

Ammonium chloride



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IDENTIFICATION

Ammonium chloride

Ammonium muriate

Chlorid amonny

Sal ammonia

Sal ammoniac

Salmiac

ZVG No: 1460
CAS No: 12125-02-9
EC No: 235-186-4
INDEX No: 017-014-00-8

CHARACTERISATION

SUBSTANCE GROUP CODE

128120 Ammonium salts
133210 Chlorides

STATE OF AGGREGATION

The substance is solid.

PROPERTIES

crystalline powder
white
odourless

CHEMICAL CHARACTERISATION

Non-combustible substance.
Freely soluble in water.
In the presence of high air moisture, hygroscopic crystals.
Aqueous solution reacts acidic.
Acute or chronic health hazards result from the substance.
(see: chapter REGULATIONS).

[Substance information in Wikipedia](#)

DUST EXPLOSIVENESS

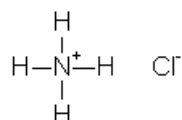
No risk of dust explosion.

Quelle: [99999](#)

FORMULA

NH₄Cl

H₄ClN



Molar mass: 53,49 g/mol

PHYSICAL AND CHEMICAL PROPERTIES

[Sublimation point](#) | [Triple point](#) | [Melting point](#) | [Density](#) | [Vapour pressure](#) | [Solubility](#) | [Partition coefficient](#) | [Hazardous reactions](#)

SUBLIMATION POINT

Sublimation point: 338 ... 340 °C

Ammonium chloride vapour is partly split to ammonia and hydrogen chloride.

Reference: [00454](#) [01221](#) [01271](#)

TRIPLE POINT

Temperature: 520 °C °C

Reference: [00454](#)

MELTING POINT

The substance has no melting point at normal pressure.

Reference: [99999](#)

DENSITY

DENSITY

Value: 1,53 g/cm³

Temperature: 25 °C

Reference: [01211](#)

VAPOUR PRESSURE

Vapour pressure: 1,3 hPa

Temperature: 160 °C

Reference: [00454](#)

SOLUBILITY IN WATER

Concentration: 372 g/l

Temperature: 20 °C

Reference: [01211](#)

PARTITION COEFFICIENT (octanol/water)

log Kow: -4,35

Reference: [01231](#)

HAZARDOUS REACTIONS

Decomposition temperature: 350 °C

Thermal decomposition

Humid ammonium chloride decomposes at sublimation.

Hazardous chemical reactions

Risk of explosion in contact with:

chlorine

ammonium nitrate

bromine pentafluoride

bromine trifluoride

hydrocyanic acid

potassium chlorate

nitrites

silver salts/impact

The substance can react dangerously with:

alkali hydroxide

water

alkali carbonates --> release of ammonia

iodine heptafluoride

nitrates

TOXICOLOGY / ECOTOXICOLOGY

TOXICOLOGICAL DATA

LD50 oral rat

Value: 1650 mg/kg

Unknown

Reference: [02071](#)

ECOTOXICOLOGICAL DATA

LC50 Fish (96 hours)

Minimum: 0,08 mg/l

Maximum: 725 mg/l

Median: 7,43 mg/l

Study number: 521

Reference for median:

Broderius, S., R. Drummond, J. Fiandt, and C. Russom 1985. Toxicity of Ammonia to Early Life Stages of the Smallmouth Bass at Four pH Values. Environ.Toxicol.Chem. 4:87-96

LC50 Crustaceans (48 hours)

Minimum: 0,02 mg/l
Maximum: 520 mg/l
Median: 22,1 mg/l
Study number: 94

Reference for median:

Chen, J.C., P.C. Liu, and F.H. Nan 1991. Acute Toxicity of Ammonia to Larval *Metapenaeus ensis*. Asian Fish.Sci. 4(1):41-51; Buikema, A.L.J., B.R. Niederlehner, and J. Cairns Jr. 1981. The Effects of a Simulated Refinery Effluent and Its Components on the Estuarine Crustacean, *Mysidopsis bahia*. Arch.Environ.Contam.Toxicol. 10:231-240

EC50 Crustaceans (48 hours)

