

Ammonium fluoride



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IDENTIFICATION

Ammonium fluoride

Acid ammonium fluoride

Neutral ammonium fluoride

ZVG No: 500000
CAS No: 12125-01-8
EC No: 235-185-9
INDEX No: 009-006-00-8

CHARACTERISATION

SUBSTANCE GROUP CODE

128120 Ammonium salts
133110 Fluorides, hydrogen difluorides

STATE OF AGGREGATION

The substance is solid.

PROPERTIES

deliquescent crystals
white

CHEMICAL CHARACTERISATION

Non-combustible substance.
Freely soluble in water.
Slowly releases ammonia under formation of ammonium hydrogenfluoride (at room temperature).
Acute or chronic health hazards result from the substance.
(see: chapter REGULATIONS).

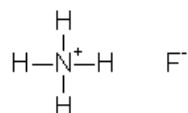
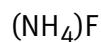
[Substance information in Wikipedia](#)

DUST EXPLOSIVENESS

No risk of dust explosion.

Quelle: [99999](#)

FORMULA

**Molar mass:** 37,04 g/mol

PHYSICAL AND CHEMICAL PROPERTIES

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

MELTING POINT

The substance decomposes when heated (see decomposition temperature).

Reference: [99999](#)

DENSITY

DENSITY

Value: ca. 1,01 g/cm³

Temperature: 20 °C

Reference: [01211](#)

SOLUBILITY IN WATER

Concentration: 820 g/l

Temperature: 20 °C

Reference: [01211](#)

pH-VALUE

pH-value: ca. 6

Temperature: 20 °C

Concentration: 50 g/l

Reference: [01211](#)

HAZARDOUS REACTIONS

Decomposition temperature: ca. 100 °C

Decompositon products

Decomposes already at room temperature with formation of ammonia and ammonium hydrogen fluoride. In the heat:

Ammonia

Nitrous gases

Hydrogen fluoride
fluorides

Hazardous chemical reactions

Risk of explosion in contact with:
bromine trifluoride
chlorine trifluoride

The substance can react dangerously with:
bases
acids

FURTHER INFORMATION

The substance is sublimable.
Decomposed by hot water into ammonia and ammonium bifluoride. Cannot be obtained by evaporation of its aqueous solution.

Reference: 00131

OCCUPATIONAL HEALTH AND FIRST AID

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

ROUTES OF EXPOSURE

Main routes of exposure

During occupational handling the main intake pathways for ammonium fluoride (NH₄F) are via the respiratory tract and via the skin. [7619]

Respiratory tract

In moist air NH₄F exists as crystals which deliquesce easily. [7652] Inhalation is conceivable as an aerosol from solutions rather than from dust. [99999]

The salt is very easily soluble in water and 100% absorption in the respiratory tract is expected. [7619]

The same is expected for vapors from heated NH₄F [99999] which contains ammonia and hydrogen fluoride (HF). [550]

Skin

Valid kinetic studies on the uptake of fluorides through the skin are not available. The dermal LD₅₀ for sodium fluoride (NaF) on rodents was found to be low, so significant absorption through the skin for water soluble fluorides is certainly possible. [7619]

Gastrointestinal tract

Based on investigations carried out with NaF, rapid and almost complete absorption of NH₄F from an empty stomach is assumed. There, the stomach acid increases the hydrolytic formation of HF. Simultaneous intake of food (leading to an increased pH in the stomach) and certain food components (such as calcium, aluminum and magnesium ions), which form complexes with fluoride, can reduce the absorption rate considerably (e.g. to 60 – 70% if a glass of milk or food rich in calcium is consumed). [83]

TOXIC EFFECTS

Main toxic effects

Acute:

Irritation through to corrosion to the mucous membranes and the skin, [421]

Irritation/damage in the gastrointestinal tract, disturbances to the cardiovascular system, muscular system and nervous system, metabolic disturbances [451]

Chronic:

Damage to the bones (skeletal fluorosis) [7619]

Acute toxicity

Information on local irritation caused by NH_4F is not available. [99983]

The salt readily takes up water and in aqueous solution a large amount exists as ammonia and the corrosive ammonium bifluoride. [7652]

For this reason, irritation up to corrosion to the eyes and skin should be assumed, particularly following prolonged contact with solutions of the salt.

