Hexafluorosilicic Acid

This Safety Data Sheet contains information concerning the potential risks to those involved in handling, transporting and working with the material, as well as describing potential risks to the consumer and the environment. This information must be made available to those who may come into contact with the material or are responsible for the use of the material.

Section 1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Substance name:	Hexafluorosilicic acid, solution 22 – 25%
Chemical Name:	Hexafluorosilicic acid
CAS Number:	16961-83-4
CAS Name:	Silicate(2-), hexafluoro-, dihydrogen
EINECS Number:	241-034-8
Index Number:	Not available
Chemical Constituent:	Monoconstituent, inorganic
REACH Registration No.:	**01-2119488906-19-0000**
UFI #	**K020-E06K-500X-1QDK**

1.2 Relevant identified uses of the substances or mixture and uses advised against

M – Manufacture.
F – Formulation: Industrial distribution / Industrial formulation to formulate chemical product mixtures.
I – Industrial uses: mineral acidification; metal surface treatment; reactive agent in cleaning products; Water treatment (fluoridation), fluoridation of cleaning agents; manufacture of chemicals; agent in manufacture of basic metals; Laboratory agent.
P – Professional uses: reactive agent/processing aid and for general chemical applications.
C – Consumer uses: use of fluorinated drinking water; use of fluorinated washing and cleaning products.

Uses advised against: Not determined.

1.3 Details of the supplier of the safety data sheet

Manufacturer:

Company name:	AGROPOLYCHIM AD
Address:	BULGARIA, 9160 DEVNYA INDUSTRIAL ZONE
Contact person:	Miroslava Tsvetkova, dipl. eng. e-mail: m.tsvetkova@agropolychim.bg tel.:+359 / 519 97 419, mob.:+359 / 885 897 661

1.4 Emergency telephone numbers

In case of emergency:

Country	Contact Number	Specific Information
Bulgaria: National center for Prevention and Treatment of Intoxications; Medical Institute Pirogov, Sofia	+359 2 9154 233; +359 2 9154 409	Available 7 days a week, 24 hours a day
Hungary: Emergency National Toxicology (TOXINFO)	+36 706 376 986	Available 7 days a week, 24 hours a day
European emergency #	112	Available 7 days a week, 24 hours a day

Section 2. Hazards Identification

2.1 Classification of the substance or mixture

2.1.1 Classification according to Regulation (EC) No 1272/2008 (CLP)

Skin Corr. 1B H314

2.1.2 Additional information:

For full text of hazard statements – see Section 16.

2.2 Label elements

Signal word: Danger

Hazard pictogram:

GHS05: corrosion

Hazard Statements

H314 Causes severe skin burns and eye damage

Precautionary statements:

P260 Do not breathe dust/fumes/gas/mist/vapours/sprays.
P301+P330+P331 IF SWALLOWED: rinse mouth. Do not induce vomiting.
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405 Store locked up.

2.3 Other hazards

PBT / vPvB:	Not considered to be a PBT, vPvB
Endocrine disrupting properties:	This substance does not have endocrine disrupting properties in relation to non-target organisms, as it does not meet the criteria set out in Section B of Regulation (EC) № 2017/2100.
Nanoforms:	This product does not contain nanoforms or nanoform-containing substances.

Section 3. Composition / information on ingredients

Name	CAS Number	EINECS Number	% (w/w)	REACH Registration No.	Classification according to Regulation (EC) No. 1272/2008	SCL- specific concentration limits
Hexafluorosilicic Acid	16961-83-4	241-034-8	22 - 25	01-2119488906-19-0000	H314 - Skin Corr. 1B.	Boundary composition (HF containing) <0,25%
Water	7732-18-5	231-791-2	75 - 78	n. a.	n. a.	

See section 16 for full description of the text of each classification.

Section 4. First Aid Measures

4.1 Description of first aid measures

Inhalation
Fresh air, rest. Half-upright position. Refer for medical attention.
Ingestion
Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.
Skin contact
Remove contaminated clothes. Rinse skin with plenty of water or shower. Immediately refer for medical attention.
Eye contact
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then consult a doctor.

4.2 Most important symptoms and effects, both acute and delayed

No reliable data are available. The **acute** oral, dermal and inhalation toxicity is likely to be dominated by local (site of contact) effects as a consequence of the corrosivity of the substance. Further testing was waived based on GLP Regulation Annex VII, column 2 specific rules of adaptation of 18 December 2006.

No data on skin sensitisation are available. The substance is classified as corrosive. There are no reports of skin sensitisation (**delayed contact** hypersensitivity) resulting from human exposure to the substance; effects are dominated by local irritation.

4.3 Indication of any immediate attention and special treatment needed.

Treat symptomatically.

Section 5. Firefighting Measures

5.1 Extinguishing media

In case of fire in the surroundings: use appropriate extinguishing media.
Suitable media may include water spray, dry chemical, fog or foam. There are no restrictions on fire-fighting media.

5.2 Special hazards arising from the substance or mixture

When heated to decomposition (105 ^{0}C), it emits highly toxic and corrosive fumes of Hydrogen Fluoride, Silicon Tetrafluoride and Hydrogen gas.

5.3 Advice for fire-fighters

Firefighting instructions:
In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.
Protection during firefighting:
Wear gas tight chemically protective clothing in combination with self-contained breathing apparatus. For further information refer to section 8: "Exposure controls/personal protection".

