



ABN: 81 008 668 371

MATERIAL SAFETY DATA SHEET

Fluorosilicic Acid

Section 1 – Identification of the Material and Supplier

Product Name

Fluorosilicic Acid (22% Solution)

Other names

Fluosilicic acid, hydrofluorosilicic acid, silicofluoric acid. Company product 2730.

Recommended use

Fluoridation of potable water.

Company name

CSBP Limited

Address

Kwinana Beach Road, KWINANA

State

Western Australia

Postcode

6167

Telephone number

(08) 9411 8777 (Australia), +61 8 9411 8777 (Overseas)

Emergency telephone number

1800 093 333 (Australia), +61 8 9411 8444

Section 2 – Hazard Identification

Hazard Classification, including a statement of overall hazardous nature

HAZARDOUS SUBSTANCE.

Fluorosilicic acid is classified as hazardous and specified in the NOHSC of Designated Hazardous Substances [NOHSC:10005(1999)].

DANGEROUS GOODS.

Fluorosilicic acid is classified for physicochemical hazards and specified as dangerous in the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code), 7th Edition, (FORS, 2007).

Risk Phrases

Fluorosilicic acid is classified as corrosive.

- R20/21/22** Harmful by inhalation, in contact with skin and if swallowed.
- R34** Causes burns
- R36/37/38** Irritating to eyes/respiratory system and skin.
- R41** Risk of serious damage to the eyes.
- R66** Repeated exposure may cause skin dryness or cracking.

Safety Phrases

Fluorosilicic acid is a hazardous substance.

- S7/9** Keep container tightly closed and in a well ventilated place
- S13** Keep away from food, drink and animal feeding stuffs.
- S21** When using do not smoke.
- S23** Do not breathe fumes, vapour or mist
- S24/25** Avoid contact with skin.
- S26** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S27** Take off immediately all contaminated clothing.
- S28** After contact with skin, wash immediately with plenty of water.
- S29** Do not empty into drains.
- S36/37/39** Wear suitable protective clothing, gloves and eye/face protection.
- S38** In case of insufficient ventilation, wear suitable respiratory equipment.
- S41** In case of fire and/or explosion do not breathe fumes.



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Safety Phrases (cont..)

S45	In case of accident or if you feel unwell seek medical attention immediately (show the label where possible).
S46/64	If swallowed, rinse mouth with water (only if the person is conscious), seek medical advice immediately and show this label.
S50	Do not mix with hypochlorites, cyanides and strong alkalis.
S51	Use only in well-ventilated areas.
S63	In case of accident by inhalation: remove casualty to fresh air and keep at rest.

Poison Schedule

SUSDP Poison Schedule 7

Section 3 – Composition/Information on Ingredients

Chemical identity of ingredients	Proportion of ingredients	CAS Number for ingredients
Fluorosilicic acid	22 % (wt/wt)	16961-83-4
Hydrofluoric acid	0.5 % (wt/wt)	7664-39-3
Water	Remainder	



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Section 4 – First Aid Measures

First Aid

FLUROSILICIC ACID IS CORROSIVE ON CONTACT AND POISONOUS BY INGESTION AND INHALATION OF ITS VAPOUR. FIRST AID ATTENTION MUST BE GIVEN AS URGENTLY AS POSSIBLE AS OUTLINED BELOW. ALL SUSPECTED FLUROSILICIC ACID BURNS SHOULD RECEIVE MEDICAL ATTENTION. TRAINING ON HANDLING FLUROSILICIC ACID INCIDENTS USING THIS MSDS SHOULD BE PROVIDED BEFORE ANY FLUROSILICIC ACID HANDLING OR USE COMMENCES.

First Aid Facilities

First aid procedures, equipment, medication and training for the treatment of burns with fluorosilicic acid should be in place BEFORE the use commences. First aid personnel should be aware of the nearest hospitals which are familiar with the treatment of fluorosilicic acid burns.