Minimum: 35,5 mg/l
Maximum: 180 mg/l
Median: 49,7 mg/l
Study number: 3

Reference for median:

Cesar, A., L. Marin-Guirao, R. Vita, and A. Marin 2002. Sensitivity of Mediterranean Amphipods and Sea Urchins to Reference Toxicants (Sensibilidad de Anfipodos y erizos del Mar Mediterraneo a Sustancias Toxicas de Referencia). Cienc.Mar. 28(4):407-417

Reference: [02072](#)

OCCUPATIONAL HEALTH AND FIRST AID

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

ROUTES OF EXPOSURE**Main routes of exposure**

Occupational exposure to ammonium chloride (A.) is most likely to occur through inhalation of mists or fumes, possibly also of dusts. [7748]

Respiratory tract

No substance-specific information is available. [99998]

Due to the physico-chemical properties of A. and to its decomposition products ammonia and hydrochloric acid, absorption via the respiratory tract should be assumed. The absorption of A. aerosols occurs primarily in the upper respiratory tract on account of the particle size. [7520]

Skin

No substance-specific information is available. [99998]

Due to the physico-chemical properties of A., a low dermal absorption is to be expected. [7520]
Normal working conditions are not expected to result in the uptake of toxicologically relevant amounts of A. through the skin. [99999]

Gastrointestinal tract

In the event of oral intake, A. is effectively absorbed via the digestive tract. [435]

TOXIC EFFECTS**Main toxic effects**

Acute:

marked irritation of eyes, mucous membranes and respiratory tract, mild skin irritation [7520, 99999]

only after high oral doses: acidosis [8101]

Chronic:

irritation of eyes, mucous membranes and respiratory tract, mild skin irritation [7520, 99999]

only after high oral doses: systemic effects with metabolic acidosis and impairment of general well-being [7520, 2077]

Acute toxicity

In workplace conditions, the localised effect of the substance is most salient. [7748]

In a study involving the substance's effect on the eyes of rabbits (comparable to OECD Guideline 405), 50 mg A., introduced as a powder and not washed out, caused reddening of the mucous membranes, chemosis, iritis and corneal opacity and, in one animal, haemorrhage in the eye. All effects were fully reversible within 7 days. In an earlier study, a 1 % solution in the eye of rabbits caused transient hyperaemia that subsided within one day. [7520]

Compared to this, the skin irritant effect of A. is low. In occlusive conditions, 15 minutes of exposure of the skin of rabbits to A. (powder, moistened) followed by rinsing resulted in only slight reddening of the skin, which subsided fully within 8 days. 20 hours of exposure (without rinsing) resulted in more pronounced irritation with redness and swelling, which also subsided within 8 days. In another test, A. (0.5 g in 1 ml water, 24 h exposure) caused transient redness 24 h after the end of exposure, which was undetectable after a further 24 h, resulting in neither oedema nor scab formation.

Comparable effects occurred on superficially injured skin. [7520]

In humans, no evidence of a sensitising effect of A. exists. [99999]

In animal studies, no sensitising effect was observed for A. in two guinea pig maximisation tests comparable to OECD Guideline 406. [7520]

Animal studies have revealed a low dermal toxicity. In a test involving semi-occlusive dermal exposure of rats, mild local irritative effects occurred after 24 hours of exposure to 2000 mg/kg bw, but no clinical symptoms or other signs of systemic toxic effects occurred either during the exposure or in the following days (LD50 > 2000 mg/kg bw). [7520]

It cannot be ruled out that inhalation of A. aerosols may result in irritation of the respiratory tract.

When heated above 300 °C, A. decomposes to form ammonia and hydrogen chloride (in humid air: hydrochloric acid), from which A. is formed again on cooling as fumes or, in humid air, as mists.