Section 6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

General measures:
Evacuate unnecessary personnel. Ensure adequate air ventilation. Do not breathe gas, fumes, vapor or spray.
For non-emergency personnel:
Only qualified personnel equipped with suitable protective equipment may intervene.
For emergency responders:
Protective equipment: Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".
Emergency procedure: Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.

6.2 Environmental precautions

Do not allow any release to waterways, watercourses, drains and municipal sewers. If the product contaminates rivers and lakes, inform respective authorities.

6.3 Methods and materials for containment and cleaning up

For containment: Stop leak if safe to do so. Dike for recovery or absorb with appropriate material.

Methods for cleaning up: Take up large spills with pump or vacuum and finish with dry chemical absorbent. Use explosion-proof equipment. Take up small spills with dry chemical absorbent. Sweep or shovel spills into appropriate container for disposal. Ventilate area.

6.4 Reference to other sections

For disposal of solid materials or residues refer to section 13: "Disposal considerations".

Section 7. Handling and Storage

7.1 Precautions for safe handling

Tanks should be vented and fitted with an overflow pipe. Tanks should be bunded to contain spillage. For smaller packages double skinned HDPE plastic containers are acceptable. Submerged loading should be preferred to avoid splashing.

7.2 Condition for safe storage, including any incompatibilities

Technical measures:	Comply with applicable regulations.
Storage conditions:	Keep container closed when not in use.
Incompatible materials:	Refer to Section 10 on Incompatible Materials.
Storage area:	Store in dry, cool, well-ventilated area.

7.3 Specific end use(s)

No further details

Section 8. Exposure Controls/Personal Protection

8.1 Control parameters

Hexafluorosilicic acid, aqua solution: c.a. 24%

DNEL derivation:
The SCOEL have recommended (1998) **IOEL values of 1.5 mg/m3 (8-hour TWA as F-**) and **2.5 mg/m3 (15-minute STEL as F-) for HF** (SCOEL/SUM/56 final December 1998). They concluded that the 8-hour TWA was sufficient to protect against systemic effects (fluorosis) and that the STEL value was adequate to limit peaks of exposure which could result in irritation. Based upon the study of Largent and Columbus (1960), conducted in volunteers exposed for 6 h/d for 10-50d, a STEL (15 mins) of 3 ppm (2.5 mg/m3 as F-) was proposed for hydrogen fluoride to limit peaks in exposure which could result in irritation.

Following the same approach for hexafluorosilicic acid, on the basis that local irritant effects will be caused by the generation of HF and systemic toxicity by the liberation of fluoride; correcting for F-content results in following values

- Long term (8h): 1.5 mg/m3 as F- corresponds with 1.58 mg/m3 as HF, which leads to a ‘target’ TWA of 1.2 x 1.58 mg/m3 = 1.89 mg/m3

- Short term (15’): 2.5 mg/m3 as F- corresponds with 2.625 mg/m3 as HF, which leads to a ‘target’ STEL of 1.2 x 2.63 mg/m3 = 3.15 mg/m3

Hazard conclusions for the general population:

Route	Type of effect	Hazard conclusion	Most sensitive endpoint
Inhalation	Systemic effects - Long-term	DNEL (Derived No Effect Level) 0.04mg/m³	repeated dose toxicity
Inhalation	Systemic effects - Acute	DNEL (Derived No Effect Level) 0.04mg/m³	repeated dose toxicity
Inhalation	Local effects - Long-term	DNEL (Derived No Effect Level) 0.95mg/m³	irritation (respiratory tract)
Inhalation	Local effects - Acute	DNEL (Derived No Effect Level) 1.58mg/m³	irritation (respiratory tract)
Dermal	Systemic effects - Long-term	medium hazard (no threshold derived)	skin irritation/corrosion
Dermal	Systemic effects - Acute	medium hazard (no threshold derived)	skin irritation/corrosion
Dermal	Local effects - Long-term	medium hazard (no threshold derived)	skin irritation/corrosion
Dermal	Local effects - Acute	medium hazard (no threshold derived)	skin irritation/corrosion
Oral	Systemic effects - Long-term	DNEL (Derived No Effect Level) 0.013mg/kg bw/day	repeated dose toxicity
Oral	Systemic effects - Acute	DNEL (Derived No Effect Level) 0.013mg/kg bw/day	repeated dose toxicity
Eyes	Local effects	medium hazard (no threshold derived)	

DNEL for systemic effects:

An **inhalation DNEL** for the general public can be derived by the application of an additional assessment factor of 2 to take into account potential additional intra-species variation (factor 10 instead of factor 5) and an additional factor of 2 to take into account relative breathing rates and the duration of exposure (20 m3/day instead of 10 m3/8h). This results in a **target long term DNEL of 0.47 mg/m3**. However the potential fluoride exposure resulting from this DNEL **is equivalent to 9.4 mg/day (20 m3 x 0.47 mg/m3), which slightly exceeds the upper tolerable daily intake of 3 mg fluoride** (EFSA, 2013),

corresponding to **target general population DNEL of 1.26 x 3 mg/day = 3.78 mg/day**. The latest acceptable intake of fluoride (AI) from all sources (including non-dietary sources) is 0.05 mg/kg body weight per day for both children and adults, including pregnant and lactating women. For adults of 60kg, this would be 3.0 mg/day (as F-). Major dietary fluoride sources are water and water-based beverages or foods reconstituted with fluoridated water, tea, marine fish, and fluoridated salt. The average total dietary fluoride intake of the adult population in the UK was to be 1.2-1.78 mg/day. Taking into account these other sources (including tooth paste), **it is recommended to reduce the general population DNELS to 20% of the EFSA AI (0.6 mg/day) , leading to a 'target' AI of 0.1.26 x 0.6 mg/day = 0.76 mg/day**.

