



Safety Data Sheet

Product: **HYDROFLUOROSILICIC ACID**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name INCITEC PIVOT LIMITED
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Synonym(s) 81488 - PRODUCT CODE • Fluorosilicic Acid • Fluosilicic Acid • FSA • Hydrofluosilicic Acid • Hydrofluorosilicic Acid
Use(s) Industrial Chemical, Water Treatment, Fluoridation
SDS Date 1/5/2010

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO ASCC CRITERIA

RISK PHRASES

R34 Causes burns
R41 Risk of serious damage to eyes

SAFETY PHRASES

S24/25 Avoid contact with skin and eyes
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S28 After contact with skin, wash immediately with plenty of water.
S36/37/39 Wear suitable protective clothing, gloves and eye/face protection
S45 In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No	1778	Hazchem Code	2X	Pkg Group	II
DG Class	8	Subsidiary Risk	None Allocated	EPG	8A4

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	Formula	Conc	CAS No
FLUOROSILICIC ACID	H ₂ SiF ₆	20%	16961-83-4
WATER	H ₂ O	Remainder	7732-18-5

4. FIRST AID MEASURES

Eye If in eyes, check for and remove any contact lenses. Hold eyelids apart and flush the eye continuously with running water. Continue flushing for at least 15 minutes.

Inhalation If inhaled, remove from contaminated area. Apply artificial respiration if not breathing. Do not give direct mouth-to-mouth resuscitation. To protect rescuer, use air-viva, oxy-viva or one-way mask. Resuscitate in a well-ventilated area. Seek immediate medical advice.

Skin If skin contact occurs, immediately remove contaminated clothing. Flush skin under running water for 15 minutes. Apply calcium gluconate gel to the affected area. Contact the poisons information centre. If pain continues, re-apply the gel until pain ceases. Cover affected area with a clean, dry dressing until medical help is available.

Ingestion If swallowed give large amounts of water to drink. Do not induce vomiting. If the victim is not breathing, apply artificial respiration use air-viva, oxy-viva or one-way mask. Seek immediate medical attention. For advice, contact a Poisons Information Centre on 13 11 26 (Australia Wide) or a doctor.

Advice to Doctor Treat symptomatically. Effects may be delayed.

First Aid Facilities Eye wash facilities and safety shower are recommended



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5. FIRE FIGHTING MEASURES

Flammability	Non flammable. May evolve toxic gases (fluorides) when heated to decomposition. May evolve flammable hydrogen gas in contact with some metals
Fire and Explosion	Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.
Extinguishing	Prevent contamination of drains or waterways
Hazchem Code	2X

6. ACCIDENTAL RELEASE MEASURES

Small Spill: Contain spill and stop leak if it can be done without risk.

Large Spill: Contact Emergency Services. Evacuate area and move upwind. Deny entry.

Do not walk through spilled material. Do not touch damaged containers or spilled material unless wearing approved PPE (Personal Protection Equipment). Refer to Section 8 for details.

Clean up of large spills should only be undertaken by trained emergency response personnel. Ventilate enclosed areas before re-entry. Absorb spilt material with vermiculate or other non-combustible absorbent (dry soil, sand or other inert material). Spill may be neutralized with Soda Ash (sodium carbonate) or Slaked Lime (calcium hydroxide). If in open, cover with plastic sheeting to minimize spreading or contact by rain. Collect in acid resistant lined or poly drums for disposal. Do not allow water to enter containers.

Once product has been recovered from sumps and adsorbent material swept up and removed, hose down contaminated surfaces and collect rinse water for disposal. If spill has occurred on an unsealed surface, scrape up topsoil.

If spill has occurred in an unbunded area, e.g. on open road while in transit, prevent discharge into drains and waterways, e.g. by construction of an earthen bund if safe to do so. If drains or surface water in drains has been contaminated, close off or block drains so as to prevent flow to larger watercourses, so that contaminated water can be pumped out and removed. Remove livestock so that they do not have access to contaminated water. Clean up and recovery operations should be done in consultation with and have the full approval of Emergency Response staff and the Environmental Protection Agency. If contaminated water can not be contained and water is available, it may be best to flush with copious amounts of unpolluted water so as to dilute the fluoride concentration in the receiving water.

See Section 13 for disposal information.

7. STORAGE AND HANDLING

This product is an acid and a S7 Poison. It is corrosive and toxic. Eye wash and shower stations should be available where acid is being handled. Should the product be spilt, leak or evaporate from containers, it will release highly toxic hydrogen fluoride gas.

Storage	Store in a cool, well ventilated area, removed from oxidising agents (e.g. peroxides), alkalis (e.g. hydroxides), active metals (e.g. sodium) and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills. Keep storage area and containers dry. Fluosilicic acid reacts with water which may lead to drum failure.
Handling	Avoid skin and eye contact and breathing in vapour, mists and aerosols. Maintain good personal hygiene. Wash hands thoroughly after handling and before eating. Always add the acid to water, never the reverse.