Equipment and medication in place should be:

Safety shower and eyewash stations immediately accessible in the workplace;

Eye-wash bottle;

Personal protective equipment for use by first aid personnel;

Fresh, clean cool drinking water;

1 % calcium gluconate fluid (Refrigerate and check Use-by-date);

1 % gluconate gel (Refrigerate and check Use-by-date);

1 % calcium chloride solution;

1 % aluminium hydroxide solution;

Oxygen;

“Space” or thermal blankets for treating patients for shock.

FIRST AID PROCEDURES FOR DEALING WITH THIS PRODUCT AND EXPOSURE TO IT

1. Personal Protection By First Aid Personnel

First aid personnel providing first aid treatment to a patient exposed to fluorosilicic acid should observe the following precautions for their own personal protection:

- Avoid contact with contaminated skin, clothing and equipment by wearing protective gloves;
- Wear chemical goggles as a minimum level of eye protection to prevent splashes of fluorosilicic acid entering eyes;
- Avoid inhalation of fluorosilicic acid fumes or mist during rescue in contaminated areas by wearing suitable respiratory protection;
- Respiratory protection suggested is: an air supplied breathing apparatus, or positive pressure self-contained breathing apparatus.

2. Swallowed

If 250 mL, or more, of fluorosilicic acid has been swallowed and if the person is conscious, rinse mouth thoroughly with water immediately, and give water or milk to drink. Induce vomiting. Seek medical assistance immediately.

If unable to induce vomiting, give lime water, or 1 % calcium chloride, or milk, or 1 % aluminium hydroxide solution before transferring to hospital.

Give oxygen via nasal catheter.

3. Eyes

Persons with potential eye exposure should not wear contact lenses. Immediately irrigate eye with copious amounts of water, while holding eyelids open, for at least 15 minutes.

Where available, and after flushing for 15 minutes with water, flush affected eye with 1 % calcium gluconate fluid for 2 minutes. Supply, storage and maintenance of calcium gluconate needs to be under supervision of a registered nurse.

Seek medical assistance immediately.



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FIRST AID PROCEDURES (cont..)

4. Skin

Wash affected area with copious amounts of water for at least 15 minutes.

Remove contaminated clothing and launder before re-use.

Apply 1 % calcium gluconate gel to affected area. If pain continues, re-apply the gel until pain ceases.

Seek medical assistance immediately.

5. Inhalation

Remove affected person from exposure to a well ventilated area. Keep warm and at rest.

Give oxygen.

If the affected person suffers cardiac arrest, commence cardio-pulmonary resuscitation immediately.

Seek medical assistance immediately.

ADVICE TO DOCTOR.

Treatment of acute skin and mucous membrane contact:

- Wash eyes, and shower instantly for 15 minutes;
- If pain exists perform topical application of 1 % calcium gluconate gel to the skin. Continual pain requires continuing gel application;
- Flush the eyes and under the eyelids with 1 % calcium gluconate fluid for 2 minutes. Flush for a further 15 minutes using water. Continuing pain warrants further flushing with 1 % calcium gluconate fluid for a further 2 minutes, followed by 10 minutes of flushing with water

Treatment for ingestion:

- If 250 mL, or more, has been swallowed induce vomiting immediately;
- The use of a gastric lavage using aluminium hydroxide solution, or lime water, or 1 % calcium chloride solution, or milk, is suggested – aluminium hydroxide solution is considered best;
- Insert an intravenous line. Monitor patient closely on ECG. Monitor plasma calcium regularly;
- 10 % calcium gluconate 500 mL given over 3 hours will be needed if there is a prolonged QT interval in the ECG.