[7942] Exposure of mucous membranes of the respiratory tract and the eyes to heated A. must therefore be expected to result in pronounced irritative effects due to the presence of ammonia and hydrogen chloride or of hydrochloric acid. [99999]

Inhalation studies on animals involving nebulised aqueous - and hence undecomposed - solutions of ammonium sulfate, which is toxicologically comparable to A., indicate a low systemic toxicity:

Inhalative exposure of rats to inhalable aerosols (particle diameter 2–3 µm) revealed neither signs of toxic effects nor lethal effects after 8 hours of inhalation at 1000–1200 mg/m³. An LC50 (8 h inhalation, particle diameter 1–3 µm) of more than 900 mg/m³ was reported for guinea pigs. [7520]

Oral ingestion of A. has little toxic effect. At high doses, in addition to local irritation symptoms in the digestive tract, metabolic acidosis should be expected, which in severe cases can lead to nausea, vomiting, restlessness, disturbed reflexes and, in extreme cases, cyanosis and pathological breathing patterns (Kussmaul breathing). A daily intake of 10 g A. to acidify the urine is said to have no acute toxic effect. [8101]

In an animal study in rats conducted in a comparable manner to OECD Guideline 401, oral doses of 1000 mg/kg bw or more resulted in breathing difficulties, apathy, abnormal posture and locomotion, convulsions, atonia, tonic convulsions and bulging eyes (exophthalmos). An LD50 dose of 1410 mg/kg bw was determined. At autopsy, mucosal changes were found to be present in the gastrointestinal tract of deceased animals. No symptoms were observed at 651 mg/kg bw per day. [7520, 2077]

Chronic toxicity

Occupational contact with A. does not appear to pose any significant risk to health. [7748] However, it cannot be ruled out that exposure can result in irritation of the mucous membranes of the eyes and respiratory tract, especially if exposed to smoke, aerosols or, if heated, to the vapours of decomposition products of A. [99999]

Metabolic acidosis and impairment of general health have been described after oral intake of very high doses. In one case, ingestion of 15 g A./day for six months, culminating in 82 g within 48 hours, caused nausea, weakness and hyperventilation in an 18-year-old woman, followed by vomiting, drowsiness, confusion and a comatose state. [2077]

Long-term daily intake of 10 g A. is generally thought to be well tolerated without symptoms. [8101] However, in the case of a 58-year-old woman with impaired kidney function, after taking 6 g A./day for six months, severe metabolic acidosis, shortness of breath and exhaustion occurred, necessitating emergency hospitalisation. [2077]

Animal studies in rats (as per OECD Guideline 408) involving subchronic oral exposure for 13 weeks at 4 % A. in the diet (corresponding to approx. 3370 mg/kg bw per day) resulted in reduced weight gain without signs of systemic toxic effects. No changes occurred at a concentration of 2 % A. in the diet (approx. 1700 mg/kg bw per day)(NOAEL). [2077, 7520]

In another study in rats, 12300 ppm A. in the diet (corresponding to approx. 680 mg/kg bw per day) led to an acidification of the urine to a pH of 6.0 (control: 7.6) and raised concentrations of calcium in the urine after 70 days. Histopathological changes in the stomach, bladder and kidney were not recorded, nor were clinical symptoms or impaired weight development. [7520, 2077]

Reproductive toxicity, mutagenicity, carcinogenicity

Reproductive toxicity:

No substance-specific information is available for humans. [99998]

In an earlier study in pregnant rats, administration of 4.37 g A./l of drinking water (corresponding to 421 mg/kg bw per day) on day 7 to 11 of gestation did not result in impaired weight gain in the dams, impaired embryonic development or teratogenic effects. [7520]

In a screening study on toxicity/reproductive toxicity (as per OECD Guideline 422), male and female rats were administered up to 1500 mg/kg bw per day of diammonium hydrogen phosphate as an aqueous solution via a gastric tube. In pregnant females, weight gain was reduced at the highest dosage of 1500 mg/kg bw per day during the first week of gestation, however no other systemic changes were observed. Impairments of fertility and developmental parameters were not recorded up to the highest dosage. [7520]

Mutagenicity:

A. was established as non-mutagenic in in vitro tests on bacteria in the presence and absence of an exogenous metabolic activation system (S9 mix). Ammonium sulfate, a toxicologically comparable substance to A., is likewise non-mutagenic in the HPRT test on mammalian cells (V79 cells) in the presence and absence of an S9 mix. [7520, 435]