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8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Ventilation Do not inhale vapours. Use in well ventilated areas. In poorly ventilated areas, mechanical extraction ventilation is essential.

Exposure Standards FLUOROSILICIC ACID (16961-83-4)
ES-TWA: 2.5 mg/m³ (as fluorides)

PPE The selection of PPE is dependant on a detailed risk assessment of the tasks and handling methods.

Where large quantities are handled, such as loading/unloading road tankers, face shield, impervious coveralls, full-length butyl gloves and PVC boots are recommended.

Where an inhalation risk exists, wear a Full-face Type B (Inorganic and Acid gas) or an Air-line respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colourless to light brown liquid	Solubility (water)	Miscible
Odour	Characteristic sour odour	Specific Gravity	1.187
pH	1	% Volatiles	Not available
Vapour pressure	18 mm Hg @ 20 ^o C	Flammability	Not flammable
Vapour Density	Not available	Flash Point	Not relevant
Melting Point	0 ^o C (Approximately)	Upper Explosion Limit	Not relevant
Boiling point	105 Deg C	Lower Explosion Limit	Not relevant
Evaporation Rate	As for water	Autoignition Temp	Not available

10. STABILITY AND REACTIVITY

Material to Avoid Incompatible with oxidising agents (eg. hypochlorites), alkalis (e.g. hydroxides) and metals.

Decomposition Products Releases highly toxic hydrogen fluoride gas when evaporated or heated to decomposition. Like hydrogen fluoride, it attacks glass and stoneware.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Highly corrosive. Avoid eye or skin contact and vapour inhalation. Over exposure may result in respiratory damage. Burning sensation - corrosive effects may be delayed. Chronic effects may result in bone (osteosclerosis, skeletal fluorosis) and ligament damage. The potential for adverse effects will be reduced markedly when diluted. Evolves highly corrosive and toxic hydrofluoric acid.

Eye Highly corrosive. Contact may result in irritation, lacrimation, pain, redness, conjunctivitis and corneal burns with possible permanent damage.

Inhalation Corrosive. Over exposure may result in mucous membrane irritation of the respiratory tract, coughing and possible burns. High level exposure may result in ulceration of the respiratory tract, breathing difficulties, chemical pneumonitis and pulmonary oedema.

Skin Corrosive. Contact may result in irritation, redness, itching, pain, rash, dermatitis and burns. Effects may be delayed.

Ingestion Highly corrosive - toxic. Ingestion may result in severe burns to the mouth and throat, nausea, vomiting, abdominal pain and diarrhoea. Ingestion of large quantities may result in severe ulceration of the gastrointestinal tract, unconsciousness, convulsions and death.



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Toxicity Data FLUOROSILICIC ACID (16961-83-4)

LDLo (Subcutaneous): 140 mg/kg (frog)

Oral LD50

Rat	For the constituent	Fluosilicic Acid	430 mg/kg
	For this product	20% Fluosilicic Acid	2 150 mg/kg
Guinea Pig	For the constituent	Fluosilicic Acid	200 mg/kg
	For this product	20% Fluosilicic Acid	1 000 mg/kg

This product can evaporate or decompose when heated to release hydrogen fluoride (HF), also known as Hydrofluoric Acid.

Hydrofluoric Acid (7664-39-3) has an LC50 (Inhalation) of 342 ppm/1 hour (mouse).
The Hydrofluoric Acid lowest lethal concentration in humans is 50 ppm in 30 minutes.

12. ECOLOGICAL INFORMATION

Fluosilicic Acid (H_2SiF_6) contains 79% Fluorine (F). This product (20% Fluosilicic Acid) contains 16% Fluorine. Fluosilicic Acid is primarily used in the fluoridation of water supplies for drinking purposes. It disassociates in solution in water to form the hexafluorosilicate anion (SiF_6^{2-}) and protons (H^+).

If spilt, Fluosilicic Acid poses an immediate risk to humans and animals that come in direct contact with it, or are exposed to hydrogen fluoride fumes.

Fluosilicic Acid also poses a risk to aquatic life in and animals that drink from contaminated waterways, the extent of which will depend on the dilution that occurs. At high concentrations Fluosilicic Acid is toxic and poses an immediate health risk. At lower concentrations, long term exposure may result in fluorosis. At the concentrations used in fluoridation of town water supplies, it is harmless.

Fluorine is not essential for plants but is an essential element for animals. In the human body 99% of the fluoride is retained in calcium rich areas such as the bones and teeth (dentine and enamel). Low concentrations are good for teeth, but excessive concentrations can lead to debilitating disease, such as skeletal fluorosis.

In most areas, the main source of fluorine for animals is in their drinking water. Intake is dependent on the amount of water consumed and, among other factors, increases with temperature.

Fluorine is the most reactive and electronegative of all the chemical elements. It has a strong tendency to acquire a negative charge and is not found as fluorine in the natural environment.

