Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
SODIUM FLUORIDE GRANULAR-UL G (SODFLU25P)

SYNONYMS

PROPER SHIPPING NAME
SODIUM FLUORIDE, SOLID

PRODUCT USE
As an insecticide, used in other pesticide formulations; a constituent of vitreous enamel and glass mixes; as a steel degreasing agent; in electroplating; in fluxes; in heat treating salt compositions. Used in the fluoridation of drinking water; manufacture of coated paper; frosting glass; in dental laboratories; in the removal of HF from exhaust gases to reduce air pollution. Also used as a disinfection for fermentation apparatus in breweries and distilleries.

SUPPLIER
Company: Quantum Chemicals Pty Ltd
Address:
70 Quantum Close, Quantum Industrial Park
Dandenong South
VICTORIA, 3175
Australia
Telephone: +61 3 8795 8000
Fax: +61 3 8795 8099

Section 2 - HAZARDS IDENTIFICATION

HAZARDOUS SUBSTANCE. DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

CHEMWATCH HAZARD RATINGS

<table>
<thead>
<tr>
<th>Flammability</th>
<th>Toxicity</th>
<th>Body Contact</th>
<th>Reactivity</th>
<th>Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SCALE:</th>
<th>Min/Nil=0</th>
<th>Low=1</th>
<th>Moderate=2</th>
<th>High=3</th>
<th>Extreme=4</th>
</tr>
</thead>
</table>

RISK
Risk Codes  R25  R32  R36/38
Risk Phrases  Toxic if swallowed.  Contact with acids liberates very toxic gas.  Irritating to eyes and skin.

continued...
SAFETY

Safety Codes Safety Phrases
S01 • Keep locked up.
S22 • Do not breathe dust.
S24 • Avoid contact with skin.
S25 • Avoid contact with eyes.
S36 • Wear suitable protective clothing.
S38 • In case of insufficient ventilation, wear suitable respiratory equipment.
S37 • Wear suitable gloves.
S39 • Wear eye/face protection.
S40 • To clean the floor and all objects contaminated by this material, use water.
S35 • This material and its container must be disposed of in a safe way.
S13 • Keep away from food, drink and animal feeding stuffs.
S27 • Take off immediately all contaminated clothing.
S26 • In case of contact with eyes, rinse with plenty of water and contact Doctor or Poisons Information Centre.
S60 • This material and its container must be disposed of as hazardous waste.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>sodium fluoride</td>
<td>7681-49-4</td>
<td>&gt; 98</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

SWALLOWED

■ - IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
  - For advice, contact a Poisons Information Centre or a doctor.
  - Urgent hospital treatment is likely to be needed.
  - In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.

EYE

■ - 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.

SKIN

■ - If skin contact occurs:
  - Immediately remove all contaminated clothing, including footwear.
  - Flush skin and hair with running water (and soap if available).
  - Seek medical attention in event of irritation.

INHALED

■ - If 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.

NOTES TO PHYSICIAN

■ 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.
Section 5 - FIRE FIGHTING MEASURES

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

FIRE FIGHTING
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.

FIRE/EXPLOSION HAZARD
- Non combustible.
- Not considered a significant fire risk, however containers may burn.
Decomposition may produce toxic fumes of hydrogen fluoride.
May emit poisonous fumes.

FIRE INCOMPATIBILITY
- None known.

HAZCHEM
2Z

Section 6 - ACCIDENTAL RELEASE MEASURES

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 breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.

SUITABLE CONTAINER
- Lined metal can, lined metal pail/ can.
- Plastic pail.
- Polyliner drum.
- Packing as recommended by manufacturer.
For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure. </.

STORAGE INCOMPATIBILITY
- Sodium fluoride:
- aqueous solutions attack glass and react violently with xenon hexafluoride; are incompatible with sulfuric acid, caustics, ammonia, aliphatic amines, alkanolamines, amides, organic anhydrides, isocyanates, vinyl acetate, alkylene oxides, epichlorohydrin
- reacts with acids forming hydrogen fluoride.

continued...
- Contact with acids produces toxic fumes.

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, alkyene oxides, amides, epichlorohydrin, isocyanates, nitromethane, organic anhydrides, vinyl acetate.
- corrode metals in presence of moisture.
- Avoid strong bases.

PACKAGING MATERIAL INCOMPATIBILITIES

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Container Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&quot;304 stainless steel&quot;, &quot;316 stainless steel&quot;, &quot;Carbon Steel&quot;, Copper, Tygon</td>
</tr>
</tbody>
</table>

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

MATERIAL DATA

SODIUM FLUORIDE:

- It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.
- At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience).

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers’ responses to various airborne concentrations.

For fluorides:

- Based on a study in which the threshold for minimum increase in bone density due to fluoride exposure was 3.38 mg/m³ (as fluoride), the present TLV-TWA has been adopted to prevent irritant effects and disabling bone changes. There is also support for the proposition that occupational exposure below the TLV will have no adverse effect on pregnant women or off-spring.

PERSONAL PROTECTION

RESPIRATOR


EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent].

HANDS/FEET

- Wear chemical protective gloves, e.g. PVC.
- Wear safety footwear or safety gumboots, e.g. Rubber.

The selection of the 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 breakthrough time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:
Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

OTHER
- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.

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.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
White, odourless powder or crystals. Soluble in water, very slightly soluble in alcohol. May also be available as blue tinted crystals.

PHYSICAL PROPERTIES
Solid.
Mixes with water.
Contact with acids liberates very toxic gas.