Treatment of acute toxic response, once admitted into hospital:

- Insert I/V line with saline;
- Give oxygen and be prepared for intubation;
- Apply continuous cardiac monitoring;
- Assess status of calcium, magnesium, bicarbonate and pH;
- Induce a metabolic acidosis with sodium bicarbonate to aid renal clearance and with osmotic diuretic;
- Treat shock vigorously with saline, or plasma;
- If tetany appears use I/V 10 % calcium gluconate 30 mL slowly, repeat at 20 – 30 minute intervals (1 -3 mL per minute) until QT intervals return to normal;
- Correct dehydration and implement a forced alkaline diuresis by using sodium bicarbonate. If patient is aneuric do not discontinue I/V fluids;
- If ventricular fibrillation occurs, vigorously resuscitative efforts are appropriate with DC cardioversion and I/V lignocaine;
- If aneuric, extra corporeal haemodialysis is effective at removing fluoride;
- On cessation of pain, allow home and review within 24 hours. Any ongoing concerns regarding eye contact (identified on fluorescence staining) require an urgent ophthalmological opinion. Otherwise, cover with soframycin eye ointment and pad for 8 hours. Review the next day.

Long Term Complications

No data available.

Further information about the treatment for exposure to this product can be obtained from the Poisons Information Centre on (08) 13 1126 (Australia only)



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Section 5 – Fire Fighting Measures

Product flammability

Fluorosilicic acid is non-flammable and non-combustible. However, on contact with most metals, fluorosilicic acid will liberate hydrogen gas, which is flammable and explosive.

Suitable extinguishing media

Water spray or fog, foam, dry chemical powder, or carbon dioxide.

Hazard from combustion products

Decomposes on heating producing toxic and corrosive fumes, including hydrogen fluoride and silicon tetra-fluoride.

Special protective precautions and equipment for fire fighters

Wear full body protective clothing with breathing apparatus. Prevent spillage from entering drains or waterways. Consider evacuation. Use water to control fire and cool adjacent area and fire exposed fluorosilicic acid storage containers. Avoid direct water impingement on strong acid since this creates heat increasing toxic fume evolution. Do not approach fluorosilicic acid containers suspected to be hot. If safe and practicable to do so remove fluorosilicic acid containers from path of fire. Equipment should be thoroughly decontaminated after use.

Wear self-contained breathing apparatus with a full-face piece operated in pressure-demand or positive pressure mode.

After intervention, take shower, remove clothing carefully, clean and check equipment.

Hazchem Code

2X

Section 6 – Accidental Release Measures

Emergency procedures

The hazardous nature of fluorosilicic acid, require emergency and spill procedures to be effective to avoid both human and environmental exposure. Hazardous conditions may result if material is managed improperly. Make plans in advance to handle possible emergencies, including obtaining stocks of absorbent materials. Always wear recommended personal protective equipment and respiratory protection. Good ventilation is necessary.

Fluorosilicic acid dissolves very readily in water.

Methods and Materials for containment and clean up

For ALL spills, evacuate unprotected personnel upwind and out of danger.

Shut off fluorosilicic acid supply, if safe to do so. Shut off all possible sources of ignition. Stay upwind of vapours. Restrict access to spill site.

Small Leaks

Fluorosilicic acid fumes: Increase ventilation and allow fumes to vent to a safe area

Fluorosilicic acid liquid: If possible contain the surface area of a spill by bunding with sand, earth or vermiculite. Dilute spill with water, then neutralise with lime or soda ash to pH 6 to 10.

Prevent run-off into drains and waterways.

Large Leaks

Fluorosilicic acid fumes: Use water fog to dampen cloud of fluorosilicic acid fumes and reduce vapours. Do not spray water directly on the leak or fluorosilicic acid container.

Fluorosilicic acid liquid: If possible contain the surface area of a spill by bunding with sand, earth or vermiculite. Use foam blanket, at least 150 mm thick, to cover fluorosilicic acid and thus minimise evolution of acid fumes. Use water fog to dampen fluorosilicic acid fumes and reduce vapours.

Prevent run-off into drains and waterways.

Notify Fire and Rescue Services then CSBP Emergency Response.

Dispose of all contained spill residues in accordance with the requirements of the Department of Environment.