Acute, systemic effects could appear following extended contact with the skin. [99999]

This is supported by the low dermal LD_{50} (330 mg/kg bw) found in dermal toxicity tests with NaF on mice. [220]

There are no indications of any skin sensitizing action. [99983]

Following inhalation of NH_4F in the form of dust or aerosols, irritation and corrosion are expected on the mucous membranes in the nose, mouth and throat and also in the deeper airways. Following massive inhalative impact, damage to the lung could result. [22]

Vapors released by heated NH_4F are particularly dangerous because they contain the corrosively acting HF. Systemic effects are also possible following massive inhalation. [99996]

Unintentional swallowing of consumer products containing NH_4F has caused several deaths. The symptoms were not described in detail [451] but they should be similar to those caused by NaF and these are known from numerous cases of poisoning: [99999] High doses can immediately cause massive irritation in the mouth, throat, esophagus (burning, pain, difficulty in swallowing) and in the gastrointestinal tract (nausea, vomiting, abdominal pain, diarrhea; [7798] gastritis/hemorrhagic gastroenteritis).

Soon, fluoride specific symptoms appear: significant disturbance to the metabolism (hypocalcemia, hyperkalemia, disturbances to enzyme activities) with serious disturbances to the cardiovascular system (hypotension, arrhythmia, ventricular fibrillation), in the muscle and nervous system (pain in the extremities, headache, paresthesia, tremor, tetaniform cramps, danger of respiratory paralysis). Further typical symptoms are salivation, thirst, dyspnoea, cyanosis. [7978]

Based on cases of poisoning with NaF, the lowest toxic dose is estimated to be about 5 mg fluoride/kg bw. The lethal dose for adults is about 30 – 64 mg fluoride/kg bw. [7619]

As fluoride from NH_4F tends to be more readily bio-available than fluoride from NaF, the assessment should also be valid for the ammonium salt. [99999]

Chronic toxicity

Workplace studies specifically on exposure to KF or NaF are not available. [99983]

Experience has shown that, irrespective of the composition of the rest of the molecule, the critical effect resulting from long-term, occupational overexposure to fluorides is an accumulation of fluoride in the bones, leading to an increased risk of skeletal fluorosis. [7619]

This results in increased bone density/hardness through to a reduction in the mechanical resilience (increased tendency to break bones) and to hardening of the skeleton (osteosclerosis, calcifying of the tendons). Subjective complaints resemble those of rheumatic illness with pain and stiffening of the joints. [83]

Reported cases of occupationally related fluorosis were mostly following exposure to mixtures from soluble and gaseous fluorides. The exposure was mostly described as being to an (unspecified) total impact with fluoride. Skeletal fluorosis was found in workers who were exposed to concentrations higher than 2.4 – 6 mg/m³ or 3.4 mg/m³ for 10 years or more. [7619]

Based on knowledge from epidemiological studies, particularly on persons who received fluoride in their drinking water, a total intake of 14 mg fluoride/day long-term leads to skeletal fluorosis. The threshold at which changes to the bones occur is thought to be lower than this but this could not be definitely verified. [83]

Exposure up to about 1 mg fluoride/m³ is estimated not to result in any increased risk of fluorosis in workplaces.

As fluoride mixtures and HF did not cause any irritation up to this concentration, this exposure level is also considered to be tolerable for local irritative effects. [7619]

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).

[99983]

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.

[7619]

Based on valid animal experiments with NaF, disturbances to fertility only result at concentrations which already cause systemic effects. [83]

Mutagenicity:

NaF was used to test the effects caused by soluble fluorides. This salt did not show any mutagenic effect on bacteria but in-vitro tests on mammalian cells and some in-vivo tests on clastogenic effects provided inconsistent results. The data available do not allow a final assessment of the mutagenic potential of fluorides.