DNEL for local effects:

The critical local effect for **short-term and long-term dermal exposure is irritation / corrosion**, **however this cannot be quantified and therefore a DNEL is not derived**. Dermal exposure to HFS acid of the general public is not expected and, in any case, must be minimised by the use of protective equipment.
The critical local effect of inhalation exposure to HFS acid is respiratory tract irritation. **The EU IOEL value for HF of 2.5 mg/m3 F- (3 ppm)** was derived based on the results of the volunteer study of Largent & Columbus (1960) to limit peaks in exposure which could result in irritation. The application of an additional assessment factor of 2 to consider potential additional intra-species variation in the exposed general population is considered to be appropriate. **This approach results in a DNEL (short-term, local, inhalation) of 1.5 ppm (1.25 mg/m3 as F; 1.58 mg/m3 HFS acid). For the DNEL Local effect – long term, the 8-h TWA based value was used: IOEL (SCOEL, 1998): 1.5 mg/m3 (8-hourTWA as F-) ≈ 1.58 mg/m3 HF, leading to a 'target' TWA of 1.2 x 1.58 mg/m3= 1.89 mg/m3.Application of an extra intraspecies factor (10/5) of 2 leads to 1.89 mg/m3/2 = 0.95 mg/m3.**

8.2 Exposure controls

8.2.1 Appropriate engineering controls
Ensure appropriate exhaust ventilation of the workstation. Facilities are housed outdoors and not close to buildings. The integrity of the enclosed processes are fully monitored. Ensure that primary emission sources are not located in the breathing zone of the worker. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

8.2.2 Individual protection measures, such as personal protective equipment
Respiratory protection
- In the case of dust or aerosol formation use respirator with an approved filter.
- Self-contained breathing apparatus in medium confinement/insufficient oxygen/in case of large uncontrolled emissions/in all circumstances when the mask and cartridge do not give adequate protection.
- Use only respiratory protection that conforms to international/ national standards.
- Use NIOSH approved respiratory protection.

Hand skin protection
- Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).
- Protective gloves - impervious chemical resistant: Gloves APF 10 (90%).
- Suitable material: butyl-rubber

Eye protection
Face shield or eye protection in combination with breathing protection.
Skin and body protection
- Chemical resistant apron
- If splashes are likely to occur, wear: butyl-rubber; - boots; - do not wear leather shoes.

8.2.3 Environmental exposure control

Usually and with the largest amount, Hexafluorosilicic acid is a by-product from the reaction between Fluorapatite and Sulphuric acid during Phosphoric acid production.

The reaction produces Hydrogen fluoride, which in turn reacts with silicate contaminates in Fluorapatite according to the following equation:

$SiO2 + 6\ HF \rightarrow H2SiF6 + 2\ H2O$

The off-gas is released during phosphoric acid evaporation and concentration. It is absorbed in an absorption column with water. The final concentration of the hexafluorosilicic acid after the absorption step is 22-25%. The hexafluorosilicic acid flows in a closed loop in the system and is stored in closed tanks.

Hexafluorosilicic acid is also a by-product in the production of hydrofluoric acid (HF). SiO2 is present as an impurity in the raw material fluorspar and reacts in the above-mentioned manner.

Workers involved in production, handing, sampling and transfer of materials are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimise exposure and risks. This may include chemical resistant clothing, goggles and respiratory equipment where required. Due to the nature of the materials the level of control is extremely high and so in reality exposure is highly unlikely. Primary emission sources are mostly not located in the breathing zone of the worker. The handling of Hexafluorosilicic Acid is such that contact between product and adjacent air is reduced and controlled loading is used reducing the amount of aerosol formation. Submerged loading may be used when needed. Vapour recovery systems and local exhaust ventilation such as enclosing hoods are used where required. Emission sources can be completely or partially segregated from the work environment by isolating the source in a fully enclosed and separate room and using complete personal enclosure with ventilation where necessary. The processes are generally fully enclosed (air tight) and the integrity of the enclosure is monitored. The facilities that are housed outdoors are generally not close to buildings and workers are generally located > 4 metres from far field source. The facilities that are housing indoors have good natural ventilation.

Environmental emissions from industrial processes are limited by designated waste treatment process designed to limit environmental exposure to all relevant compartments. Atmospheric emissions are monitored and controlled. Liquid wastes would generally be treated (neutralisation to neutral pH and/or precipitation) prior to emission to remove any Hexafluorosilicic acid in the waste water. Sludge from the waste water treatment plant is sent for recovery, incineration or landfill and is not used for agricultural spreading. This precludes any contamination of soil by sludge spreading.

Section 9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Physical state:	Transparent, fuming liquid.
Colour:	Colourless
Odour:	Sour, pungent odour
Odour threshold:	n. a.
Melting point/freezing point °C:	-16.6°C at 101.3 kPa (10 % solution) -15.5°C (25% solution) 19^0C (60-70% solution)
Boiling point and boiling range °C:	The substance decomposes on heating; n. a.
Flammability	Not classified**.**
Lower and upper explosion limits:	No data are available**.** The substance does not contain any groups associated with explosive properties
Flash point:	An inorganic substance; n. a
Auto-ignition temperature:	Substance is non-flammable; n. a.