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For the management of fluorosilicic acid emergencies during transport by road or rail, SAA/SNZ HB76: Dangerous Goods-Initial Response Guide, Guide 37 should be consulted. This Guide should be carried at all times when fluorosilicic acid is being transported.

Clean up personnel will need personal protection equipment and respiratory protection. Portable safety shower and eyewash facilities may also be needed for clean up personnel. Bags of neutralising agent or chemical absorbent and substantial amounts of water will be required for large spill. A front-end loader may be required to scoop up neutralised acid/lime/soda ash residue. Foam blanket may be required for large spills.

Section 7 – Handling and Storage

Precautions for safe handling

Regulated dangerous goods as Class 8 Corrosive. Proper protective clothing to be worn includes: PVC jacket and pants, PVC gauntlet gloves, goggles and face shield, chemical resistant safety boots. A safety shower and eyewash should be available. Do not breathe vapour or mist. Avoid contact with skin, eyes and clothing.

In dilution process, do not add water to fluorosilicic acid, fluorosilicic acid should be added to plenty of water. Do not smoke anywhere near the storage and handling of fluorosilicic acid or associated pipework and equipment.

Do not touch damaged containers or spilled material unless wearing appropriate personal protective equipment.

Change and wash clothing, and personal protective equipment if contaminated, or before storing and/or re-using. Wash hands and face thoroughly after handling and before work breaks, eating, drinking, smoking and using toilet facilities.

Conditions for safe storage, including any incompatibilities

Ensure fluorosilicic acid in bulk is stored and handled in accordance with Australian Standard AS 3780 *The storage and handling of corrosive substances*. Ensure adequate ventilation to keep airborne concentration below exposure standard. Where necessary, use local exhaust ventilation in conjunction with P2 canister respirator, or as appropriate, self contained breathing apparatus.

Store away from strong alkalis, hypochlorites, cyanides, organic and combustible materials.

Fluorosilicic acid is highly corrosive to most metals, and is incompatible with glass and stoneware.

Section 8 – Exposure Controls/Personal Protection

National exposure standards

ES-TWA	ES-STEL	ES-Peak
2.5 mg/m ³ as fluorides (F)	No data assigned by NOHSC	No data assigned by NOHSC

Biological limit values

No data available.

Engineering controls

Handle fluorosilicic acid within closed systems whenever possible. Provide adequate ventilation particularly close to floor level.

Personal protective equipment

Whenever the risk of exposure exists, such as tanker loading/unloading procedures, non-routine operations and emergency circumstances, the following personal protection measures are recommended:

Respiratory protection

Self contained breathing apparatus recommended where risk of exposure to fluorosilicic acid or decomposition fumes exists.

Hand protection

PVC or butyl rubber gauntlet-type gloves.

Eye protection

Chemical splash goggles (gas tight type preferred) and full face shield.

Skin protection

PVC overalls or jacket and pants and butyl rubber Wellington boots.



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Section 9 – Physical and Chemical Properties

Appearance (colour, physical form, shape)

Cloudy grey liquid.

Odour

Slight pungent and unpleasant odour

pH

10% solution < 1

Vapour pressure

Approximately 24 mm mercury at 25°C

Vapour density

No data available

Boiling point/range

105°C at 101.3 kPa, with decomposition

Freezing/melting point

Freezes between -18°C and -20°C at 101.3 kPa

Solubility

Miscible in water in all proportions; soluble in methanol; insoluble in diethyl ether.

Specific gravity or density

Specific gravity = 1.18 at 20°C

Flash point and method of detecting flash point

Not applicable

Upper and lower flammable (explosive) limits in air

Not applicable

Ignition temperature

Not applicable

Viscosity

Approximately 6.5 mPa.s at 15.5°C

Section 10 – Stability and Reactivity

Chemical stability

Stable at ambient conditions.

Conditions to avoid

Decomposes in heat giving off toxic fluoride compounds, including fluorosilicic acid fumes and silicon tetrafluoride.