Fluoride (F^-) combines with various cations. Mineral complexes of low solubility containing fluoride make up about 0.06 – 0.09 per cent of the earth's crust. The average concentration is 300 mg/kg F. Fluoride is found at higher concentrations, typically in the range of 2.5 - 4% F in fluorapatite (rock phosphate) from which phosphorus fertilisers are manufactured.

Fluoride ions are found in solution in all natural waters at some concentration. Seawater typically contains about 1mg/L F while rivers and lakes generally exhibit concentrations of less than 0.5 mg/L F. Fluoride concentrations in ground water are variable.

Concentrations of fluoride in water are limited by the amount of calcium that is present. Fluorite or calcium fluoride (CaF_2) is precipitated in waters high in calcium. If the water is hard (high in calcium), fluoride concentrations are unlikely to exceed 3 mg/L F.

High fluoride concentrations may be encountered in ground water from calcium-poor aquifers, such as granite and gneiss, in areas where fluoride-bearing minerals are common. Some artesian waters in Australia contain in excess of 10 mg/L F.

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In Australia, the national recommended level for fluoride in drinking water is about 1 mg/L. Below this supplementation may be beneficial. Dental fluorosis is the only side effect to which water fluoridation can contribute,

The World Health Organization (WHO) guideline for fluoride in drinking water for humans is 1.5 mg/L F. For livestock, concentrations up to 2 mg/L F can be considered safe, with increasing problems above this figure. For monogastrics, a suggested upper limit is 4 mg/L F, and 6 mg/L F for ruminants (cattle, sheep).

Long term consumption of water above these concentrations may result in fluorosis.

Acute toxicity may occur at higher concentrations.

Toxicity data for aquatic species is shown below.

Chronic ecotoxicity:

Fish: 21 days LC50 (*Salmo gairdneri*): from 2.7 - 4.7 mg/L, (as fluoride);
Crustaceans: 21 days NOEC (*Daphnia magna*): 3.7 mg/L, (as fluoride).

Acute ecotoxicity:

Fish: 96 hr LC50 (*Salmo gairdneri*): 51 mg/L, (as fluoride);
Crustaceans: 48 hr EC50 (*Daphnia magna*): 97 mg/L, (as fluoride), in fresh water conditions;
Crustaceans: 96 hr EC50 (*Mysidopsis bahia*): 10.5 mg/L, (as fluoride), in salt water conditions;
Algae: 96 hr EC50 (*Scenedesmus* sp.): 43 mg/L, (as fluoride).

13. DISPOSAL CONSIDERATIONS

Waste Disposal Contact and engage the services of a licensed professional waste contractor to undertake disposal of all contained waste and neutralised spill. If further information is required on disposal options and procedures, seek advice from the Local Government Waste Management Authority, and in turn State Environmental Protection Authority if necessary. Wear the protective equipment detailed in Section 8 at all times when handling waste. Ensure the area is well ventilated. If waste needs to be neutralised this can be done by SLOW addition TO a saturated sodium bicarbonate solution or similar basic solution. Hydrated lime (calcium hydroxide) can be used to precipitate fluoride as calcium fluoride (CaF₂). The Australian ADG Code requires empty containers to be labelled and treated as full. Do not allow water to enter containers. Professional advice should be sought on the decontamination and destruction of containers. Ensure all who are involved in the handling and disposal of waste and containers are advised of the presence of Fluosilicic Acid.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION





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CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name: FLUOROSILICIC ACID

UN No	1778	Hazchem Code	2X	Pkg Group	II
DG Class	8	Subsidiary Risk	None Allocated	EPG	8A4

IATA

Shipping Name: FLUOROSILICIC ACID

UN No	1778	DG Class	8	Pkg Group	II
Subsidiary Risk	None Allocated				

IMDG

Shipping Name: FLUOROSILICIC ACID

UN No	1778	DG Class	8	Pkg Group	II
Subsidiary Risk	None Allocated				

15. REGULATORY INFORMATION

Poison Schedule Classified as a Schedule 7 (**S7**) Poison using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

EXPOSURE STANDARDS - TIME WEIGHTED AVERAGES: Exposure standards are established on the premise of an 8 hour work period of normal intensity, under normal climatic conditions and where a 16 hour break between shifts exists to enable the body to eliminate absorbed contaminants. In the following circumstances, exposure standards must be reduced: strenuous work conditions; hot, humid climates; high altitude conditions; extended shifts (which increase the exposure period and shorten the period of recuperation).

ABBREVIATIONS:

mg/m³ - Milligrams per cubic metre

ppm - Parts Per Million

TWA/ES - Time Weighted Average or Exposure Standard.

CNS - Central Nervous System

NOS - Not Otherwise Specified

pH - relates to hydrogen ion concentration - this value will relate to a scale of 0 - 14, where 0 is highly acidic and 14 is highly alkaline.

CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.

M - moles per litre, a unit of concentration.

IARC - International Agency for Research on Cancer.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:

The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

HEALTH EFFECTS FROM EXPOSURE:

It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.



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This report has been prepared by Incitec Pivot Limited in consultation with:

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