Decomposition temperature:	No decomposition observed up to 108 ^{0}C.
pH:	n. d.
Viscosity:	6.5 cps at 20 ^{0}C (23% solution); 11 cps at 10 Pa (10% solution)
Solubility:	Miscible with water, up to at least 60.97%.
Partition Coefficient: n-octanol/water:	Substance is inorganic; n. a.
Vapour pressure:	2300 Pa at 293K (10% solution) 30 hPa at 20^{0}C (35% solution)
Relative density:	1.0407 **-** 1.2742 g/cm^3 for solutions of 5-30% at 17.5^{0}C.
Relative vapour density	n. d.
Particle characteristics:	Substance is liquid at room temperature; not relevant.

9.2 Other information

Explosive properties:	Non explosive.
Partition coefficient n-octanol/water:	Substance is inorganic**;** n. a
Oxidising properties:	No.

Section 10. Stability and Reactivity

10.1 Reactivity

Reacts with many metals to produce flammable and explosive hydrogen gas. Keep containers cool with water, using spray nozzles.

10.2 Chemical stability

- Stable under recommended storage conditions.
- Corrosive in contact with metals
- Gives off hydrogen by reaction with metals.
- Risk of violent reaction.

10.3 Possibility of hazardous reactions

Possibility of hazardous reactions occurring at decomposition.

10.4 Conditions to avoid

- To avoid thermal decomposition, do not overheat.
- Keep at temperature not exceeding: 108 °C.

10.5 Incompatible materials
Metals, glass, stoneware, strong oxidizing agents.

10.6 Hazardous decomposition products
Hydrogen, Hydrogen fluoride.

Section 11. Toxicological Information

11.1 Information on toxicological effects

Acute Toxicity: The acute oral, dermal and inhalation toxicity is likely to be dominated by local (site of contact) effects as a consequence of the corrosivity of the substance. Based on the classification of mixtures, classification of a substance containing HF as impurity result to be the following. Classification shall therefore be given based on the % HF concentration.

Oral Acute Tox Cons:

Acute tox 2: ATE mix < 50 => CHF >100*5/50 = 10 %

Acute Tox 3: ATE mix < 300 => CHF >100*5/300 = 1,6 %

Acute Tox 4: ATE mix < 2000 => CHF >100*5/2000 = 0,25%

Dermal Acute Tox Cons:

Acute tox 1: ATE mix < 50 => CHF >100*5/50 = 10 %

Acute Tox 2: ATE mix < 200 => CHF >100*5/200 =2,5%

Acute Tox 3: ATE mix < 1000 => CHF >100*5/1000 = 0,5 %

Acute Tox 4: ATE mix < 2000 => CHF >100*5/2000 = 0,25%

Inhalation Acute Tox Cons:

Acute tox 2: ATE mix < 500 => CHF >100*100/500 = 20 %

Acute Tox 3: ATE mix < 2500 => CHF >100*100/2500 = 4 %

Acute Tox 4: ATE mix < 20000 => CHF >100*100/20000 = 0,5%

Skin corrosion / Irritation: No relevant information available.

Serious eye damage / Irritation: No relevant information available.

Respiratory or skin sensitisation: No relevant information available.

Germ cell mutagenicity:

Method	Results
micronucleus assay [chromosome aberration] in vivo mammalian somatic cell study: cytogenicity / erythrocyte micronucleus mouse (NMRI [mouse]) male/female intraperitoneal	Genotoxicity: negative (male/female) toxicity: not specified vehicle controls valid: valid negative controls valid: not examined positive controls valid:

37.6 mg/kg bw actual equivalent or similar to guideline OECD Guideline 474 (Mammalian Erythrocyte Micronucleus Test) [in vivo mammalian somatic cell study: cytogenicity / erythrocyte micronucleus]	
in vivo mammalian somatic cell study: cytogenicity / erythrocyte micronucleus	Genotoxicity: negative (male/female) toxicity: not specified vehicle controls valid: valid negative controls valid: not examined positive controls valid: Remark: Sodium hexafluorosilicate
somatic mutation and recombination test in Drosophila [in vivo mammalian germ cell study: gene mutation] in vivo mammalian germ cell study: gene mutation Drosophila melanogaster (Berlin K (wild type) and Basc) not specified oral: feed 47 g/L (equivalent to 0.25 mM) analytical conc. no guideline followed Induction of sex-linked recessive lethal mutations in Drosophila melanogaster.	Genotoxicity: negative (male/female) toxicity: not specified vehicle controls valid: not specified negative controls valid: not specified positive controls valid: not specified
in vivo mammalian germ cell study: gene mutation	Genotoxicity: negative (male/female) toxicity: not specified vehicle controls valid: not specified negative controls valid: not specified positive controls valid: not specified Remark: Sodium hexafluorosilicate
Drosophila SLRL assay [in vivo insect germ cell study: gene mutation] in vivo mammalian germ cell study: gene mutation Drosophila melanogaster (Oregon-r) male/female inhalation: vapour 0ppm nominal conc. vapour 1.3ppm nominal conc. vapour 2.9ppm nominal conc. vapour 4.3ppm nominal conc. vapour	Genotoxicity: positive - 2.9 ppm and above (male/female) toxicity: not examined vehicle controls valid: not applicable negative controls valid: valid positive controls valid: not examined

Not examined. no guideline followed Exposure to 3 concentrations of hydrogen fluoride vapour to determine sex-linked recessive lethal mutations and sterility levels in Drosophila melanogaster.	
in vivo mammalian germ cell study: gene mutation	Genotoxicity: positive - 2.9 ppm and above (male/female) toxicity: not examined vehicle controls valid: not applicable negative controls valid: valid positive controls valid: not examined Remark: Hydrogen fluoride
Drosophila recessive lethal test in vivo mammalian germ cell study: gene mutation Drosophila melanogaster (not specified) male inhalation: vapour 2.5% nominal conc. 2.5% acid Not examined. Drosophila were exposed to hydrofluoric acid vapour to determine the level of induced recessive lethals.	Genotoxicity: positive (male/female) toxicity: not examined vehicle controls valid: valid negative controls valid: not examined positive controls valid: not examined
in vivo mammalian germ cell study: gene mutation	Genotoxicity: positive (male/female) toxicity: not examined vehicle controls valid: valid negative controls valid: not examined positive controls valid: not examined Remark: Hydrogen fluoride
combined chromosomal aberration and micronucleus assay in vivo mammalian germ cell study: cytogenicity / chromosome aberration - Type of genotoxicity: chromosome aberration mouse (not specified) not specified oral: drinking water 200 mg/L nominal in water 400 mg/L nominal in water A concurrent positive control was used. no guideline followed The study was performed in the mouse and investigated the incidence of chromosomal aberrations in bone marrow cells and the incidence of micronuclei in erythrocytes.	Genotoxicity: negative - No evidence of micronuclei in erythrocytes or chromosomal aberrations in bone marrow cells. (male/female) toxicity: yes - Mortality at 400 mg/L; bodyweight effects at 200 and 400 mg/L vehicle controls valid: valid negative controls valid: not applicable positive controls valid: valid

in vivo mammalian germ cell study: cytogenicity / chromosome aberration - Type of genotoxicity: chromosome aberration	Genotoxicity: negative - No evidence of micronuclei in erythrocytes or chromosomal aberrations in bone marrow cells. (male/female) toxicity: yes - Mortality at 400 mg/L; bodyweight effects at 200 and 400 mg/L vehicle controls valid: valid negative controls valid: not applicable positive controls valid: valid Remark: Sodium fluoride
chromosome aberration assay [chromosome aberration] in vivo mammalian germ cell study: cytogenicity / chromosome aberration - Type of genotoxicity: chromosome aberration Rat and mouse inhalation 1 mg/m3 nominal conc no guideline followed Chromosomal aberration in rat bone marrow cells following inhalation of HF; dominant lethal assay in mice following HF inhalation	Genotoxicity: positive - : rat bone marrow clastogenicity toxicity: vehicle controls valid: negative controls valid: positive controls valid: Genotoxicity: negative - : mouse dominant lethal toxicity: vehicle controls valid: negative controls valid: positive controls valid:
in vivo mammalian germ cell study: cytogenicity / chromosome aberration - Type of genotoxicity: chromosome aberration	Genotoxicity: positive - : rat bone marrow clastogenicity toxicity: vehicle controls valid: negative controls valid: positive controls valid: Remark: Hydrogen fluoride Genotoxicity: negative - : mouse dominant lethal toxicity: vehicle controls valid: negative controls valid: positive controls valid: Remark: Hydrogen fluoride

Repeated dose toxicity:

Endpoint	Route	Dose descriptor or qualitative effect characterization; test type
Repeated dose toxicity	oral	adverse effect observed (LOAEL): 3.42mg/kg bw/day (chronic; mouse [common rodent species]) Target system/organs: musculoskeletal system bone
Repeated dose toxicity	dermal (systemic effects)	no study available
Repeated dose toxicity	inhalation (systemic effects)	adverse effect observed (NOAEC): 0.72mg/m³ (subchronic; rat Target system/organs: musculoskeletal system bone

Carcinogenicity:
Value used for CSA (**route: oral**): no adverse effect observed.

(NOAEL) 8mg/kg bw/day (chronic); (rat [common rodent species]).

Value used for CSA (**route: dermal**): no study available.

Value used for CSA (**route: inhalation**): no study available

Toxicity for reproduction / Development toxicity: No indication of reprotoxicity / No relevant information available.

Endpoint	Route	Dose descriptor or qualitative effect characterization; test type
Reproductive toxicity: effects on fertility	oral	(NOAEL): 11.4mg/kg bw/day
Reproductive toxicity: effects on fertility	dermal	no study available
Reproductive toxicity: effects on fertility	inhalation	no study available
Reproductive toxicity: developmental toxicity	oral	no adverse effect observed (NOAEL): 11.1mg/kg bw/day (subacute; rat
Reproductive toxicity: developmental toxicity	dermal	no study available
Reproductive toxicity: developmental toxicity	inhalation	no study available

Hazard conclusions for workers

Route	Type of effect	Hazard conclusion	Most sensitive endpoint
Inhalation	Systemic effects - Long-term	DNEL (Derived No Effect Level) 1.89mg/m³	repeated dose toxicity
Inhalation	Systemic effects - Acute	medium hazard (no threshold derived)	irritation (respiratory tract)
Inhalation	Local effects - Long-term	medium hazard (no threshold derived)	irritation (respiratory tract)
Inhalation	Local effects - Acute	DNEL (Derived No Effect Level) 3.15mg/m³	repeated dose toxicity
Dermal	Systemic effects - Long-term	medium hazard (no threshold derived)	skin irritation/corrosion
Dermal	Systemic effects - Acute	medium hazard (no threshold derived)	skin irritation/corrosion
Dermal	Local effects - Long-term	medium hazard (no threshold derived)	skin irritation/corrosion

Dermal	Local effects - Acute	medium hazard (no threshold derived)	skin irritation/corrosion
Eyes	Local effects	medium hazard (no threshold derived)	

Hazard conclusions for the general population

Route	Type of effect	Hazard conclusion	Most sensitive endpoint
Inhalation	Systemic effects - Long-term	DNEL (Derived No Effect Level) 0.04mg/m³	repeated dose toxicity
Inhalation	Systemic effects - Acute	DNEL (Derived No Effect Level) 0.04mg/m³	repeated dose toxicity
Inhalation	Local effects - Long-term	DNEL (Derived No Effect Level) 0.95mg/m³	irritation (respiratory tract)
Inhalation	Local effects - Acute	DNEL (Derived No Effect Level) 1.58mg/m³	irritation (respiratory tract)
Dermal	Systemic effects - Long-term	medium hazard (no threshold derived)	skin irritation/corrosion
Dermal	Systemic effects - Acute	medium hazard (no threshold derived)	skin irritation/corrosion
Dermal	Local effects - Long-term	medium hazard (no threshold derived)	skin irritation/corrosion
Dermal	Local effects - Acute	medium hazard (no threshold derived)	skin irritation/corrosion
Oral	Systemic effects - Long-term	DNEL (Derived No Effect Level) 0.013mg/kg bw/day	repeated dose toxicity
Oral	Systemic effects - Acute	DNEL (Derived No Effect Level) 0.013mg/kg bw/day	repeated dose toxicity
Eyes	Local effects	medium hazard (no threshold derived)	

Section 12. Ecological Information

12.1 Toxicity

Toxic to aquatic organisms.

Aquatic toxicity	Effect dose	Exposure time	Species	Method	Evaluation	Remark
Short-term fish toxicity – fresh water	LC50	96 h	*Lepomis macrochirus*	OECD Guideline 203 (Fish, Acute Toxicity Test)	50 mg/L	
Short-term fish toxicity – salt water	LC50	96 h	*Menidia beryllina*	OECD Guideline 203 (Fish, Acute Toxicity Test)	123 mg/L	Experimental study

Long-term fish toxicity – fresh water	NOEC	32 d	*Pimephales promelas*	OECD Guideline 210 (Fish, Early-Life Stage Toxicity Test)	83.9 mg/L	
Short-term toxicity to aq. Invertebrates – fresh water	EC50	96 h	*Trichoptera aquatic larvae*	US Environmental Protection Agency, 440/5-86-001	32.8 – 60.5 mg/l	Key study
Short-term toxicity to Daphnia – fresh water	EC50	48 h	*Daphnia magna*	OECD Guideline 202 (Daphnia sp. Acute Immobilisation Test)	311.2 mg/l	Key study
Long-term toxicity to daphnia – fresh water	NOEC	21 d	*Daphnia magna*	OECD Guideline 211 (Daphnia magna Reproduction Test)	18 mg/l	Key study
Long-term toxicity to aquatic invertebrates – salt water	NOEC	90 d	*Various*	No guideline available	5.17 mg/l	Key study
Toxicity to aquatic algae and cyanobacteria	EC50 – fresh water	96 h	*various algae species*	No guideline followed	54.2 mg/L	Result based on biomass with test material: sodium fluoride.
	EC50 – marine water	96 h			102 mg/l	
	NOEC - fresh water	7 d			63 mg/l	
	NOEC - marine water	7 d			63 mg/l	
Toxicity to soil microorganisms – short-term	NOEC	63 d	*Species/Inoculum*	No guideline followed	133.6 mg/l	Taken into account for toxicity on soil micro-organisms for the derivation of PNEC:

12.2 Persistence and degradability

Not considered to be persistent or biodegradable. The substance is inorganic and will hydrolyse and dissociate under environmental conditions to form fluoride and silicate ions. No biodegradation of the substance or these ions will occur.

12.3 Bioaccumulative potential

Fluoride accumulates in aquatic organisms predominantly in the exoskeleton of crustacea and in the skeleton of fish; no accumulation was reported for edible tissue
In freshwater aquatic organisms it was found that the fluoride accumulates primarily in the exoskeleton of crustacea and in the bones of fish. In fish, the BCF value was between 53 -58 (d.w.) and <2 (w.w.). In crustacea, BCF value was <1 (d.w.). The highest reported BCF value for mollusca and aquatic macrophyta were 3.2 and 7.5 (w.w) respectively. In an experimental marine ecosystem with fish, crustaceans and plants, F was found to accumulate in all species. The highest value, 149, was found in fish. BCF values for crustacea range from 27 to 62. Fluoride concentrations up to 30 mg F/kg were found in consumption fish. The limited data indicate that fluoride biomagnification in the aquatic environment is

of little significance. Fluoride accumulates in aquatic organisms predominantly in the exoskeleton of crustacea and in the skeleton of fish; no accumulation was reported for edible tissue

12.4 Mobility in soil

Fluoride is the predominant ion in soil above pH of 6. Below pH 5.5, adsorption is low as fluoride exists as complexes. Above pH 5.5, adsorption is lower due to reduced electrostatic potential. The occurrence of precipitation of fluoride ions at higher concentrations reduces the concentration of free fluoride in calcareous soils. Fluoride is extremely immobile in soil as a result of precipitation and adsorption, with leaching of 5% observed in soil with fluoride concentrations up to 80mg/dm^3.

