Safety Data Sheet

Issue Date: 23-Feb-2019 **Revision Date:** 15-Jul-2019 **Version** 3

1. IDENTIFICATION

Product identifier

Product Name Vikane™

Other means of identification

SDS # DOUG-005
Document ID # SDS.VIKANE.English.20190715.1
Registration Number(s) EPA Reg. No. 1015-78
UN/ID No UN2191

Recommended use of the chemical and restrictions on use

Recommended Use End Use Fumigant.

Details of the supplier of the safety data sheet

Supplier Address
Douglas Products and Packaging Company, LLC
1550 East Old 210 Highway
Liberty, MO 64068
Customer Information Number: 800-223-3684

Emergency telephone number

Emergency Telephone 1-844-845-3129 or 1-352-326-7641

2. HAZARDS IDENTIFICATION

Emergency Overview: This chemical is a product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-EPA registered chemicals. Please see Section 15 for additional EPA information.

Appearance: Colorless gas **Physical state:** Gas **Odor:** Odorless

Classification

Acute toxicity - Oral	Category 3
Acute toxicity - Inhalation (Gases)	Category 2
Acute toxicity - Inhalation (Dusts/Mists)	Category 3
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 1
Specific target organ toxicity (repeated exposure)	Category 2
Gases under pressure	Liquefied gas

Signal Word
Danger

Hazard statements
Toxic if swallowed
Fatal if inhaled
May cause cancer
Causes damage to organs
May cause damage to organs through prolonged or repeated exposure
Contains gas under pressure; may explode if heated

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear respiratory protection

Precautionary Statements - Response
If exposed or concerned: Get medical advice/attention
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a poison center or doctor/physician
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth

Precautionary Statements - Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Protect from sunlight

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Other hazards
Very toxic to aquatic life

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	CAS No	Weight-%
Sulfuryl fluoride	2699-79-8	99.8
Other ingredients	Proprietary	0.1

If Chemical Name/CAS No is "proprietary" and/or Weight-% is listed as a range, the specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. FIRST AID MEASURES

Description of first aid measures

General Advice Provide this SDS to medical personnel for treatment. Any additional important symptoms and effects are described in Section 11: Toxicology Information.

Eye Contact Liquid: 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.
Gas: No treatment required.

Skin Contact	Liquid: Immediately apply water to contaminated area of clothing before removing. Once area has thawed, remove contaminated clothing, shoes, and other items covering skin. Rinse skin immediately with plenty of water for 15 to 20 minutes. Call a poison control center or doctor for treatment advice. Thoroughly aerate clothing and shoes contacted by liquid fumigant before wearing again. Gas: No treatment required. No decontamination of clothing or shoes covering the skin is required.
Inhalation	Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc). Call a poison control center or doctor for treatment advice. If breathing is difficult, oxygen should be administered by qualified personnel. If the person is not breathing and has no pulse, consider cardiopulmonary resuscitation (CPR); use pocket resuscitation mask, bag valve mask etc., to avoid risk of poisoning rescuer. To prevent pulmonaryedema have the person inhale 5 shots of an aerosol corticosteroid metered dose inhaler (if available), such asbeclomethasone or fluticasone, etc., every 10 minutes until the person is evaluated by a physician.
Ingestion	Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.
Self-Protection of the First Aider	First Aid responders should pay attention to self-protection and use the recommended protective clothing (gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Most important symptoms and effects, both acute and delayed

Symptoms	Fatal if inhaled. Toxic if swallowed. See Section 11: Toxicological Information of this SDS for more detailed symptoms.

Indication of any immediate medical attention and special treatment needed

Notes to Physician	Maintain adequate ventilation and oxygenation of the patient. Sulfuryl fluoride is a gas which has no warning properties such as odor or eye irritation. The prediction of possible human effects is based in part on observations made on laboratory animals. Treat for frostbite from exposure to the liquid fumigant if present (eyes, skin) with gentle rewarming by water irrigation for at least 15 minutes. Clinical observation is essential. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress There is no known antidote for overexposure to sulfuryl fluoride. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. It is predicted that persons exposed to sulfuryl fluoride will show little evidence of intoxication at first, unless the concentration is very high (greater than 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. May cause asthma-like (reactive airways) symptoms. Bronchodilators, expectorants, antitussives and corticosteroids may be of help. Respiratory symptoms, including pulmonary edema, may be delayed. Consider administering a complete aerosol corticosteroid metered dose inhaler (100-150 shots) or equivalent as initial preventive treatment for incipient pulmonary edema. Consider administering 250-1000 mg prednisolone IV on the first day of treatment. Excessive exposure may aggravate preexisting asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome).

