Material Safety Data Sheet

ZYTHOR GAS FUMIGANT

Emergency Phone 1-800-424-9300 (Chemtrec)

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Zythor
Chemical Name: Sulfuryl fluoride
Company: Ensystex II, Inc.
Address: 2713 Breezewood Ave., Fayetteville, NC 28303
Daytime Phone: 1-888-398-3772

2. COMPOSITION / INFORMATION ON INGREDIENTS

Sulfuryl fluoride 99.3% CAS# 2699-79-8 EINECS#: 220-281-5
Carbon dioxide 0.5% CAS# 124-38-9

3. HAZARDS IDENTIFICATION

Compressed gas harmful by inhalation. Sulfuryl fluoride has no warning properties such as odor, color or eye irritation. Exposure to toxic and even lethal levels may occur without warning or detection during a single exposure. Evacuate immediate area if leak occurs. Releases hydrogen fluoride upon decomposition by high heat.

4. FIRST-AID

In all cases of overexposure, when symptoms such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech or numbness in extremities are exhibited, get medical attention immediately. Take affected person to a doctor or emergency treatment facility.

Inhalation: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Excessive exposure may severely irritate upper respiratory tract. Consult a physician in all cases.

Eye Contact: Hold eye open and rinse slowly and gently with water for at least 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Liquid fumigant in the eye may cause damage due to refrigeration or freezing.

Skin Contact: 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 15-20 minutes.

Note to Physician: Sulfuryl fluoride is a gas that has no warning properties such as odor, color or eye irritation. (Chloropicrin, (CAS# 76-06-2) which is used as a warning agent in conjunction with sulfuryl fluoride, is the active ingredient in tear gas and will cause tearing.) 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. Such individuals should rest in bed for at least 24 hours. 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. Single exposures at high concentrations have resulted in death. Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Extinguishing Media: This product does not burn. All means of extinguishing are acceptable. If cylinders are in a fire area, remove them if possible. Alternately, water can be used to keep them cool to prevent discharge of product due to the melting of fusible plugs in the cylinder valves which will occur at temperatures above 158°F. Use of water may also help to scrub out part of any hydrofluoric acid and sulphur dioxide which may be formed by decomposition of the product in a fire.

Hazardous Combustion Products: At temperatures above 752°F, sulfuryl fluoride will decompose into hydrogen fluoride and sulfur dioxide.

Fire fighting Equipment: Firefighters should wear protective clothing and use self-contained breathing apparatus. 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

Personal Precautions: Wear appropriate safety clothing, respiratory protection devices and eye/face protection (see Section 8). Evacuate unprotected personnel that are nearby.

Leak Procedure: Evacuate immediate area of leak. Move leaking cylinder to an isolated location observing strict safety precautions. If safe to do so, try to stop leak. Work upwind from the cylinder, if possible. Entry into affected area(s) by persons not using approved respiratory protection devices is not permitted until the concentration of sulfuryl fluoride in the air of the affected area(s) is determined to be 1 ppm or less, as determined by an approved Low Fumigant Level Detection Device (such as ExplorIR, Interscan, or Miran gas analyzer).

7. HANDLING AND STORAGE

Handling: Use good personal hygiene. Follow proper cylinder handling directions. See Section 8 for control measures.

Storage: Keep out of reach of children. Product should be stored in compliance with local regulations. Store in a well ventilated, cool, dry area. Keep away from heat sources.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ventilation and respiratory protection information given below is applicable to handling sulfuryl fluoride during production, packaging, transportation and storage. Applicators should refer to the product label for personal protection equipment requirements during application.

Exposure Limits: ACGIH TLV is 5 ppm TWA, 10 ppm STEL. OSHA PEL is 5 PPM TWA. Provide general and/or local exhaust ventilation to control airborne levels below the exposure limits.

