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AMMONIUM BIFLUORIDE

ConsolidatedChemicals (N.Z.) Ltd.

Chemwatch: **1727**
Version No: **6.1.1.1**
Safety Data Sheet according to HSNO Regulations

Chemwatch Hazard Alert Code: 3

Issue Date: **11/02/2014**
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Initial Date: **Not Available**
S.GHS.NZL.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	AMMONIUM BIFLUORIDE
Chemical Name	ammonium bifluoride
Proper shipping name	AMMONIUM HYDROGENDIFLUORIDE, SOLID
Chemical formula	F2-H5-N
Other means of identification	Not Available
CAS number	1341-49-7

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	In manufacture of magnesium and magnesium alloys; in brightening of aluminium; for purifying and cleansing various parts of beer-dispensing apparatus, tubes, etc., sterilizing dairy and other food equipment. In glass and porcelain industries; as mordant for aluminium; as a `sour' in laundering cloth. In the laboratory production of hydrogen fluoride.

Details of the manufacturer/importer

Registered company name	ConsolidatedChemicals (N.Z.) Ltd.
Address	Building 10, Central Park, 666 Great South Road, Penrose, Auckland 1051 P.O. Box 62-568, Kalmia Street, Auckland, 1546 New Zealand
Telephone	(09) 571 0712; Freecall: 0800 220 202
Fax	(09) 525 2755
Website	Not Available
Email	conchem@xtra.co.nz

Emergency telephone number

Association / Organisation	Not Available
Emergency telephone numbers	0800 2436 2255
Other emergency telephone numbers	Not Available

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation.
Classified as Dangerous Goods for transport purposes.

CHEMWATCH HAZARD RATINGS

Continued...

	Min	Max
Flammability	0	
Toxicity	3	
Body Contact	3	
Reactivity	0	
Chronic	0	

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme

GHS Classification [2]	Acute Toxicity (Oral) Category 3, Skin Corrosion/Irritation Category 1C, Serious Eye Damage Category 1, Acute Vertebrate Hazard Category 2
Legend:	*1. Classified by Chemwatch; 2. Classification drawn from CCID EPA NZ ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI*
Gazetted by EPA New Zealand	6.1C (oral), 8.2C, 8.3A, 9.3B

Label elements

GHS label elements

SIGNAL WORD	DANGER

Hazard statement(s)

H301	Toxic if swallowed
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
H432	Toxic to terrestrial vertebrates

Precautionary statement(s) Prevention

P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P273	Avoid release to the environment.

Precautionary statement(s) Response

P301+P310	IF SWALLOWED: Immediately call a POISON CENTER/doctor/physician/first aider
P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Precautionary statement(s) Storage

P405	Store locked up.

Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised chemical landfill or if organic to high temperature incineration

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

CAS No	%[weight]	Name
1341-49-7	>98	ammonium bifluoride
		impurities may include:
12125-01-8	<2	ammonium fluoride
7664-39-3	<0.01	hydrogen fluoride
16919-19-0	<0.05	ammonium fluorosilicate

Mixtures

Continued...

See section above for composition of Substances

SECTION 4 FIRST AID MEASURES

NZ Poisons Centre 0800 POISON (0800 764 766) | NZ Emergency Services: 111

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: ▸ Immediately hold eyelids apart and flush the eye continuously with running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. ▸ Transport to hospital or doctor without delay. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If there is evidence of severe skin irritation or skin burns: ▸ Avoid further contact. Immediately remove contaminated clothing, including footwear. ▸ Flush skin under running water for 15 minutes. ▸ Avoiding contamination of the hands, massage calcium gluconate gel into affected areas, pay particular attention to creases in skin. ▸ Contact the Poisons Information Centre. ▸ Continue gel application for at least 15 minutes after burning sensation ceases. ▸ If pain recurs, repeat application of calcium gluconate gel or apply every 20 minutes. ▸ If no gel is available, continue washing for at least 15 minutes, using soap if available. If patient is conscious, give six calcium gluconate or calcium carbonate tablets in water by mouth. ▸ Transport to hospital, or doctor, urgently.
Inhalation	▸ If dust is inhaled, remove from contaminated area. ▸ Encourage patient to blow nose to ensure clear breathing passages. ▸ Ask patient to rinse mouth with water but to not drink water. ▸ Seek immediate medical attention. For massive exposures: ▸ If dusts, vapours, aerosols, fumes or combustion products are inhaled, remove from contaminated area. ▸ Lay patient down. ▸ Keep warm and rested. ▸ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▸ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▸ If victim is conscious, give six calcium gluconate or calcium carbonate tablets in water by mouth. ▸ Transport to hospital, or doctor, urgently.
Ingestion	▸ For advice, contact a Poisons Information Centre or a doctor at once. ▸ Urgent hospital treatment is likely to be needed. ▸ If swallowed do **NOT** induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Transport to hospital or doctor without delay.

Indication of any immediate medical attention and special treatment needed

For acute or short term repeated exposures to fluorides:
- Fluoride absorption from gastro-intestinal tract may be retarded by calcium salts, milk or antacids.
- Fluoride particulates or fume may be absorbed through the respiratory tract with 20-30% deposited at alveolar level.
- Peak serum levels are reached 30 mins. post-exposure; 50% appears in the urine within 24 hours.
- For acute poisoning (endotracheal intubation if inadequate tidal volume), monitor breathing and evaluate/monitor blood pressure and pulse frequently since shock may supervene with little warning. Monitor ECG immediately; watch for arrhythmias and evidence of Q-T prolongation or T-wave changes. Maintain monitor. Treat shock vigorously with isotonic saline (in 5% glucose) to restore blood volume and enhance renal excretion.
- Where evidence of hypocalcaemic or normocalcaemic tetany exists, calcium gluconate (10 ml of a 10% solution) is injected to avoid tachycardia.

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
Fluorides in urine	3 mg/gm creatinine	Prior to shift	B, NS
	10mg/gm creatinine	End of shift	B, NS

Continued...

B: Background levels occur in specimens collected from subjects **NOT** exposed

NS: Non-specific determinant; also observed after exposure to other exposures.
For acute or short term repeated exposures to strong acids:

- Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
- Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling
- Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
- Strong acids produce a coagulation necrosis characterised by formation of a coagulum (eschar) as a result of the dessicating action of the acid on proteins in specific tissues.

INGESTION:

- Immediate dilution (milk or water) within 30 minutes post ingestion is recommended.
- **DO NOT** attempt to neutralise the acid since exothermic reaction may extend the corrosive injury.
- Be careful to avoid further vomit since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.
- Charcoal has no place in acid management.
- Some authors suggest the use of lavage within 1 hour of ingestion.

SKIN:

- Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
- Deep second-degree burns may benefit from topical silver sulfadiazine.

EYE:

- Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjuctival cul-de-sacs. Irrigation should last at least 20-30 minutes. **DO NOT** use neutralising agents or any other additives. Several litres of saline are required.
- Cycloplegic drops, (1% cyclopentolate for short-term use or 5% homatropine for longer term use) antibiotic drops, vasoconstrictive agents or artificial tears may be indicated dependent on the severity of the injury.
- Steroid eye drops should only be administered with the approval of a consulting ophthalmologist).

[Ellenhorn and Barceloux: Medical Toxicology]

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known.

Advice for firefighters

Fire Fighting	▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Wear full body protective clothing with breathing apparatus. ▸ Prevent, by any means available, spillage from entering drains or water course. ▸ Use fire fighting procedures suitable for surrounding area.
Fire/Explosion Hazard	▸ Non combustible. ▸ Not considered to be a significant fire risk. ▸ Acids may react with metals to produce hydrogen, a highly flammable and explosive gas. ▸ Heating may cause expansion or decomposition leading to violent rupture of containers.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills	▸ Remove all ignition sources. ▸ Clean up all spills immediately. ▸ Avoid contact with skin and eyes. ▸ Control personal contact with the substance, by using protective equipment.
Major Spills	▸ Clear area of personnel and move upwind. ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ Wear full body protective clothing with breathing apparatus. ▸ Prevent, by any means available, spillage from entering drains or water course.
	Personal Protective Equipment advice is contained in Section 8 of the MSDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Continued...