In a test performed on mammalian cells (Chinese hamster lung cells) in the absence of S9 mix, A. had a clastogenic effect (induction of chromosomal aberrations), which was attributed to acidification of the cell culture medium and the ensuing cytotoxic effect. [7520, 435]

In vivo, the micronucleus test in mice (comparable to OECD guideline 476) revealed no clastogenic effect after intraperitoneal administration of a single dose of 500 mg A./kg bw or a dosage of 250 mg/kg bw per day for four consecutive days. [7520, 435]

Carcinogenicity:

Insufficient information is available in humans. [99998]

In animal studies, no carcinogenic effect was observed in rats after administration of feed containing up to 2.1 % A. (corresponding to approx. 1100 mg/kg bw per day) for 30 months, neither in mice administered with 1 % A. in their drinking water for 652 days. [7520]

Biotransformation and excretion

In the body, ammonium ions are both converted to glutamine in a reaction with glutamic acid as well as converted to urea after reaction with bicarbonate ions in the urea cycle in the liver (and to a lesser extent in the kidney). These reactions are key to maintaining normal pH levels in the body.

Absorption of high doses of A. can lead to metabolic acidosis. [8101, 10203]

A. is excreted in the form of ammonium and chloride ions together with the urea formed in the urine. The chloride ions, in particular, are also excreted to a small extent in sweat. [10203, 7520]

Annotation

This occupational health information was compiled on 22.03.2021.

It will be updated if necessary.

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

FIRST AID**Eyes**

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

Arrange medical treatment.

Skin

Remove contaminated clothing while protecting yourself.

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

In case of skin irritation:

Arrange for medical treatment.

[99999]

Respiratory tract

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

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

Arrange medical treatment.

[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 prevent the vomit from penetrating the respiratory tract.

Arrange medical treatment.

[99999]

Information for physicians

- Symptoms of acute poisoning

Eyes: Irritation (redness, iritis, chemosis, corneal opacity and pain possible) [2001, 7520, 99999]

Skin: at the most, mild irritation [7520, 99999].

Inhalation: exposure to aerosols may cause respiratory irritation, exposure to heated ammonium chloride can be expected to cause severe irritation by the decomposition products ammonia and hydrogen chloride / hydrochloric acid: coughing, sore throat, dyspnoea, glottic and pulmonary oedema possible after extensive inhalation [2110, 2001, 99999].

Ingestion: irritation, nausea, vomiting, diarrhoea, systemic effects possible after ingestion of high doses [8101].

Absorption: after high oral doses metabolic acidosis possible with vomiting, headache, restlessness, hyperreflexia, in rare cases up to areflexia, cyanosis, tachypnoea and respiratory disturbance (Kussmaul breathing), cardiac arrhythmia and coma. [2110, 8101, 99999]

- First medical assistance

After eye contact: following eye rinsing, consult an ophthalmologist [99999].

After skin contact: after rinsing with water, no medical measures are usually required, except in the case of skin irritation, which requires symptomatic therapy. [99999]

After inhalation: administration, if necessary, of a short-acting β -2 sympathomimetic spray and inhalation of a muscarinic receptor antagonist such as ipatropium bromide, in the event of glottic oedema tracheostomy and intubation, symptomatic therapy [10014, 99999]

After ingestion: after drinking water, gastroscopy if necessary, inpatient medical monitoring of cardiovascular function, as well as kidney and liver parameters and acid-base balance, symptomatic therapy [8101, 99999]

Recommendations

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

Annotation

This first aid information was compiled on 17.07.2021.

It will be updated if necessary.

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

SAFE HANDLING

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

TECHNICAL MEASURES - HANDLING

Workplace

Provision of good ventilation in the working area.

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.

Unsuitable materials:

Iron

Copper

Aluminium

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.

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

Use a tested industrial vacuum cleaner or suction device.

Do not raise dust while cleaning.

Use of a blower for cleaning is not permitted.

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

TECHNICAL MEASURES - STORAGE

Storage

Do not use any food containers - risk of mistake.

Containers have to be labelled clearly and permanently.

Store in the original container as much as possible.

Keep container tightly closed.

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.

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 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 \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

Foods, beverages and other articles of consumption must not be consumed at the work areas. Suitable areas are to be designated for these purposes.

