

MATERIAL SAFETY DATA SHEET



Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

Effective Date: 10/7/03
Product Code: 91503
MSDS: 000506

VIKANE* GAS FUMIGANT

1. PRODUCT AND COMPANY IDENTIFICATION:

PRODUCT: Vikane* Gas Fumigant

COMPANY IDENTIFICATION:

Dow AgroSciences
9330 Zionsville Road
Indianapolis, IN 46268-1189

2. COMPOSITION/INFORMATION ON INGREDIENTS:

Sulfuryl fluoride	CAS# 002699-79-8	99.8%
Impurities Associated with the Active Ingredient		0.2%

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

3. HAZARDOUS IDENTIFICATIONS:

EMERGENCY OVERVIEW

Hazardous Chemical. Colorless, odorless compressed gas. Evacuate immediate area if leak occurs. Excessive vapor concentrations are attainable and a single exposure may cause death. Toxic to pets, fish, wildlife, and avian.

EMERGENCY PHONE NUMBER: 800-992-5994

POTENTIAL HEALTH EFFECTS: This section includes possible adverse effects, which could occur if this material is not handled in the recommended manner.

EYE: Essentially non-irritating to eyes. Liquid may cause frostbite.

SKIN: Essentially non-irritating to skin. Liquid may cause frostbite. No adverse effects anticipated by skin absorption.

INGESTION: Moderate toxicity if swallowed. The oral LD₅₀ for rats is 100 mg/kg. Swallowing is unlikely because of the physical state.

INHALATION: Vapor concentrations are attainable which may be fatal with single exposure. Excessive exposure may cause severe irritation to upper respiratory tract (nose and throat) and lungs. The LC₅₀ for a 4-hour exposure for rats is 991-1122 ppm.

SYSTEMIC (OTHER TARGET ORGAN) EFFECTS: In animals, effects have been reported on the following organs: brain, central nervous system, kidney, lung, respiratory tract and thyroid gland. Observations in animals include convulsions and tremors. May cause fluorosis of teeth and bones.

CANCER INFORMATION: Did not cause cancer in laboratory animals.

TERATOLOGY (BIRTH DEFECTS): Birth defects are unlikely. Exposures having no effect on the mother should have no effect on the fetus. Did not cause birth defects in animals; other effects were seen in the fetus only at doses which caused toxic effects to the mother.

REPRODUCTIVE EFFECTS: In animal studies, did not interfere with reproduction.

4. FIRST AID:

EYES: In case of frostbite, immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention promptly preferably from an ophthalmologist.

SKIN: If shoes, gloves, or clothing covering skin become wet with sulfuryl fluoride, immediately apply water to contaminated clothing before removing. Once area has thawed, remove contaminated items covering skin. Wash thoroughly or shower.

INGESTION: If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Seek medical attention.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

MATERIAL SAFETY DATA SHEET



Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

VIKANE* GAS FUMIGANT

Effective Date: 10/7/03
Product Code: 91503
MSDS: 000506

NOTE TO PHYSICIAN: Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Sulfuryl fluoride is a gas, which has no warning properties such as odor or eye irritation (however, chloropicrin is used as a warning agent and is a known lachrymator). The prediction of possible human effects is based in part on observations made on laboratory animals. It is predicted that persons exposed to sulfuryl fluoride will show little evidence of intoxication at first, unless the concentration is very high (>400 ppm). Early symptoms of exposure to sulfuryl fluoride are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. It is essential to keep such an individual at bed rest for at least 24 hours. Clinical observations should be directed at the pulmonary, hepatic, and renal systems. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations can result in significant lung and kidney damage. Convulsions may ensue with respiratory arrest being the terminal event. Assisted respiration may be necessary. Clinical observation is essential. There is no known antidote for over-exposure to sulfuryl fluoride.