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

This material does not burn. If exposed to fire from another source, use suitable extinguishing agent for that fire.

Unsuitable Extinguishing Media Not determined.

Specific Hazards Arising from the Chemical

Container may rupture from gas generation in a fire situation.

Hazardous combustion products: Decomposition products can include and are not limited to: Hydrogen fluoride. Sulfur oxides. Toxic gases are released during decomposition.

Protective equipment and precautions for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Move container from fire area if this is possible without hazard. Contain fire water run-off if possible. Fire water runoff, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this SDS.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective firefighting clothing (includes firefighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during firefighting operations. If contact is likely, change to full chemical resistant firefighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions	Isolate area. Stay upwind and out of low areas. Ventilate area of leak or spill. Use personal protection recommended in Section 8.

Environmental precautions

Environmental precautions	Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and material for containment and cleaning up

Methods for Containment	Prevent further leakage or spillage if safe to do so.
Methods for Clean-Up	Isolate area until gas has dispersed. Small spills: Knock down and dilute vapors with water fog or spray. Apply vapor suppression foams until spill can be cleaned up. Use non-sparking tools in cleanup operations. Large spills: Contact Douglas Products for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on Safe Handling Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep container tightly closed and store in a cool, dry and well-ventilated place. Keep/store only in original container. Do not store near food, foodstuffs, drugs or potable water supplies.

Incompatible Materials Strong bases.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Sulfuryl fluoride 2699-79-8	STEL: 10 ppm TWA: 5 ppm TWA: 2.5 mg/m^3 F	TWA: 5 ppm TWA: 20 mg/m^3 TWA: 2.5 mg/m^3 F (vacated) TWA: 5 ppm (vacated) TWA: 20 mg/m^3 (vacated) TWA: 2.5 mg/m^3 (vacated) STEL: 10 ppm (vacated) STEL: 40 mg/m^3	IDLH: 200 ppm IDLH: 250 mg/m^3 F TWA: 5 ppm TWA: 20 mg/m^3 STEL: 10 ppm STEL: 40 mg/m^3
Other ingredients	TWA: 10 ppm	TWA: 50 ppm (vacated) TWA: 1 ppm (vacated) TWA: 4 mg/m^3 (vacated) STEL: 2 ppm (vacated) STEL: 8 mg/m^3 Ceiling: 100 ppm	IDLH: 50 ppm TWA: 1 ppm TWA: 4 mg/m^3 STEL: 2 ppm STEL: 8 mg/m^3

Other Information RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDINGAND PACKAGING WORKERS. **APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCTLABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.**

Appropriate engineering controls

Engineering Controls Apply technical measures to comply with the occupational exposure limits. Showers. Eyewash stations. Ventilation systems. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. Lethal concentrations may exist in areas with poor ventilation.

Individual protection measures, such as personal protective equipment

Eye/Face Protection For handling the gas, wear safety glasses (with side shields). When contact with the liquid (condensed gas) is possible, wear chemical goggles. Refer to 29 CFR 1910.133 for eye and face protection regulations.

Skin and Body Protection Wear clean, body-covering clothing. Chemical protective gloves should not be needed when handling this material. Consistent with general hygienic practice for any material, skin contact should be minimized. Refer to 29 CFR 1910.138 for appropriate skin and body protection.

Respiratory Protection Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. When respirator protection is required, use an approved positive-pressure self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply. Refer to 29 CFR 1910.134 for respiratory protection requirements.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Gas		
Appearance	Colorless gas	**Odor**	Odorless
Color	Colorless	**Odor Threshold**	Odorless