Incompatible materials

Corrosive to most metals. Incompatible with glass and stoneware. Incompatible with strong alkalis and strong concentrated acids. Reacts with oxidizing agents, combustible solids and organic peroxides.

Hazardous decomposition products

When heated to decomposition, emits toxic fluoride compounds, including fluorosilicic acid fumes and silicon tetrafluoride. Reaction with metals produces flammable hydrogen gas.

Hazardous reactions

Fluorosilicic acid may react violently with alkaline materials.



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Section 11 – Toxicological Information

HEALTH EFFECTS

When handled in accordance with the guidelines in this material safety data sheet, fluorosilicic acid should not present any health effects. If this product is mishandled, the following symptoms may develop:

Acute:

Fluorosilicic acid is an acute irritant to the skin, eyes and mucous membranes and lungs. The acid and its vapour are moderately toxic. Fluoride effects may be delayed up to 24 hours, depending upon the fluoride ion concentration.

Inhalation:

Severe irritant to the respiratory tract. Over exposure at high levels may result in mucous membrane irritation of the nose and throat with coughing, shortness of breath and pulmonary oedema (accumulation of fluid in lungs). Asthma can also be aggravated by exposure to fluorosilicic acid mists. Vapour, LC₅₀ (Inhalation, rat) = 850 to 1,070 ppm at 1 hour.

Skin:

Severe irritant. Prolonged contact may result in irritation, itching and possible skin rash.

Eye:

Severe irritant. Contact may result in lacrimation, irritation, pain, redness and conjunctivitis. Prolonged contact may lead to corneal burns and possible permanent damage.

Swallowed:

Severe irritant. Ingestion may cause burns of the intestinal tract leading to vomiting, acidosis, bloody diarrhoea, wheezing, laryngitis, shortness of breath, headache and shock. Circulatory system may be affected with symptoms of shock, rapid, weak or no pulse, severe hypotension and pulmonary changes with dyspnea and emphysema. In some cases, necrosis and haemorrhage of the gastrointestinal tract, liver damage and death may occur. Scarring of the gastrointestinal tract may occur in non-fatal cases. LD₅₀ (Oral, rat) = 410 mg/kg.

Chronic:

Chronic exposure to fluorosilicic acid may lead to sclerosis of the bones, calcification of ligaments, loss of weight, anaemia and teeth disorders. At low levels, chronic exposure can lead to nose bleeds and sinus problems.

Section 12 – Ecological Information

Ecotoxicity

Accidental spillage of fluorosilicic acid may suddenly reduce pH levels in an aquatic environment. No visible toxic effects have been observed on biological components such as plants and algae, although fluorosilicic acid is moderately toxic to molluscs and fish. However, hazard for the aquatic environment is limited due to fluorosilicic acid having low chronic properties. The acid is highly dependent on environmental conditions: pH, temperature, oxidoreductive potential, mineral and organic content of the medium.

Persistence and degradability

Abiotic:

- Air – neutralisation by natural alkalinity;
- Water/Soil – ionisation/neutralisation of inorganic and organic materials;
- Water/Soil – complexation/precipitation of inorganic materials.

Degradation product: aluminium/iron/calcium/phosphate complexes and /or precipitates, as a function of pH (fluorides).

Biotic: Not applicable as fluorosilicic acid is an inorganic compound.



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Mobility

- Air – mobility in aerosol form;
- Water – considerable solubility and mobility;
- Soil/Sediments – adsorption on minerals soil constituents – the proton occurring in clay may assist with neutralisation; may dissolve carbonate based materials; some material may remain for transport down towards the water table – on reaching the ground water table, the remnants of the acid may continue to move, in the direction of the ground water flow;
- Conditions: slightly acid pH (fluorides) - lime addition may be required to rectify low pH resulting from fluorosilicic acid spillages.

Environmental fate (exposure)

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).

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).

Bioaccumulative potential

Fluorosilicic acid has potential for bioaccumulation as fluorides into vegetables.