Safe handling	▸ Avoid all personal contact, including inhalation. ▸ Wear protective clothing when risk of exposure occurs. ▸ Use in a well-ventilated area. ▸ **WARNING:** To avoid violent reaction, **ALWAYS** add material to water and **NEVER** water to material.
Other information	▸ Store in original containers. ▸ Keep containers securely sealed. ▸ Store in a cool, dry, well-ventilated area. ▸ Store away from incompatible materials and foodstuff containers.

Conditions for safe storage, including any incompatibilities

Suitable container	▸ **DO NOT** use aluminium or galvanised containers ▸ Check regularly for spills and leaks ▸ **DO NOT** use unlined steel containers ▸ Lined metal can, lined metal pail/ can. ▸ Plastic pail. ▸ Polyliner drum. ▸ Packing as recommended by manufacturer.
Storage incompatibility	Salts of inorganic fluoride: ▸ react with water forming acidic solutions. ▸ are violent reactive with boron, bromine pentafluoride,bromine trifluoride, calcium disilicide, calcium hydride, oxygen difluoride, platinum, potassium. ▸ in aqueous solutions are incompatible with sulfuric acid, alkalis, ammonia, aliphatic amines, alkanolamines, alkylene oxides, amides, epichlorohydrin, isocyanates, nitromethane, organic anhydrides, vinyl acetate. ▸ corrode metals in presence of moisture ▸ may be incompatible with glass and porcelain Ammonium bifluoride: ▸ reacts with water forming a weak solution of hydrofluoric acid ▸ reacts violently with bases releasing ammonia gas ▸ attacks glass, cement and most metals in the presence of moisture ▸ upon contact with moisture and meal may release flammable hydrogen gas which may collect in confined spaces -a void aluminium, nickel or steel containers ▸ when heated to decomposition emits toxic and corrosive fumes of ammonia, hydrogen fluoride and nitric oxides ▸ Inorganic acids are generally soluble in water with the release of hydrogen ions.

X X + X X +

X —— Must not be stored together
0 —— May be stored together with specific preventions
+ —— May be stored together

PACKAGE MATERIAL INCOMPATIBILITIES

Not Available

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
New Zealand Workplace Exposure Standards (WES)	ammonium bifluoride	Fluorides, as F	2.5 mg/m3	Not Available	Not Available	Exposure can also be estimated by biological monitoring.
New Zealand Workplace Exposure Standards (WES)	ammonium fluoride	Fluorides, as F	2.5 mg/m3	Not Available	Not Available	Exposure can also be estimated by biological monitoring.
New Zealand Workplace Exposure Standards (WES)	hydrogen fluoride	Hydrogen fluoride, as F	Not Available	Not Available	2.6 mg/m3 / 3 ppm	Not Available
New Zealand Workplace Exposure Standards (WES)	ammonium fluorosilicate	Fluorides, as F	2.5 mg/m3	Not Available	Not Available	Exposure can also be estimated by biological monitoring.

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EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ammonium bifluoride	Ammonium hydrogen fluoride; (Ammonium bifluoride)	11 mg/m3	130 mg/m3	750 mg/m3
ammonium fluoride	Ammonium fluoride	15 mg/m3	160 mg/m3	980 mg/m3
hydrogen fluoride	Hydrogen fluoride; (Hydrofluoric acid)	Not Available	Not Available	Not Available
ammonium fluorosilicate	Ammonium hexafluorosilicate; (Ammonium silicofluoride)	12 mg/m3	130 mg/m3	780 mg/m3

Ingredient	Original IDLH	Revised IDLH
ammonium bifluoride	500 mg/m3	250 mg/m3
ammonium fluoride	500 mg/m3	250 mg/m3
hydrogen fluoride	30 ppm	30 [Unch] ppm
ammonium fluorosilicate	Not Available	Not Available

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection. The basic types of engineering controls are: Process controls which involve changing the way a job activity or process is done to reduce the risk. Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.
Personal protection	
Eye and face protection	▸ Chemical goggles. ▸ Full face shield may be required for supplementary but never for primary protection of eyes. ▸ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.
Skin protection	See Hand protection below
Hands/feet protection	▸ Wear chemical protective gloves, e.g. PVC. ▸ Wear safety footwear or safety gumboots, e.g. Rubber The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application. The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and.has to be observed when making a final choice.
Body protection	See Other protection below
Other protection	▸ Overalls. ▸ PVC Apron. ▸ PVC protective suit may be required if exposure severe. ▸ Eyewash unit.
Thermal hazards	Not Available

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:
"Forsberg Clothing Performance Index".
The effect(s) of the following substance(s) are taken into account in the ***computer-generated*** selection:
AMMONIUM BIFLUORIDE

Material	CPI
NATURAL RUBBER	A
NATURAL+NEOPRENE	A
NEOPRENE	A
NEOPRENE/NATURAL	A
BUTYL/NEOPRENE	C
NAT+NEOPR+NITRILE	C

Respiratory protection

Type B-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.
Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	B-AUS P2	-	B-PAPR-AUS / Class 1 P2
up to 50 x ES	-	B-AUS / Class 1 P2	-
up to 100 x ES	-	B-2 P2	B-PAPR-2 P2 ^

Continued...

NITRILE	C
PE	C
PVC	C
SARANEX-23	C
VITON/NEOPRENE	C

* CPI - Chemwatch Performance Index
A: Best Selection
B: Satisfactory; may degrade after 4 hours continuous immersion
C: Poor to Dangerous Choice for other than short term immersion
NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -
* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

^ - Full-face
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	White, deliquescent crystals, with no odour. Freely soluble in water. Dissolves in water to form a weak solution of hydrofluoric acid. In the presence of moisture, highly corrosive to glass, other siliceous materials and most metals.

Physical state	Divided Solid	**Relative density (Water = 1)**	1.5
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	Not Applicable
pH (as supplied)	Not Applicable	**Decomposition temperature**	Not Available
Melting point / freezing point (°C)	125	**Viscosity (cSt)**	Not Applicable
Initial boiling point and boiling range (°C)	239	**Molecular weight (g/mol)**	57.06
Flash point (°C)	Not Applicable	**Taste**	Not Available
Evaporation rate	Not Available	**Explosive properties**	Not Available
Flammability	Not Applicable	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	Not Applicable	**Surface Tension (dyn/cm or mN/m)**	Not Applicable
Lower Explosive Limit (%)	Not Applicable	**Volatile Component (%vol)**	Negligible
Vapour pressure (kPa)	Negligible	**Gas group**	Not Available
Solubility in water (g/L)	Miscible	**pH as a solution(1%)**	3.5 (5% aqueous)
Vapour density (Air = 1)	Not Applicable	**VOC g/L**	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	▸ Contact with alkaline material liberates heat ▸ Unstable in the presence of incompatible materials. ▸ Product is considered stable. ▸ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7

Continued...

Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	Inhalation of dusts, generated by the material, during the course of normal handling, may be harmful. Acute effects of fluoride inhalation include irritation of nose and throat, coughing and chest discomfort. A single acute over-exposure may even cause nose bleed. Corrosive acids can cause irritation of the respiratory tract, with coughing, choking and mucous membrane damage. |Symptoms of inhalation (of dust, solution mists or of liberated hydrogen fluoride gases), can produce symptoms such as spasm, inflammation and oedema of the larynx and bronchii, chemical pneumonitis and pulmonary oedema.
Ingestion	Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual. The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion. Fluoride causes severe loss of calcium in the blood, with symptoms appearing several hours later including painful and rigid muscle contractions of the limbs. Cardiovascular collapse can occur and may cause death with increased heart rate and other heart rhythm irregularities. |Acute ingestion of 3.75 g (2.5 g of fluoride ion) is estimated to be fatal for a human being. Ingestion may result in dehydration, thirst, nausea, vomiting, diarrhoea, abdominal pain, gastrointestinal burns, headache and convulsions.
Skin Contact	The material can produce chemical burns following direct contact with the skin. Skin contact with the material may damage the health of the individual; systemic effects may result following absorption. Skin contact with acidic corrosives may result in pain and burns; these may be deep with distinct edges and may heal slowly with the formation of scar tissue. Fluorides are easily absorbed through the skin and cause death of soft tissue and erode bone.
Eye	The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating. If applied to the eyes, this material causes severe eye damage. Direct eye contact with acid corrosives may produce pain, tears, sensitivity to light and burns.
Chronic	Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and/or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs. Extended exposure to inorganic fluorides causes fluorosis, which includes signs of joint pain and stiffness, tooth discolouration, nausea and vomiting, loss of appetite, diarrhoea or constipation, weight loss, anaemia, weakness and general unwellness.

	TOXICITY	IRRITATION
ammonium bifluoride	Inhalation (rat) LC50: 1276 ppm/1hr*][2]	*[Bayer]
	Oral (rat) LD50: 130 mg/kg[1]	Eye (-): corrosive*
		Skin (-): corrosive*
ammonium fluoride	TOXICITY	IRRITATION
	Not Available	Not Available
hydrogen fluoride	TOXICITY	IRRITATION
	Inhalation (rat) LC50: 1.1 mg/L/60M[2]	Eye (human): 50 mg - SEVERE
	Inhalation (rat) LC50: 1276 ppm/1h[2]	
ammonium fluorosilicate	TOXICITY	IRRITATION
	Oral (mouse) LD50: 70 mg/kg[2]	Not Available
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's msds unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

AMMONIUM BIFLUORIDE	for acid mists, aerosols, vapours Data from assays for genotoxic activity in vitro suggest that eukaryotic cells are susceptible to genetic damage when the pH falls to about 6.5. Cells from the respiratory tract have not been examined in this respect. Mucous secretion may protect the cells of the airways from direct exposure to inhaled acidic mists, just as mucous plays an important role in protecting the gastric epithelium from its auto-secreted hydrochloric acid. In considering whether pH itself induces genotoxic events in vivo in the respiratory system, comparison should be made with the human stomach, in which gastric juice may be at pH 1-2 under fasting or nocturnal conditions, and with the human urinary bladder, in which the pH of urine can range from <5 to > 7 and normally averages 6.2.

Continued...

	as fluoride anion
HYDROGEN FLUORIDE	Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS.

Acute Toxicity	✔	**Carcinogenicity**	⊘
Skin Irritation/Corrosion	✔	**Reproductivity**	⊘
Serious Eye Damage/Irritation	✔	**STOT - Single Exposure**	⊘
Respiratory or Skin sensitisation	⊘	**STOT - Repeated Exposure**	⊘
Mutagenicity	⊘	**Aspiration Hazard**	⊘

Legend: ✔ *– Data required to make classification available*
✘ *– Data available but does not fill the criteria for classification*
⊘ *– Data Not Available to make classification*

CMR STATUS

Not Applicable

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Ecotoxicity:
The tolerance of water organisms towards pH margin and variation is diverse. Recommended pH values for test species listed in OECD guidelines are between 6.0 and almost 9. Acute testing with fish showed 96h-LC50 at about pH 3.5
For Fluorides: Small amounts of fluoride have beneficial effects however; excessive intake over long periods may cause dental and/or skeletal fluorosis. Fluorides are absorbed by humans following inhalation of workplace and ambient air that has been contaminated, ingestion of drinking water and foods and dermal contact.
|Fish toxicity:|Acute (Brachydanio rerio) LC0: 237 mg/l/96h (F Flakes)*|Bacterial toxicity:|Acute (activated sludge micro-organism) EC50: 2394 mg/l (B Flakes)*|Acute (activated sludge micro-organism) EC50: 4184 mg/l (F Flakes)*|Water pollution class (WGK): 1 - slightly hazardous to water* *[Bayer]

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	▸ Containers may still present a chemical hazard/ danger when empty. ▸ Return to supplier for reuse/ recycling if possible. Otherwise: ▸ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill. ▸ Where possible retain label warnings and MSDS and observe all notices pertaining to the product.
	Ensure that the disposal of material is carried out in accordance with Hazardous Substances (Disposal) Regulations 2001.

Continued...

SECTION 14 TRANSPORT INFORMATION

Labels Required

Marine Pollutant	NO
HAZCHEM	2X

Land transport (UN)

UN number	1727
Packing group	II
UN proper shipping name	AMMONIUM HYDROGENDIFLUORIDE, SOLID
Environmental hazard	No relevant data
Transport hazard class(es)	Class: 8 Subrisk: Not Applicable
Special precautions for user	Special provisions: Not Applicable Limited quantity: 1 kg

Air transport (ICAO-IATA / DGR)

UN number	1727
Packing group	II
UN proper shipping name	Ammonium hydrogendifluoride, solid
Environmental hazard	No relevant data
Transport hazard class(es)	ICAO/IATA Class: 8 ICAO / IATA Subrisk: Not Applicable ERG Code: 8L
Special precautions for user	Special provisions: Not Applicable Cargo Only Packing Instructions: 863 Cargo Only Maximum Qty / Pack: 50 kg Passenger and Cargo Packing Instructions: 859 Passenger and Cargo Maximum Qty / Pack: 15 kg Passenger and Cargo Limited Quantity Packing Instructions: Y844 Passenger and Cargo Limited Maximum Qty / Pack: 5 kg

Sea transport (IMDG-Code / GGVSee)

UN number	1727
Packing group	II
UN proper shipping name	AMMONIUM HYDROGENDIFLUORIDE, SOLID
Environmental hazard	Not Applicable
Transport hazard class(es)	IMDG Class: 8 IMDG Subrisk: Not Applicable
Special precautions for user	EMS Number: F-A , S-B Special provisions: Not Applicable Limited Quantities: 1 kg

Continued...

SECTION 15 REGULATORY INFORMATION

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

This substance can be managed under the controls specified in the Transfer Notice or alternatively it may be managed using the conditions specified in an applicable Group Standard.

HSR Number	Group Standard
HSR003970	Not Available

ammonium bifluoride(1341-49-7) is found on the following regulatory lists	"New Zealand Inventory of Chemicals (NZIoC)","International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs","New Zealand Workplace Exposure Standards (WES)","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals"
ammonium fluoride(12125-01-8) is found on the following regulatory lists	"New Zealand Inventory of Chemicals (NZIoC)","International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs","New Zealand Workplace Exposure Standards (WES)","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals"
hydrogen fluoride(7664-39-3) is found on the following regulatory lists	"New Zealand Inventory of Chemicals (NZIoC)","International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs","New Zealand Workplace Exposure Standards (WES)","International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List Passenger and Cargo Aircraft","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals"
ammonium fluorosilicate(16919-19-0) is found on the following regulatory lists	"New Zealand Inventory of Chemicals (NZIoC)","International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs","New Zealand Workplace Exposure Standards (WES)","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals"

Location Test Certificate

Subject to Regulation 55 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations a location test certificate is required when quantity greater than or equal to those indicated below are present.

Hazard Class	Quantity beyond which controls apply for closed containers	Quantity beyond which controls apply when use occurring in open containers
Not Applicable	Not Applicable	Not Applicable

Approved Handler

Subject to Regulation 56 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations, the substance must be under the personal control of an Approved Handler when present in a quantity greater than or equal to those indicated below.

Class of substance	Quantities
6.1A, 6.1B, 6.1C (except for propellant powders of classes 1.1C (UN 0160) and 1.3C (UN 0161)	Any quantity

SECTION 16 OTHER INFORMATION

Other information

Ingredients with multiple cas numbers

Name	CAS No
ammonium fluorosilicate	1309-32-6, 16919-19-0

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.