Respiratory Protection: Atmospheric levels should be maintained below the exposure guidelines. When respiratory protection is required or during emergency conditions, use a NIOSH approved positive pressure self-contained breathing apparatus or positive pressure airline with auxiliary self-contained air supply.

Hand/Skin Protection: No 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/Face Protection: Chemical proof goggles / face shield

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance/Odor: Colorless, odorless
Relative vapor density (air=1): 3.5 at 68 °F (20 °C)
Boiling point/range: - 67 °F (-55.4 °C)
Water solubility: Practically insoluble
Vapor pressure: 15.2 atmospheres at @ 68 °F (20 °C)

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal storage conditions.

Conditions to Avoid: Avoid heating product to its decomposition temperature.

Materials to Avoid: Strong bases.

Hazardous Decomposition Products: Hydrogen fluoride and sulfur dioxide upon heating above decomposition temperature.

Additional Information: Hazardous polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity: Inhalation LC50/Rat/991 ppm Oral LD50/Rat/100mg/kg
Irritation: Reacts with mucous membranes
Chronic Toxicity: Inhalation, after repeated exposure, various species,
Target organ: respiratory system, nervous system, kidney, skeleton, 20 ppm, observed effect
No teratogenic effect
Carcinogenic Designation: None

12. ECOTOXICOLOGICAL INFORMATION

Acute Ecotoxicity: No Data
Chronic Ecotoxicity: No Data
Other effects: Product is known to have herbicide and insecticide properties

13. DISPOSAL CONSIDERATIONS

Promptly return all empty cylinders to Ensystex II. Follow proper cylinder handling and waste disposal guidelines (see label).

14. TRANSPORT INFORMATION

DOT Proper Shipping Name: Sulfuryl Fluoride; Technical Shipping Name: Sulfuryl Fluoride; DOT Hazard Class: 2.3; DOT Label: Poison Gas; DOT Packing Group: Inhalation Hazard Zone D ; DOT ID#: UN2191

15. REGULATORY INFORMATION

The information herein is given in good faith, but no warranty, expressed or implied, is made. Consult Ensystex II for further information.

TSCA 8(b): Yes
SARA Hazard Classifications:
Immediate (Acute) Health Hazard: Yes
Delayed (Chronic) Health Hazard: Yes
Sudden Release of Pressure Hazard: Yes
Reactive Hazard: Upon heating above decomposition temperature
Fire Hazard: No
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.
Sulfuryl Fluoride 002699-79-8 NJ3 PA1
OSHA HAZARD COMMUNICATION STANDARD: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

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The conversion of the fumigant from liquid to gas normally occurs almost instantaneously when it is released into the fumigated space, however it is possible that, based on the circumstances, some fumigant will remain in its liquid form for a short period of time after it has been released. This can be a problem if this super-cooled liquid fumigant is deposited onto surfaces that can be damaged by its presence, however brief.

Care must be taken to reduce the chances that moisture is condensed from the air within the fumigated space during fumigant application or that unconverted liquid fumigant is present within the fumigant space long enough to come to rest on surfaces. One way to accomplish both of these is to maximize the amount of air into which the fumigant is released. The greater the number of "units" of air used to vaporize each "unit" of fumigant, the less heat that must be removed from each "unit" of air during the conversion process. This reduces the possibility that the capacity of the air into which the fumigant is released to hold water or fumigant will be exceeded. Increase the volume of air into which the fumigant is released, and thereby maximize the rate of fumigant vaporization from liquid to gas, by situating the discharge end of the fumigant shooting tube on the positive pressure side of an operating fan (blast side) located within a large open area of the fumigated space. The air movement capacity of the fan should be at least 1,000 cubic feet per minute for each pound of ZYTHOR released per minute.