Property	**Values**	**Remarks • Method**
pH	Not applicable	
Melting point / freezing point	-137°C / -215°F	
Boiling point / boiling range	-54°C / -65°F	
Flash point	Not applicable	
Evaporation Rate	Not applicable	
Flammability (Solid, Gas)	Not Flammable	
Flammability Limit in Air		
Upper flammability or explosive limits	Not applicable	
Lower flammability or explosive limits	Not applicable	
Vapor Pressure	18,000 hPa	(at 20°C/68°F)
Vapor Density	3.5	(at 20°C/68°F) (Air=1)
Relative Density	1.35	(Water=1)
Water Solubility	1.04 g/L 20°C, Unbuffered	
Solubility in other solvents	Not determined	
Partition Coefficient	Not determined	
Autoignition temperature	Not applicable	
Decomposition temperature	Not determined	
Kinematic viscosity	Not determined	
Dynamic Viscosity	Not determined	
Explosive Properties	Not determined	
Oxidizing Properties	Not determined	

Other information

Softening Point NOTE: The physical data presented above are typical values and should not be construed as a specification

10. STABILITY AND REACTIVITY

Reactivity
Not reactive under normal conditions.

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

Conditions to Avoid
Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible materials
Strong bases.

Hazardous decomposition products
Decomposition products can include and are not limited to: Hydrogen fluoride. Sulfur oxides. Toxic gases are released during

decomposition.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Eye Contact No hazard from gas. Liquid may cause frostbite.

Skin Contact Prolonged skin contact is unlikely to result in absorption of harmful amounts. The dermal LD50 of Sulfuryl fluoride has not been determined.

Inhalation Fatal if inhaled. 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.

Ingestion Toxic if swallowed. Swallowing is unlikely because of the physical state. Single dose oral LD50 of Sulfuryl fluoride has not been determined.

Component Information

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
Sulfuryl fluoride 2699-79-8	-	-	= 991-1122 ppm (Rat) 4 h
Other ingredients	= 680 mg/kg (Rat)	= 4890 mg/kg (Rabbit)	= 4 mg/L (Rat) 6 h

Symptoms related to the physical, chemical and toxicological characteristics

Symptoms Please see section 4 of this SDS for symptoms.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation Essentially nonirritating to skin. Liquid may cause frostbite upon skin contact.

Germ cell mutagenicity Most in vitro genetic toxicity studies were negative, but some were positive due to artifacts associated with the test system. Animal genetic toxicity studies were negative.

Carcinogenicity Carcinogenic potential is unknown.

Chemical name	ACGIH	IARC	NTP	OSHA
Sulfuryl fluoride 2699-79-8		Group 2A		X
Other ingredients		Group 2B	Reasonably Anticipated	X

Reproductive toxicity In animal studies, did not interfere with reproduction.

Teratogenicity Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.

STOT - single exposure Causes damage to organs. Route of Exposure: Inhalation
Target Organs: Kidney.

STOT - repeated exposure Causes damage to organs through prolonged or repeated exposure. In animals, effects have been reported on the following organs: Central nervous system, Kidney, Lung, Respiratory tract, Thyroid observations in animals include: Convulsions, Tremors. May cause fluorosis of teeth and bones.

Numerical measures of toxicity

Oral LD50 100.20 mg/kg
Gas 100.20 mg/L
ATEmix (inhalation-dust/mist) 0.50 mg/L

12. ECOLOGICAL INFORMATION

Ecotoxicity

Very toxic to aquatic life.

Component Information

Chemical name	Algae/aquatic plants	Fish	Crustacea
Sulfuryl fluoride	EyC50, Pseudokirchneriella subcapitata (green algae), static test, 96 Hour, Growth inhibition (cell density reduction), 3.05 mg/l EbC50, Pseudokirchneriella subcapitata (green algae), static test, 72 Hour, Biomass, 0.58 mg/l ErC50, Pseudokirchneriella subcapitata (green algae), static test, 72 Hour, Growth rate inhibition, 1.13 mg/l	LC50, Danio rerio (zebra fish), static test, 96 Hour, 0.89 mg/l	EC50, Daphnia magna (Water flea), static test, 48 Hour, 0.62 mg/l
Other ingredients	433: 96 h Pseudokirchneriella subcapitata mg/L EC50 166: 96 h Desmodesmus subspicatus mg/L EC50 static	225: 96 h Oncorhynchus mykiss mg/L LC50 static 110 - 123: 96 h Pimephales promelas mg/L LC50 flow-through 230 - 710: 96 h Lepomis macrochirus mg/L LC50 flow-through	140 - 190: 48 h Daphnia magna mg/L EC50 Static

Persistence/Degradability

Chemical degradation (hydrolysis) is expected in the environment.