Carcinogenicity:

Epidemiologic studies on persons with increased fluoride exposure via drinking water and nutrition or through occupational exposure did not provide any indication that fluorides cause carcinogenic effects. Nevertheless, not all tumor illnesses have been investigated.

Oral carcinogenicity tests with NaF on rats and mice did not provide any clear results.

Further tests are needed to provide a final assessment. [7619]

Biotransformation and excretion

Once absorbed, fluoride is distributed rapidly throughout the organs. For adults, approximately 50% is excreted rapidly and most of the elimination takes place via the urine within 24 hours. Small amounts are excreted via other paths (feces, sweat, saliva). Almost all (99%) of the part remaining in the body is stored in the bones and in the teeth. There fluoride is exchanged for the hydroxyl groups in the carbonate-apatite-structure. At least part of the fluoride bound here can be mobilized and excreted. [83]

The half-life for the elimination from the bones was stated to be 8 – 20 years. [7619]

During long term constant exposure to fluoride, the amount found in the urine and in the plasma corresponds to the current exposure. After occupational exposure ceases, the amount remaining in the body could be higher than what would be expected from the current level of exposure because of the slow mobilization of the part in the bones. [7620]

Annotation

This occupational health information was compiled on 18.01.2008.

It will be updated if necessary.

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.

[80105]

Skin

Remove contaminated clothing while protecting yourself.

Immediately rinse the affected skin areas with running water thoroughly.

Then apply calcium gluconate gel (2.5%) and rub it in gently in order to bind fluoride ions.

If calcium gluconate gel is not available, apply compresses soaked with 10% calcium gluconate solution.

Arrange for medical treatment.

Following contact over a large area call a physician to the site of the accident.

[80105]

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.
As soon as possible repeatedly have the casualty deeply breath a glucocorticoid inhalation spray in.
In the case of breathing difficulties have the casualty inhale oxygen.
Arrange medical treatment.
A particularly high risk consists in the inhalation of vapors from the hot substance (release of HF!).
[22]

Swallowing

Rinse the mouth and spit the fluids out.
I m m e d i a t e l y: have the casualty drink 1 - 4 drinking ampules "frubias calcium T" or 1% calcium gluconate solution in small sips (if not available: milk or a suspension of powdered chalk as alternatives or otherwise water).
Lay the casualty down in a quiet place and protect him against hypothermia.
Always call a physician to the site of the accident.
During spontaneous vomiting hold the head of the casualty low with the body in a prone position in order to avoid aspiration.
[80105, 7978, 99999]

Information for physicians

Ammonium fluoride taken in orally has caused fatal poisoning in several cases. The poisoning picture should essentially correspond to that of sodium fluoride. [454]
No information is available on poisoning cases from inhalative exposure or consequences from contact with the eyes or skin. [99983] Irritation up to corrosion is expected because the salt dissolved in water reacts to form ammonia and ammonium hydrogen difluoride. [22]

- Symptoms of acute poisoning:

Eyes: irritation, ischemia, opacity of the cornea, stromatic edema; deep (irreversible) damage can become only noticeable after a prolonged latency period [7979]

Skin: following short-term contact, probably only moderate irritation (dependent on the skin moisture); following prolonged contact, increasing danger of deep corrosion (after a latency period); [99999] following massive/extensive contact, absorptive-toxic effects possible (irrespective of whether irritation becomes noticeable) [7619]

Inhalation: irritation to the nose and throat and lower airways, following massive inhalation (in particular of vapors), danger of serious damage to the lungs, possibly also systemic effects [22]

Ingestion: burning sensation and pain in the mucous membranes, salivation, difficulty in swallowing, numbness, nausea, vomiting, diarrhea, [99983] possibly hemorrhagic gastroenteritis; [7978] absorptive toxic effects within 1 (up to 5) h.

Absorption: salivation, perspiration, nausea, severe thirst, [8101] muscular weakness and pain, paresthesia, visual disturbances, [7798] headache, tremor, somnolence -> coma, tetaniform cramps; hypotension, rhythm disturbances (ventricular tachycardia, ventricular fibrillation); respiratory insufficiency; metabolic disturbances (hypocalcemia, hyperkalemia, dehydration, coagulation defects and changes to the activity of enzymes). [7978]

- Medical advice:

Following contact with the eyes, prompt and continuous rinsing with water is the most important measure. [80105, 99997] Isotonic sodium chloride solution or ringer's solution is recommended for continued rinsing. Rapidly arrange further treatment by an ophthalmologist (who should apply corticosteroids and antibiotics). [99997]

Following contact of ammonium fluoride with the skin, subdermal injection of calcium gluconate, which is disagreeable and expensive for the patient, is probably not necessary. [99997] Instead: gently massage in calcium gluconate (even if the patient is pain-free), then apply an ointment containing glucocorticoids. [80105] Systemic administration of glucocorticoids and a prophylaxis for tetanus can become necessary in addition. Following extensive and prolonged skin contact, the concentration of calcium ions in the blood must frequently be checked because of the absorptive-toxic effects. [7978]

Following inhalative exposure, prophylactic measures for pulmonary edema should be continued, also administer antibiotics thereafter. If vapors (HF) were released and inhaled, in addition inhalation of 2.5 - 3% calcium gluconate solution in physiological saline using a nebulizer is recommended. Observe the cardiovascular functions, further treatment according to symptoms (see below). Rapidly arrange hospitalization. [80105]

Following ingestion of toxic doses (>5 mg fluoride/kg bw), empty the stomach as soon as possible: induce vomiting considering usual precautions or better immediately carry out gastrolavage with 1% calcium gluconate solution. [7978] Subsequently instill 40 g calcium gluconate into the stomach and leave it in. [80105] Endoscopy can become necessary in dependence on the ingested dose and gastrointestinal symptoms. [7978]

Further treatment should be carried out symptomatically: for hypotension/shock, infusion of physiological saline solution with 5% fructose or dextrose and supplements corresponding to the current parameters of the water and electrolyte balance. For facial signs or Trousseau's signs or for cramps, very slowly inject calcium gluconate intravenously. This treatment should be oriented at signs of recovery or on the level of electrolytes in the blood.

Artificial ventilation with supplementary oxygen as necessary. [8101]

Irregular heartrhythm (check by monitoring) can require infusion of lidocaine, 2 - 4 mg/min or defibrillation. In this case, the electrolytes must be monitored particularly carefully.

Hemodialysis can become necessary in particular for renal insufficiency.

Even if there is (still) a lack of poisoning symptoms, the following parameters should be checked frequently: functions of the cardio-vascular and respiratory system, electrolytes, arterial blood gases, blood glucose, creatinine, urea nitrogen and coagulation status. [7978]

Recommendations

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

The following materials should be kept available in workplaces: above-mentioned calcium gluconate preparations (detailed formulas available in pharmacies), a glucocorticoid inhalation spray and drinking ampules of "frubiase calcium T". [80105, 99997]

The use of calcium gluconate for rinsing the eyes is no longer recommended, because of possible calcification in the corneal stroma. Under no circumstances should rinsing solutions containing phosphates be used on the eyes as these bind calcium ions. [99997]

If poisoning is suspected, fluoride concentrations in the plasma should be determined in order to estimate the dose absorbed, although the result does not allow safe conclusions to be drawn on the severity of poisoning and the chance of survival.

Case reports describe lethal outcomes as a consequence of 6.6 µg/ml but up to 14 µg/ml has been survived in other cases. [7978]

Annotation

This first aid information was compiled on 15.07.2015.

It will be updated if necessary.

OCCUPATIONAL HEALTH CHECK

Prophylaxis offer: Occupational medical prevention has to be offered when, conducting activities with this substance, an exposure cannot be excluded.

Obligatory prophylaxis: The employer shall arrange occupational medical prophylaxis if, exerting activities with this substance, the occupational exposure limit value is exceeded or skin contact cannot be excluded.