5. FIRE FIGHTING MEASURES:

FLASH POINT: Not applicable
METHOD USED: Not applicable

FLAMMABLE LIMITS

LFL: Not combustible
UFL: Not combustible

EXTINGUISHING MEDIA: Sulfuryl fluoride is not combustible. However, if cylinders are in a fire area, water can be used to keep them cool to help prevent discharge of product caused by melted fusible plugs on the cylinders. Use of water will also help to scrub out part of any hydrofluoric acid and sulfur dioxide, which may be formed by decomposition of the product in a fire.

FIRE & EXPLOSION HAZARDS: Cylinders exposed to fire may vent and release toxic gas through melted fusible plugs on cylinders. Although sulfuryl fluoride is not combustible, in temperatures exceeding 400°C (752°F), it will degrade to form hydrogen fluoride and sulfur dioxide.

FIRE-FIGHTING EQUIPMENT: Wear positive-pressure, self-contained breathing apparatus and full protective clothing. When fighting fires in atmospheres containing potentially high concentrations of sulfuryl fluoride, encapsulating protective suits should be worn due to possible formation of hydrofluoric acid. Protective suit material should be compatible with exposure to hydrofluoric acid.

6. ACCIDENTAL RELEASE MEASURES:

ACTION TO TAKE FOR SPILLS/LEAKS: Evacuate immediate area if cylinder begins to leak. Use a NIOSH or MSHA approved positive-pressure, self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott, or MSA, for entry into affected areas to correct problem. For leaking cylinders occurring near structure being fumigated, place the cylinder inside the designated structure if it can be done safely. If leaking cylinder occurs elsewhere, move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 5 ppm or less, as determined by a detection device with sufficient sensitivity such as an INTERSCAN or MIRAN gas analyzer. For detailed information on the source and use of air monitoring devices or respirators, consult Dow AgroSciences at 800-992-5994.

7. HANDLING AND STORAGE:

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Handling: Keep out of reach of children. Do not breathe gas. Keep all unnecessary people and pets out of area containing sulfuryl fluoride gas. Storage: Store in original container and away from heat and dwellings.

MATERIAL SAFETY DATA SHEET



Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

Effective Date: 10/7/03
Product Code: 91503
MSDS: 000506

VIKANE* GAS FUMIGANT

8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

These precautions are suggested for conditions where a potential for exposure exists. Emergency conditions may require additional precautions.

EXPOSURE GUIDELINE: Sulfuryl fluoride: ACGIH TLV is 5 ppm TWA, 10 ppm STEL. OSHA PEL is 5 ppm TWA.

ENGINEERING CONTROLS: Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines. Lethal concentrations may exist in areas with poor ventilation.

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below exposure guideline. When respiratory protection is required, use a NIOSH approved self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. For emergency and other conditions where the exposure guideline may be exceeded, use a NIOSH approved positive-pressure self-contained breathing apparatus or positive pressure airline with auxiliary self-contained air supply. In confined or poorly ventilated areas, use a NIOSH approved self-contained breathing apparatus or positive pressure airline with auxiliary self-contained air supply.

SKIN PROTECTION: No special skin protection should be needed. Skin contact with the liquid may cause freeze damage if the liquid is confined to the skin; do not wear gloves or rubber boots.

EYE PROTECTION: Use chemical goggles.

APPLICATORS AND ALL OTHER HANDLERS: Refer to the product label for personal protective clothing and equipment.

9. PHYSICAL AND CHEMICAL PROPERTIES:

BOILING POINT: -67°F (-55°C)
VAPOR PRESSURE: 15.2 atmospheres @ 20°C
VAPOR DENSITY: 4.3 g/L @ 20°C
SOLUBILITY IN WATER: Practically insoluble
SPECIFIC GRAVITY: 1.35 @ 20°C
APPEARANCE: Colorless
ODOR: Odorless compressed gas

10. STABILITY AND REACTIVITY:

STABILITY: (CONDITIONS TO AVOID) Cylinders may leak or rupture in a fire.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Strong base.

HAZARDOUS DECOMPOSITION PRODUCTS: Sulfur dioxide and hydrogen fluoride under fire conditions with hydrocarbons.

HAZARDOUS POLYMERIZATION: Not known to occur.

11. TOXICOLOGICAL INFORMATION:

MUTAGENICITY: In-vitro and animal genetic toxicity studies were negative.

12. ECOLOGICAL INFORMATION:

ENVIRONMENTAL FATE:

MOVEMENT & PARTITIONING:

Bioconcentration potential is low (BCF <100 or Log Pow <3). Potential for mobility in soil is very high (Koc between 0 and 50).

Log octanol/water partition coefficient (Log Pow) is estimated using a structural fragment method to be 0.41. Soil organic carbon/water partition coefficient (Koc) is estimated to be 6.124.

Henry's Law Constant (H) is estimated to be 3.28E-02 atm-M³/mole.

DEGRADATION & PERSISTENCE:

The hydrolysis half-life is 18 minutes to 3 days.

MATERIAL SAFETY DATA SHEET



Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

VIKANE* GAS FUMIGANT

Effective Date: 10/7/03
Product Code: 91503
MSDS: 000506

ECOTOXICOLOGY:

Material is highly toxic to aquatic invertebrates on an acute basis (LC₅₀ or EC₅₀ is between 0.1 and 1 mg/L. Acute immobilization EC₅₀ in water flea (*Daphnia magna*) is 0.62 mg/L. Growth inhibition EC₅₀ in green alga (*Selenastrum capricornutum*) is 3.05 mg/L. Growth inhibition EC₅₀ in green alga (*Selenastrum capricornutum*) is 0.83 mg/L.

13. DISPOSAL CONSIDERATIONS:

DISPOSAL METHOD: Promptly return all empty cylinders to Dow AgroSciences. Wastes are toxic. Improper disposal of excess waste is a violation of federal law. If these wastes can not be disposed of by use according to label instruction, consult your state pesticide or the hazardous waste representative at the nearest EPA regional office for guidance.

14. TRANSPORT INFORMATION:

U.S. DEPARTMENT OF TRANSPORTATION (DOT) INFORMATION:

Do not ship this material by air.

For all other modes of transportation:
SULPHURYL FLUORIDE/2.3/UN/2191/POISON
INHALATION HAZARD/ZONE D

15. REGULATORY INFORMATION:

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations.

U.S. REGULATIONS

SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CAS NUMBER	CONCENTRATION
Sulfuryl Fluoride	002699-79-8	99.8%

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

- An immediate health hazard
- A delayed health hazard
- A sudden release of pressure hazard
- A reactive hazard

TOXIC SUBSTANCES CONTROL ACT (TSCA): All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.

MATERIAL SAFETY DATA SHEET



Emergency Phone: 800-992-5994
Dow AgroSciences LLC
Indianapolis, IN 46268

VIKANE* GAS FUMIGANT

Effective Date: 10/7/03
Product Code: 91503
MSDS: 000506

STATE RIGHT-TO-KNOW: The following product components are cited on certain state lists as mentioned. Non-listed components may be shown in the composition section of the MSDS.

CHEMICAL NAME	CAS NUMBER	LIST
Sulfuryl Fluoride	002699-79-8	NJ3 PA1

NJ3=New Jersey Workplace Hazardous Substance (present at > or = to 1.0%).

PA1=Pennsylvania Hazardous Substance (present at > or - to 1.0%).

OSHA HAZARD COMMUNICATION STANDARD: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS:

<u>Category</u>	<u>Rating</u>
Health	3
Flammability	0
Reactivity	1

COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT (CERCLA, or SUPERFUND): To the best of our knowledge, this product contains no chemical subject to reporting under CERCLA.

16. OTHER INFORMATION:

MSDS STATUS: Revised Section: 2, 3, 4, 8, 11, 12 & 14
Reference: DR-0015-5588
Replaces MSDS dated: 5/22/01
Document Code: D03-069-447
Replaces Document Code: D03-069-446

The Information Herein Is Given In Good Faith, But No Warranty, Express or Implied, Is Made. Consult Dow AgroSciences for Further Information.