Section 13 – Disposal Considerations

Disposal methods and containers

Due to its inherent properties, hazardous conditions may result if material is managed improperly. Use lime, or preferably calcium hydroxide or calcium carbonate to precipitate the fluoride ion in the form of calcium difluoride (CaF₂). Dispose of all contained and neutralised spill residue in accordance with Department of Environment requirements. As required under the ADG Code treat empty containers as filled containers.

Special precautions for landfill or incineration

No data available

Section 14 – Transport Information

UN Number

1778

UN Proper shipping name

Fluorosilicic Acid

Class and subsidiary risk

Class 8 Corrosive. No subsidiary risk.

Packing group

II

Special precautions for user

Not to be loaded with explosives (Class 1), flammable solids; substances liable to spontaneous combustion; and substances that in contact with water emit flammable gases (Class 4), oxidizing agents (Class 5.1), organic peroxides (Class 5.2), toxic and infectious substances (Class 6) – where the Class 6 substance is a cyanide, radioactive substances (class 7) and foodstuffs and foodstuff empties.

Hazchem code

2X



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Section 15 – Regulatory Information

Australian regulatory information

SUSDP POISON Schedule 6. Licensing is required for this chemical in some States and Territories.

Listed on the Australian Inventory of Chemical Substances (AICS).

Additional national and/or international regulatory information

OSHA: Hazardous by definition of Hazard Communication Standard (29CFR 1910.1200).

Section 16 – Other Information

Key / legend to abbreviations and acronyms used in the MSDS

NOEC

NOHSC National Occupational Health and Safety Commission

SUSDP Standard for the Uniform Scheduling of Drugs and Poisons

EC₅₀: Environmental concentration 50. The concentration of a material, in ppm or ppb, in the environment (usually water) a single dose of which is expected to cause a biological effect on 50% of a group of test animals.

ES-TWA Exposure Standard – Time weighted average

ES-STEL Exposure Standard – Short term exposure level

ES-Peak Exposure Standard – Peak level

FORS Federal Office of Road and Safety

LC₅₀: Lethal concentration 50, median lethal concentration

LD₅₀ Lethal dose 50. The single dose of a substance that causes the death of 50% of an animal population from exposure to the substance by any route other than inhalation

%(^{wt}/wt) Percent amount on a weight per weight basis

%(^{wt}/vol) Percent amount on a weight per volume basis

PPM Parts per million

Zone 1 Class 1 An area in which an explosive gas atmosphere can be expected to occur periodically or occasionally during normal operation.
(More than 10 hours per year but less than 1000 hours per year)

Literature references

Occupational Safety and Health Regulations 1996, State Law Publisher, Western Australia.

National Code of Practice for the Preparation of Material Safety Data Sheets, [NOHSC:2011(2003)], Australian Government Publishing Service, Canberra, April 2003.

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Poisons Act 1964, State Law Publisher, Western Australia, Reprinted 22 January 1999.

Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NHSC:1003(1991)].

Hazardous Materials Handbook for Emergency Responders, Ongoard Training for Life, J. Varela (Editor), Van Nostrand Reinhold, New York, 1996.

Chemalert www.chemalert.net

Guidance for the Compilation of Safety Data Sheets for Fertilizer Materials, European Fertilizer Manufacturers Association, online at www.efma.org/Publications/Guidance/Index.asp

Sources for data

Important Notes

1. To the best of our knowledge this document complies with the National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition [NOHSC:2011 (2003)].
2. This material safety data sheet summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this material safety data sheet and consider the information in the context of how the product will be handled and used in the workplace, including in conjunction with other products.
3. If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact the Safety and Emergency Services Department, CSBP Limited on (08) 9411 8777 (Australia), +61 8 9411 8777 (Overseas).
4. Our responsibility for products sold, is subject to our terms and conditions, a copy of which is sent to our customers, and is also available on request.
5. CSBP reserves the right to make change to material safety data sheets without notice.