Deadlines: Employees may exert activities with this substance only after participation in obligatory prophylaxis. Prophylaxis offer has to be made prior to taking up work. Deadlines for the inducement or proposal of regularly recurrent occupational medical prevention are to gather from the Occupational Health Rule (Arbeitsmedizinische Regel) "[AMR Nummer 2.1](#)".

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 very good ventilation in the working area.

The floor has to be fluoride resistant.

Washing facility at the workplace required.

When handling excessive amounts of the substance an emergency shower is required.

Equipment

Use only closed apparatus.

If dangerous pressure can arise from contact with heat, suitable safety measures and equipment should be provided.

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:

Glass

Siliceous materials

Metals are attacked under formation of hydrogen but most are passivated by the ensuing fluoride layer.

Advice on safer handling

Take care to keep workplace clean and dry.

The substance must not be present at workplaces in quantities above that required for work to be progressed.

Do not leave container open.

Use leak-proof equipment with exhaust for refilling or transfer.

If necessary transport with/using dry gas.

Avoid spillage.

Fill only into labelled container.

Avoid any contact when handling the substance.

Avoid rising dust.

Use an appropriate exterior vessel when transporting in fragile containers.

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.

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

TECHNICAL MEASURES - STORAGE

Storage

Keep in locked storage or only make accessible to specialists or their authorised assistants.

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.

Place fragile vessels in break-proof outer vessels.

Keep container tightly closed.

Store in a cool place.

Store in a dry place.

Keep container in a well-ventilated place.

Conditions of collocated storage

Storage class 6.1 D (Not combustible, acutely toxic Cat. 3 or chronic effecting substances)

Only substances of the same storage class should be stored together.

Collocated storage with the following substances is prohibited:

- Pharmaceuticals, foods, and animal feeds including additives.
- Infectious, radioactive und explosive substances.
- Gases.
- Other explosive substances of storage class 4.1A.
- Strongly oxidizing substances of storage class 5.1A.
- Ammonium nitrate and preparations containing ammonium nitrate.
- Organic peroxides and self reactive substances.

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

- Flammable liquids of storage class 3.
- Flammable solid substances or desensitized substances of storage class 4.1B.
- Pyrophoric substances.
- Substances liberating flammable gases in contact with water.
- Oxidizing substances of storage class 5.1B.

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.

An escape and rescue plan must be prepared when the location, scale, and use of the work-site so demand.

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.

The number of employees who work with the hazardous substance must be kept to a minimum.

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

Observe the restrictions on activities of pregnant women according to the the „Mutterschutzgesetz“ (German Maternity Protection Act)

Only employees are permitted to enter the work areas. Signposting to this effect must be displayed.

PERSONAL PROTECTION**Body protection**

Depending on the risk, wear a suitable protective clothing or a suitable chemical protection suit.

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 P3, 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 should be worn.

Wear glasses with side protection.

Hand protection

Use protective gloves. The glove material must be sufficiently impermeable and resistant to the substance. Check the tightness before wear. Gloves should be well cleaned before being removed, then stored in a well ventilated location. Pay attention to skin care.

Skin protection cremes do not protect sufficiently against the substance.

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

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 skin. In case of contact wash skin.

Avoid inhalation of dust.

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

Before a break it might be necessary to change clothes.

Provide washrooms with showers and if possible rooms with separate storage for street clothing and work clothing.

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:

Inorganic fluoride solutions must be handled with great care. Avoid any contact and only work with it in a powerful hood with a closed front panel. Residuals dissolved in water can precipitate as calcium fluoride. Place precipitate in collecting container for inorganic solids. Place filtrates in collecting containers for salt solutions (pH 6-8) or in collecting containers for toxic inorganic residuals and heavy-metal salts and their solutions.

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.

Render harmless: Treat with a mixture of lime in sodium carbonate solution (precipitation as calcium fluoride).

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.