Using a small inside diameter shooting tube (1/8 inch) can also reduce the chances of un-vaporized fumigant coming to rest on surfaces within the fumigated space. To further protect against the effects of un-vaporized fumigant on surfaces, it is recommended that protective sheeting, such as polyethylene plastic, be placed on the floors in the vicinity of any fumigant release point. **In order to prevent damage, do not apply fumigant directly to any surface.**

Special care must be taken when the percent relative humidity of the air within the fumigated space is high (the amount of moisture in the air is high compared to the total amount it can hold). If necessary delay the fumigation until conditions are more favorable such as when the relative humidity within the structure to be fumigated is lower.

ZYTHOR RELEASE

Before introducing the fumigant, verify that all required safety equipment is available and in good working order. Position the ZYTHOR cylinder(s) outside the space to be fumigated. Do not connect cylinders to introduction equipment until all fumigation warning signs have been posted and the space to be fumigated is clear of persons, non-target animals and is properly secured.

Release the ZYTHOR from outside the fumigated space. Wear splash resistant goggles or full face shield for eye protection during introduction of fumigant or when working around any lines containing fumigant under pressure. Do not wear gloves or rubber boots.

AERATION AND CLEARANCE

Aeration

The final step in using ZYTHOR is to remove it from within the fumigated space (aeration) and to confirm its absence from the breathing zone of the fumigated space after the completion of the aeration process (clearance). Aeration of ZYTHOR from a fumigated space involves actively exhausting and/or allowing the ZYTHOR to dissipate from the fumigated space out into the atmosphere. Clearance involves sampling the air within the breathing zone of the fumigated space with an approved and properly calibrated Low Fumigant Level Detection Device until readings given by the detection device indicate that fumigant is no longer present above 1 ppm within the breathing zone of the fumigated space. Only when certain periods of time (see *Aeration Procedures* below) have elapsed after the initiation of the aeration process and the level of fumigant remaining within the breathing zone of the fumigated space is confirmed at the end of those time periods to no longer exceed 1 ppm can final clearance for re-occupancy be given. Breathing zones are defined as areas within the structure where individuals typically stand, sit or lie down.

Special attention must be given to aerating attics and forced air handling system ducts. Active aeration of attics can be accomplished by directing a fan into attic access openings. Air handling systems can be aerated by activating the system blower or alternately directing a fan into one or more return vents.

Refer to the Zythor Applicator's Manual for further details.

Respiratory Protection Requirements During Aeration and Clearance

The processes of aeration and clearance of the fumigated space require entry into the fumigated space while the level of ZYTHOR in the air within the breathing zone of the fumigated space still exceeds 1 ppm. All persons entering and/or remaining inside the fumigated space between the time of initial application of ZYTHOR to the fumigated space and final clearance of the fumigated space must adhere to the requirements of the *Respiratory Protection, Respiratory Protection Devices* and *Low Fumigant Level Detection Devices* sections of this label.

Aeration Procedures

There are two approved procedures for aeration. The aeration procedure used for a fumigated space is based on the total amount of ZYTHOR per thousand cubic feet that was released within the fumigated space during the exposure period. All structures into which a total of more than 16 ounces of ZYTHOR per thousand cubic feet of fumigated space has been released during the Exposure Period must be aerated using Aeration Procedure 2. All other fumigated spaces can be aerated using either Aeration Procedure 1 or Aeration Procedure 2.

Aeration Procedure 1 – Applied Dose 16 oz/1000 cubic feet or less

These steps must be completed in sequence.

Step (1): Aerate the fumigated space with all operable windows and doors open, aided by the use of 1 or more fans, for a minimum of 1 hour. All of the fans used shall, in total, be capable of displacing at least 5,000 cubic feet of air per minute. The fans may be turned off for the remainder of the aeration period if desired.

Step (2): Secure fumigated space and do not allow reentry for a minimum of 8 hours from the start of the aeration process (first opening of the seal). During this time, the fumigated space must remain posted.