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

Avoid inhalation of dust.

Avoid contact with clothing. Contaminated clothes must be exchanged and cleaned carefully.

The skin must be washed with soap and water before breaks and at the end of work.

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.

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 personal protective equipment (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.

Special protective equipment

In the case of inclusion in an ambient fire hazardous substances can be released.

Nitrous gases (nitric oxides)

Hydrogen chloride

Wear self-contained breathing apparatus and special tightly sealed suit.

REGULATIONS

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

EUROPEAN GHS CLASSIFICATION AND LABELLING

Classification

Acute toxicity, Category 4, oral; H302

Eye irritation, Category 2; H319



Signal Word "Warning"

Hazard Statement - H-phrases

H302: Harmful if swallowed.

H319: Causes serious eye irritation.

Precautionary Statement - P-phrases

P264: Wash skin thoroughly after handling.

P270: Do not eat, drink or smoke when using this product.

P280: Wear eye protection/face protection.

P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313: If eye irritation persists: Get medical advice/attention.

Manufacturer's specification by Merck

Reference: [01211](#)

State: 2021

Checked: 2022

The substance is listed in appendix VI, table 3 of CLP regulation.

The given classification can deviate from the listed classification, since this classification is to be complemented concerning missing or divergent danger classes and categories for the respective substance.

Reference: [99999](#)

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](#)

Precept label



Use safety goggles

GERMAN WATER HAZARD CLASS

Substance No: 213

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

RESTRICTIONS OF USE / BANS OF USE

REACH Regulation (EC) No 1907/2006 Annex XVII

Annex XVII, Point 65. Inorganic ammonium salts

Shall not be placed on the market, or used, in cellulose insulation mixtures or cellulose insulation articles after 14 July 2018 unless the emission of ammonia from those mixtures or articles results in a concentration of less than 3 ppm by volume (2,12 mg/m³) under the test conditions specified in paragraph 4.

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

Annex XVII, Point 75

Mixtures containing certain hazardous substances shall no longer be placed on the market for tattooing purposes. Mixtures containing such substances in specified concentrations shall no longer be used for tattooing purposes after 04.01.2022. Substances falling within one or more of the following points:

- carcinogenic or reproductive toxic substances according to Part 3 of Annex VI to CLP Regulation (excluding the classification due to effects only following exposure by inhalation),
- skin-sensitising, skin-corrosive, skin-irritant, serious eye-damaging or eye-irritant substances according to Annex VI Part 3 of the CLP Regulation,
- substances listed with specified conditions in Annex II or IV to Regulation (EC) No 1223/2009 [Cosmetics Regulation], and
- substances listed in Appendix 13 to Annex XVII (point 75) of the REACH Regulation.

In general, mixtures placed on the market for use for tattooing purposes must be labelled "Mixture for use in tattoos or permanent make-up." from 04.01.2022 on and may not be used for tattooing purposes without this labelling. Further safety information shall be provided on the packaging or in the instructions for use. Before using a mixture for tattooing purposes, the person using the mixture shall provide this information to the person undergoing the procedure.

Further information on the restrictions, concentration limits and exemptions can be taken from the Regulation.

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

TECHNICAL RULES FOR HAZARDOUS SUBSTANCES

[TRGS 201](#)

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

[TRGS 400](#)

Gefährdungsbeurteilung für Tätigkeiten mit Gefahrstoffen; Ausgabe Juli 2017

[TRGS 555](#)

Betriebsanweisung und Information der Beschäftigten; Ausgabe Februar 2017

[TRGS 600](#)

Substitution; Ausgabe Juli 2020

[TRGS 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 Data Set \(SIDS\)](#)

[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: 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: 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: 01241
GHS-Sicherheitsdatenblatt, Acros Organics (eine Marke von Thermo Fisher Scientific)
GHS Material Safety Data Sheet, Acros Organics (A Thermo Fisher Scientific Brand)

Quelle: 01271
GHS-Sicherheitsdatenblatt, BASF
GHS Material Safety Data Sheet, BASF

Quelle: 02001
International Chemical Safety Cards (ICSC)

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
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Indication of the editor

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