Hydrogen fluoride

Ammonia

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

REGULATIONS

[GHS Classification/Labelling](#) | [Workplace labelling](#) | [Water hazard class](#) | [Air quality control](#) | [Transport Regulations](#) | [Threshold limit values](#) | [EC-Threshold limit values](#) | [MAK recommendations](#) | [Biological exposure indices](#) | [SevesoIII](#) | [Restriction of use](#) | [Technical rules](#) | [Regulations of accident insurers](#) | [Occupational health check](#)

EUROPEAN GHS CLASSIFICATION AND LABELLING

Classification

Acute toxicity, Category 3, oral; H301
Acute toxicity, Category 3, dermal; H311
Acute toxicity, Category 3, inhalation; H331



Signal Word "Danger"

Hazard Statement - H-phrases

H301+H311+H331: Toxic if swallowed, in contact with skin or if inhaled.

Precautionary Statement - P-phrases

P261: Avoid breathing dust/fume/gas/mist/vapours/spray.

P264: Wash skin thoroughly after handling.

P280: Wear protective gloves/protective clothing.

P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P302+P352+P312: IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or doctor if you feel unwell.

P304+P340+P311: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician.

Manufacturer's specification by Merck

Reference: [01211](#)

State: 2022

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](#)

Prohibition label



No Smoking



No admittance for unauthorized persons



No eating and
drinking

Warning label



Caution - toxic
material

Precept label



Use safety goggles



Wear safety
gloves

GERMAN WATER HAZARD CLASS

Substance No: 291

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 5.2.2 Inorganic dusts

Class III

Also with the presence of several substances of the same class, the following values are in all not allowed to be exceeded in the exhaust gas:

Mass flow: 5 g/hr

or

Mass conc.: 1 mg/m³

Specified as F.

Scope: highly soluble fluorides.

TRANSPORT REGULATIONS

UN Number: 2505

Shipping name: Ammonium fluoride

Hazard Identification Number: 60

Class: 6.1 (Toxic Substances)

Packing Group: III (low danger)

Danger Label: 6.1



Classification code: T5

Tunnel restrictions:

Passage forbidden through tunnels of category E.

Reference: [07902](#)

TRGS 900 - GERMAN OCCUPATIONAL EXPOSURE LIMIT VALUES

1 mg/m³

with reference to the inhalable fraction

Peak limitation: Excursion factor 4

Duration 15 min, mean; 4 times per shift; interval 1 hour

Category II - Substances with systemic effects

Risk of percutaneous absorption

There is no reason to fear a risk of damage to the developing embryo or foetus when AGW and BGW are adhered to.

Source: EU, DFG

Scope:

Fluorides

calculated as fluorine

EC OCCUPATIONAL EXPOSURE LIMIT VALUES

Directive 2000/39/EC

Recommended indicative occupational exposure limit value for the European Union

A national occupational exposure limit value has to be set.

Scope: Fluorides, inorganic

8 hours limit value: 2,5 mg/m³

RECOMMENDATIONS OF MAK-COMMISSION

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

1 mg/m³

with reference to the inhalable fraction

Peak limitation: Excursion factor 4

Duration 15 min, mean; 4 times per shift; interval 1 hour

Category II - Substances with systemic effects

Risk of percutaneous absorption

Pregnancy: Group C

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

Fluorides, calculated as fluorine

GERMAN BIOLOGICAL EXPOSURE INDICES

Parameter: Fluoride

Value: 4 mg/l

Assay material: Urine

Sampling time: end of exposure/end of shift
HF and inorganic Fluorine compounds

Reference: [05347](#)

DIRECTIVE 2012/18/EU (Seveso III)

The substance is subject to the hazard categories of the Hazardous Incident Ordinance:

H2 Acute toxic, Category 2 (all exposure routes) or Category 3 (inhalation exposure route) or Category 3 (oral route if neither acute inhalation toxicity classification nor acute dermal toxicity classification can be derived)

Quantity thresholds for determination of operation scopes:

Annex I Part 1 Section: H2

Acute toxic

Qualifying quantity for the application of

Lower-tier requirements: 50 t

Upper-tier requirements: 200 t

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 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 402](#)