Step (3): After the minimum 8 hour waiting period, measure the concentration of ZYTHOR in the breathing zone of each room of the fumigated space using an approved and properly calibrated Low Fumigant Level Detection Device. If a concentration of ZYTHOR greater than 1 ppm is detected in the breathing zone, ventilate the fumigated space by opening operable doors and windows and continue to measure the concentration of Zythor in the breathing zone until it is 1 ppm or less. Fumigated space may be cleared for re-occupancy when the concentration of ZYTHOR as measured with an approved and properly calibrated Low Fumigant Level Detection Device is determined to be 1 ppm or less in the breathing zone.

Aeration Procedure 2 – Applied Dose More Than 16 oz/1000 cubic feet

These steps must be completed in sequence.

Step (1): Aerate the fumigated space with all operable windows and doors open, aided by the use of 1 or more fans, for a minimum of 1 hour. All of the fans used shall, in total, be capable of displacing at least 5,000 cubic feet of air per minute. The fans may be turned off for the remainder of the aeration period if desired.

Step (2): Secure the fumigated space and do not allow reentry for a minimum of 8 hours from the start of the aeration process (first opening of the seal). During this time, the fumigated space must remain posted.

Step (3): After the minimum 8 hour waiting period, measure the concentration of ZYTHOR in the breathing zone of each room of the fumigated space using an approved and properly calibrated Low Fumigant Level Detection Device. If a concentration of ZYTHOR greater than 1 ppm is detected in the breathing zone, ventilate the fumigated space by opening operable doors and window and continue to measure the concentration of Zythor in the breathing zone until it is 1 ppm or less. Fumigated space may be cleared for re-occupancy when the concentration of ZYTHOR as measured with an approved and properly calibrated Low Fumigant Level Detection Device is determined to be 1 ppm or less in the breathing zone.

Final Clearance and Re-occupancy

Do not reoccupy fumigated space, i.e., structure, ship, vehicle or chamber, or move fumigated vehicles until aeration is complete and clearance has been given. Warning signs must remain posted until aeration is completed and final clearance for re-occupancy is given.

TERMS AND CONDITIONS OF USE

If terms of the following Warranty Disclaimer, Inherent Risks of Use or Limitation of Remedies are not acceptable, return unopened package at once to the seller for a full refund of the purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under Warranty Disclaimer, Inherent Risks of Use and Limitation of Remedies.

WARRANTY DISCLAIMER

ENSYSTEX II warrants that this product conforms to the chemical description on the label and that it is reasonably fit for the purposes stated on the label when used in strict accordance with the directions for use, subject to the inherent risks set forth below. **TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, ENSYSTEX II MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.**

INHERENT RISKS OF USE

It is impossible to eliminate all risks associated with use of this product. Lack of performance or other unintended consequences may result because of factors such as use of the product contrary to the label directions or contrary to the dosage and/or exposure period recommendations of the Fumicalc, adverse conditions (such as unfavorable temperatures, high humidity, unfavorable soil conditions, excessive rainfall, etc.), abnormal conditions (such as excessive winds, tornadoes, hurricanes), presence of other materials, the manner of application or other factors, all of which are beyond the control of ENSYSTEX II or the seller. All such risks shall be assumed by the Buyer and User.

LIMITATION OF REMEDIES

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from the use of this product (including claims based on contract, negligence, strict liability or other legal theories), shall be limited to, at ENSYSTEX II's election, one of the following: Refund of purchase price paid by the buyer or user for product bought or replacement of amount of product used.

ENSYSTEX II shall not be liable for losses or damages resulting from handling or use of this product unless ENSYSTEX II is promptly notified of such loss or damage in writing. In no case shall ENSYSTEX II be liable for consequential or incidental damages or losses even if ENSYSTEX II knew of, was advised of, or should have been aware of the possibility of such damages.

The terms of the Terms and Conditions of Use, Warranty Disclaimer, Inherent Risks of Use and this Limitation of Remedies cannot be varied by any written or verbal statements or agreements. No employee or sales agent of ENSYSTEX II or the seller is authorized to vary or exceed the terms of the Warranty Disclaimer or this Limitation of Remedies in any manner.

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