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>42.0</td>
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<tr>
<td>Viscosity</td>
<td>Miscible</td>
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<tr>
<td>Solubility in water (g/L)</td>
<td>Miscible</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>pH (1% solution)</td>
<td>7.4 (saturated)</td>
</tr>
<tr>
<td>pH (as supplied)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>2.56 - 2.79</td>
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<tr>
<td>Relative Vapour Density (air=1)</td>
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<tr>
<td>Evaporation Rate</td>
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<tr>
<td>Divided solid</td>
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</tr>
<tr>
<td>Melting Range (°C)</td>
<td>988</td>
</tr>
<tr>
<td>Boiling Range (°C)</td>
<td>1695</td>
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<tr>
<td>Flash Point (°C)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition Temp (°C)</td>
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<tr>
<td>Autoignition Temp (°C)</td>
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<tr>
<td>Upper Explosive Limit (%)</td>
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</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Volatile Component (%vol)</td>
<td>Not available</td>
</tr>
</tbody>
</table>

Section 10 - STABILITY AND REACTIVITY

CONDITIONS CONTRIBUTING TO INSTABILITY
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
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. 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. The brain and kidneys may be affected. Other toxic effects include headache, increased saliva output, jerking of the eyeball and dilated pupils, lethargy, stupor, coma and rarely, convulsions.

Contact with acids liberates very toxic gases.

EYE
This material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Moderate inflammation may be expected with redness; conjunctivitis may occur with prolonged exposure.

continued...
SKIN

■ This material can cause inflammation of the skin on contact in some persons. The material may accentuate any pre-existing dermatitis condition. 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. Solution of material in moisture on the skin, or perspiration, may markedly increase skin corrosion and accelerate tissue destruction. Open cuts, abraded or irritated skin should not be exposed to this material. Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

■ Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual. There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled. If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures. 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. Pre-existing respiratory conditions such as emphysema, bronchitis may be aggravated by exposure. Occupational asthma may result from exposure.

CHRONIC HEALTH EFFECTS

■ Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray. Extended exposure to inorganic fluorides causes fluorosis, which includes signs of joint pain and stiffness, tooth discoloration, nausea and vomiting, loss of appetite, diarrhoea or constipation, weight loss, anaemia, weakness and general unwellness. There may also be frequent urination and thirst. Redness, itchiness and allergy-like inflammation of the skin and mouth cavity can occur. The central nervous system may be involved.

TOXICITY AND IRRITATION

■ The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. 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. The substance is classified by IARC as Group 3: NOT classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity may be inadequate or limited in animal testing.

CARCINOGEN

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>sodium fluoride</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Ecotoxicity

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
<th>Bioaccumulation</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>sodium fluoride</td>
<td>LOW</td>
<td>No Data</td>
<td>LOW</td>
<td>HIGH</td>
</tr>
</tbody>
</table>
Section 13 - DISPOSAL CONSIDERATIONS

- Containers may still present a chemical hazard/danger when empty.
- Return to supplier for reuse/recycling if possible.

Otherwise:
- If container cannot 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.

Legislation addressing waste disposal requirements may differ by country, state and/or territory. Each user must refer to laws operating in their area.

A Hierarchy of Controls seems to be common - the user should investigate:
- Reduction.
- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.

For small quantities:
- Cautiously dissolve in water
- Neutralise with sodium carbonate or if product does not dissolve completely add a small quantity of hydrochloric acid followed by sodium carbonate
- Add excess calcium chloride to precipitate the fluoride and/or carbonate
- Remove solids to site approved for hazardous waste.
- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.
- Recycle containers if possible, or dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

Labels Required: TOXIC

HAZCHEM:
2Z (ADG7)

ADG7:
Class or Division: 6.1
UN No.: 1690
Special Provision: None
Portable Tanks & Bulk Containers - Instruction:
Packagings & IBCs - Packing Instruction:
P002 IBC08 LP02

Name and Description: SODIUM FLUORIDE, SOLID

Land Transport UNDG:
Class or division: 6.1
UN No.: 1690
Shipping Name: SODIUM FLUORIDE, SOLID

Air Transport IATA:
ICAO/IATA Class: 6.1
UN/ID Number: 1690
Special provisions: None
Cargo Only
Packing Instructions: 677
Passenger and Cargo Packing Instructions: 670
Limited Quantity
Packing Instructions: Y645

Shipping name: SODIUM FLUORIDE, SOLID

Maritime Transport IMDG:
IMDG Class: 6.1
UN Number: 1690
EMS Number: F-A, S-A

IMDG Subrisk: None
Packing Group: III
Special provisions: None

continued...
Limited Quantities: 5 kg
Shipping name: SODIUM FLUORIDE, SOLID

Section 15 - REGULATORY INFORMATION

Indications of Danger:

T Toxic

POISONS SCHEDULE S6

REGULATIONS

Sodium Fluoride Granular-UL G (SODFLU25P) (CAS: 7681-49-4) is found on the following regulatory lists:
- "Australia - Australian Capital Territory - Environment Protection Regulation: Pollutants entering waterways taken to cause environmental harm - Domestic water supply quality"
- "Australia Hazardous Substances"
- "Australia High Volume Industrial Chemical List (HVICL)"
- "Australia Inventory of Chemical Substances (AICS)"
- "Australia National Pollutant Inventory"
- "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix E (Part 2)"
- "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix F (Part 3)"
- "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix J (Part 2)"
- "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 2"
- "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 3"
- "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 4"
- "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5"
- "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6"
- "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs"
- "United Nations Consolidated List of Products Whose Consumption and/or Sale Have Been Banned, Withdrawn, Severely Restricted or Not Approved by Governments"

Section 16 - OTHER INFORMATION

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.

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This is the end of the MSDS.