Ermitteln und Beurteilen der Gefährdungen bei Tätigkeiten mit Gefahrstoffen: Inhalative Exposition; Ausgabe September 2023

[TRGS 401](#)

Gefährdung durch Hautkontakt, Ermittlung - Beurteilung - Maßnahmen; Ausgabe Oktober 2022

[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 Guideline 350-001 (BGG 904): Guidelines for occupational medical examinations

G 34 : Fluorine and its inorganic compounds

[DGUV Regel 112-190](#)

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

LINKS

[International Limit Values](#)

[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: 00022

G. Hommel

"Handbuch der gefährlichen Güter" Loseblattsammlung mit Ergänzungslieferungen

"Handbook of dangerous goods " loose-leaf collection with supplement deliveries

Springer-Verlag, Heidelberg

Quelle: 00083

Environmental Health Criteria (Serie), WHO, Genf

Quelle: 00131
The Merck-Index; 14th Edition 2006

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: 00421
CHEMpendium; Canadian Center for Occupational Health and Safety

Quelle: 00451
HSDB-Datenbankrecherche 2004

Quelle: 00454
Hazardous Substances Data Bank (HSDB)

Quelle: 00550
Ullmann's Encyclopedia of Industrial Chemistry, 7th edition, release 2003

Quelle: 01211
GHS-Sicherheitsdatenblatt, Merck
GHS Material Safety Data Sheet, Merck

Quelle: 05200
Kühn-Birett "Merkblätter Gefährliche Arbeitsstoffe" Loseblattsammlung mit Ergänzungslieferungen, ecomed Sicherheit, Landsberg

Quelle: 05300
[TRGS 510](#) "Lagerung von Gefahrstoffen in ortsbeweglichen Behältern" Ausgabe Dezember 2020

Quelle: 05347
[TRGS 903](#) "Biologische Grenzwerte (BGW)" Ausgabe Februar 2013; zuletzt geändert Juni 2023

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: 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: 07620
DFG: Arbeitsmedizinisch-toxikologische Begründungen von BAT-Werten; Verlag Chemie

Quelle: 07635
AUERDATA 98

Quelle: 07652
H. Remy "Lehrbuch der anorganischen Chemie" 10. Auflage, Akademische Verlagsgesellschaft Geest & Portig KG, Leipzig 1960

Quelle: 07727
L. Roth "Gefahrstoff-Entsorgung" Loseblattsammlung mit Ergänzungslieferungen, ecomed-Verlag, Landsberg

Quelle: 07795

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

Quelle: 07798

M.J. Ellenhorn, D.G. Barceloux "Medical Toxicology, Diagnosis and Treatment of Human Poisoning"
Elsevier Science Publishing Company, Inc., New York 1988

Quelle: 07902

BAM: Datenbank [Gefahrgut-Schnellinfo](#)

Quelle: 07978

Klaus Albrecht: Intensivtherapie akuter Vergiftungen; Verlag Ullstein-Mosby; Berlin 1997

Quelle: 07979

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

Quelle: 08101

Reinhard Ludewig, Ralf Regenthal:
Akute Vergiftungen und Arzneimittelüberdosierungen,
11. Auflage,
Wissenschaftliche Verlagsgesellschaft Stuttgart, 2015

Quelle: 08112

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

Quelle: 80105

DGUV Information 213-071

Fluorwasserstoff, Flußsäure und anorganische Fluoride (Merkblatt M 005 der Reihe "Gefahrstoffe"),
Stand 12/2018

Quelle: 99983

Liste arbeitsmedizinisch-toxikologischer Standardwerke (2)
List of standard references regarding occupational health and toxicology (2)

Quelle: 99996

Projektgebundene arbeitsmedizinisch-toxikologische Literatur (2)
Project related bibliographical references regarding occupational health and toxicology (2)

Quelle: 99997

Projektgebundene arbeitsmedizinisch-toxikologische Literatur (1)
Project related bibliographical references regarding occupational health and toxicology (1)

Quelle: 99999

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