12.5 Results of PBT and vPvB assessment

This substance is not identified as a PBT / vPvB substance

12.6 Endocrine disrupting properties

This substance does not have endocrine disrupting properties in relation to non-target organisms, as it does not meet the criteria set out in Section B of Regulation (EC) № 2017/2100.

12.7 Other adverse effects

Sources of environmental fluoride are anthropogenic (industrial, application of phosphate fertilizer) and natural (volcanic, weathering, marine aerosols). The environmental behavior of fluoride is essentially independent of source.
Fluoride is removed rapidly from the environment by wet and dry deposition.
Water:
In seawater, fluoride is present as free fluoride (51%), magnesium fluoride (47%), calcium fluoride (2%) and traces of HF. Total fluoride concentrations in seawater are reported to be generally higher than those in freshwater, with an average concentration of 1.4 mg/L.
Sediment:
The main form of fluorine in sediment is as insoluble complexes. Reported are values of up to 200 mg/kg for marine sediment and up to 450 mg/kg for river sediments on a dry matter basis. Information gathered on the behavior of fluoride ions in water indicate that insoluble fluorapatite and other insoluble complexes are formed locally, which may accumulate as sediment.

Section 13. Disposal Considerations

13.1 Waste treatment methods

Disposal operations:
- Collect leaking and spilled liquid in sealable iron containers as far as possible.
- Absorb remaining liquid in sand or inert absorbent and remove to safe place.
- Clean container with water;
- The empty and clean containers are to be reused in conformity with regulations;
- To avoid treatments, as far as possible, use dedicated containers.

Please follow all local, regional and national regulations.

Section 14. Transport Information

Land transport UN RTDG/ADR/RID :

14.1 UN number: 1778

14.2 UN proper shipping name (all types of regulations): Fluorosilicic acid / **ICAO-Label** - Corrosive

14.3 Transport hazard class: 8

14.4 Packing group: II

Inland waterway transport (UN RTDG/ADN(R)):

14.1 UN number: 1778

14.2 UN proper shipping name (all types of regulations): Fluorosilicic acid / **ICAO-Label** - Corrosive

14.3 Transport hazard class: 8

14.4 Packing group: II

Marine transport (UN RTDG/IMDG) / IMDG – EmS code: F-A, S-B:

14.1 UN number: 1778

14.2 UN proper shipping name (all types of regulations): Fluorosilicic acid / **ICAO-Label** - Corrosive

14.3 Transport hazard class: 8

14.4 Packing group: II

Marine pollutant: No

Air transport (UN RTDG/ICAO/IATA):

14.1 UN number: 1778

14.2 UN proper shipping name (all types of regulations): Fluorosilicic acid / **ICAO-Label** - Corrosive

14.3 Transport hazard class: 8

14.4 Packing group: II

14.5 Environmental hazards: Environmentally Hazardous Substance
14.6 Special precautions for user: No information available

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable to packaged goods

Section 15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances: Not applicable.
Ordinance on the Order and way of storage of hazardous chemicals and mixtures, Amm. 05.02.2021.

15.2 Chemical safety assessment

A chemical safety assessment has been conducted.

Section 16. Other Information

Hazard statements:
H314 Causes severe skin burns and eye damage.

Other hazards:
Not considered to be PBT or vPvB

Another information: Provide adequate information, instructions and training of the operators. Make regular training of all staff members in the scope of transport (acc. ADR, chapter 1.3).

Revision: Current version of the SDS is fully renewed and updated. It substitutes version 3 / June 2015.

Note: The regulatory information given above only indicates the principal regulations specifically applicable to the product described in the safety data sheet. The user's attention is drawn to the possible existence of additional provisions which complete these regulations. Refer to all applicable national, international and local regulations or provisions.

Disclaimer: This sheet complements the technical sheets but does not replace them. The information given is based on our knowledge of the product, at the time of publication and is given in good faith.
In addition, the attention of the user is drawn to the possible risk incurred by using the product for any other use than that for which it was intended.
In no way does this exempt the user from knowing and applying all the regulations controlling his activity. He alone will take on the responsibility for taking the precautions involved when using the product.
The aim of all the mandatory regulations mentioned is to help the user to fulfill his obligations regarding the use of hazardous products.
This information must not be considered exhaustive. It does not exempt the user from his responsibility to ensure that other obligations than those mentioned could apply relating to the storage and use of the product.

ANNEX: EXPOSURE SCENARIOS ESTIMATION

1. Overview of exposure scenarios (ES)

ES number	ES Code	Scenario name	Use descriptor
1	ES 10, ES 10.1	Consumer use of fluorinated drinking water	ERC 8B; PC 37
2	ES 11	Consumer use of fluorinated washing and cleaning products	ERC 8B; PC 35
3	ES 2	Industrial distribution (no end-use)	ERC 2; PROC 9, 8B, 15, 2, 1
4	ES 3	Industrial formulation to formulate chemical product mixtures (no end-use)	ERC 2; PROC 9, 8B, 3, 15, 2, 1
5	ES 9	IU of substance -mineral acidification	ERC 6B; PROC 3
6	ES 6	IU of substance as a reactive agent - metal surface treatment	ERC 6B; PROC 13
7	ES 8	IU of substance as a reactive agent in cleaning products	ERC 6B; PROC 9, 10, 7
8	ES 5	IU of substance as a reactive agent-Water treatment (fluoridation), fluoridation of cleaning agents	ERC 6B; PROC 5, 8A, 9, 10, 13, 8B, 3, 2, 1
9	ES P	IU of substance as a reactive agent/processing aid and for general chemical applications	ERC 8B; PROC 1, 2, 3, 8A, 8B
10	ES 4	IU of substance as chemical intermediate - manufacture of chemicals	ERC 6A; PROC 9, 8B, 3, 2, 1
11	ES 7	IU of substance as reactive agent in manufacture of basic metals	ERC 6A; PROC 3, 2, 1
12	ES 12	Laboratory agent	ERC 7; PROC 15
13	ES 1	Manufacture	ERC 1; PROC 9, 8B, 3, 15, 2, 1

14.1 Scenario 13: Manufacture (ES 1)

This scenario is described by the following combinations of use descriptors. The corresponding contributing scenarios are described in the respective subchapters.

Description of ES 13

Free short title	Manufacture (ES 1)
Systematic title based on use descriptor	ERC 1; PROC 9, 8B, 3, 15, 2, 1
Name of constributing environmental scenario and corresponding ERC	ERC 1 Production of chemicals
Name(s) of contributing worker scenarios and corresponding PROCs	PROC 9 - Transfer of chemicals into small containers (dedicated filling line) PROC 8b - Transfer of chemicals from/to vessels/ large containers at dedicated facilities PROC 3 - Use in closed batch process (synthesis or formulation) PROC 15 - Use of laboratory reagents in small scale laboratories PROC 2 - Use in closed, continuous process with occasional controlled exposure PROC 1 - Use in closed process, no likelihood of exposure

14.2 Conditions of use affecting exposure

14.2.1 Contributing Scenario (1) controlling environmental exposure for ERC 1

14.2.1.1 Conditions of use

Operational conditions	
Annual tonnage	2.50E4 to/year
Daily amount used at site	1.25E4 kg/day
Release times per year	20 days/year
Local freshwater dilution factor	10
Local marine water dilution factor	100
Release fraction to air from process	5 %
Release fraction to wastewater from process	0.001 %
Release fraction to soil from process	0.010 %
Fraction tonnage to region	10 %
Fraction used at main source	10 %
STP	yes (municipal)
River flow rate	18000 m³/day
Municipal sewage treatment plant discharge	2000000 L/day
Risk management measures	
Reduction of sludge to soil	100 %
SpERC	HFA- ES 1 ( )

14.2.2 Contributing Scenario (2) controlling industrial worker exposure for PROC 9

14.2.2.1 Conditions of use

Name of contributing scenario	PROC 9 Transfer of chemicals into small containers (dedicated filling line)
Exposure type	Inhalation: Long-term systemic Dermal: Qualitative Risk Assessment
Qualitative Risk Assessment	
Dermal	Medium hazard (no threshold derived)
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	> 4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Other given operational conditions affecting workers exposure	
Location	indoors

Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	95 %

14.2.3 Contributing Scenario (3) controlling industrial worker exposure for PROC 8B

14.2.3.1 Conditions of use

Name of contributing scenario	PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities
Exposure type	Inhalation: Long-term systemic Dermal: Qualitative Risk Assessment
Qualitative Risk Assessment	
Dermal	Medium hazard (no threshold derived)
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	> 4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 95 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	95 %

14.2.4 Contributing Scenario (4) controlling industrial worker exposure for PROC 3

14.2.4.1 Conditions of use

Name of contributing scenario	PROC 3 Use in closed batch process (synthesis or formulation)
Exposure type	Inhalation: Long-term systemic Dermal: Qualitative Risk Assessment
Qualitative Risk Assessment	
Dermal	Medium hazard (no threshold derived)
Product characteristics	
Physical state	liquid
Concentration in substance	>25%

Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	> 4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	95 %

14.2.5 Contributing Scenario (5) controlling industrial worker exposure for PROC 15

14.2.5.1 Conditions of use

Name of contributing scenario	PROC 15 Use of laboratory reagents in small scale laboratories
Exposure type	Inhalation: Long-term systemic Dermal: Qualitative Risk Assessment
Qualitative Risk Assessment	
Dermal	Medium hazard (no threshold derived)
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	> 4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	95 %

14.2.6 Contributing Scenario (6) controlling industrial worker exposure for PROC 2

14.2.6.1 Conditions of use

Name of contributing scenario	PROC 2 Use in closed, continuous process with occasional controlled exposure
Exposure type	Inhalation: Long-term systemic Dermal: Qualitative Risk Assessment
Qualitative Risk Assessment	
Dermal	Medium hazard (no threshold derived)
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	> 4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Other given operational conditions affecting workers exposure	
Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 90 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	95 %

14.2.7 Contributing Scenario (7) controlling industrial worker exposure for PROC 1

14.2.7.1 Conditions of use

Name of contributing scenario	PROC 1 Use in closed process, no likelihood of exposure
Exposure type	Inhalation: Long-term systemic Dermal: Qualitative Risk Assessment
Qualitative Risk Assessment	
Dermal	Medium hazard (no threshold derived)
Product characteristics	
Physical state	liquid
Concentration in substance	>25%
Fugacity / Dustiness	medium
Frequency and duration of use	
Duration of activity	> 4 hours (default)
Frequency of use	5 days / week
Human factors not influenced by risk management	
Other given operational conditions affecting workers exposure	

Location	indoors
Domain	industrial
Technical conditions and measures to control dispersion and exposure	
Local exhaust ventilation	yes (inhalation 0 %)
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	95 %