. Grant, J.S. Schuman: Toxicology of the eyes; 4th Edition, Charles C Thomas Publisher,
Springfield, Illinois; 1993

Quelle: 99983

Liste arbeitsmedizinisch-toxikologischer Standardwerke (2)

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

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](#)

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