Bioaccumulation

Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Partition coefficient: n-octanol/water (log Pow): 0.41 Estimated.

Mobility

Potential for mobility in soil is very high (Koc between 0 and 50). Partition coefficient (Koc): 6 Estimated

Chemical name	Partition coefficient
Other ingredients	1.45

Other Adverse Effects

Toxicity to Above Ground Organisms

LC50, Apis mellifera (bees), 2 Hour, mortality, 6.5mg/l

LC50, Colinus virginianus (Bobwhite quail), 4 Hour, 1,844 ppm

13. DISPOSAL CONSIDERATIONS

Waste Treatment Methods

Disposal of Wastes

If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

Contaminated Packaging

Disposal should be in accordance with applicable regional, national and local laws and regulations.

US EPA Waste Number

Chemical name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Other ingredients	U077	Included in waste streams: F024, F025, F039, K018, K019, K020, K029, K030, K096	0.5 mg/L regulatory level	U077

Chemical name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
Other ingredients	Category I - Volatiles		Toxic waste waste number F025 Waste description: Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.	

California Hazardous Waste Status

Chemical name	California Hazardous Waste Status
Sulfuryl fluoride 2699-79-8	Toxic
Other ingredients	Toxic Ignitable

14. TRANSPORT INFORMATION

Note Please see current shipping paper for most up to date shipping information, including exemptions and special circumstances.

DOT

UN/ID No UN2191
Proper Shipping Name Sulfuryl Fluoride
Hazard class 2.3

IATA Forbidden

IMDG

UN number UN2191
Proper Shipping Name Sulfuryl Fluoride
Transport hazard class(es) 2.3
Marine Pollutant Yes

15. REGULATORY INFORMATION

International Inventories

Chemical name	TSCA	DSL/NDSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Sulfuryl fluoride	X	X	X	X	X	X	X	
Thionyl fluoride	X	X	X					
Ethylene dichloride	X	X	X	X	X	X	X	X

Legend:

TSCA *- United States Toxic Substances Control Act Section 8(b) Inventory*

DSL/NDSL *- Canadian Domestic Substances List/Non-Domestic Substances List*

EINECS/ELINCS *- European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances*

ENCS *- Japan Existing and New Chemical Substances*

IECSC *- China Inventory of Existing Chemical Substances*

KECL *- Korean Existing and Evaluated Chemical Substances*

PICCS *- Philippines Inventory of Chemicals and Chemical Substances*

AICS *- Australian Inventory of Chemical Substances*

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	CAS No	Weight-%	SARA 313 - Threshold Values %
Sulfuryl fluoride - 2699-79-8	2699-79-8	99.8	1.0
Other ingredients	Proprietary	0.1	0.1

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals.

Chemical name	California Proposition 65
Other ingredients	Carcinogen

U.S. State Right-to-Know Regulations

Chemical name	New Jersey	Massachusetts	Pennsylvania
Sulfuryl fluoride 2699-79-8	X	X	X
Other ingredients	X	X	X

EPA Pesticide Registration Number EPA Reg. No. 1015-78

EPA Statement

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

EPA Pesticide Label

Extremely Hazardous Liquid And Vapor Under Pressure. Fatal If Inhaled. May Be Fatal If Swallowed. Liquid May Cause Freeze Burns of Exposed Skin. Do not get in eyes, on skin, or on clothing. Vikane specialty gas fumigant is odorless. Exposure to toxic levels may occur without warning or detection by the user.

Difference between SDS and EPA pesticide label

	EPA	OSHA
Signal Word	Danger	Danger
Acute toxicity - Oral	May be fatal if swallowed	Toxic if swallowed
Acute toxicity - Inhalation	Fatal if inhaled	Fatal if inhaled
Carcinogenicity	N/A	May cause cancer
Specific target organ toxicity (single exposure)	N/A	Causes damage to organs
Specific target organ toxicity (repeated exposure)	N/A	May cause damage to organs through prolonged or repeated exposure

16. OTHER INFORMATION

NFPA	**Health Hazards**	**Flammability**	**Instability**	**Special Hazards**
	4	0	0	None
HMIS	**Health Hazards**	**Flammability**	**Physical hazards**	**Personal Protection**
	Not determined	Not determined	Not determined	Not determined

Issue Date: 23-Feb-2019
Revision Date: 15-Jul-2019
Revision Note: Editorial updates

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet