

Sesamin

sc-205507



The Power to Question

Material Safety Data Sheet

Hazard Alert Code
Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

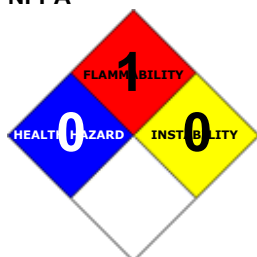
PRODUCT NAME

Sesamin

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

2145 Delaware Ave

Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: CHEMWATCH: From within the US and

Canada: 877-715-9305

Emergency Tel: From outside the US and Canada: +800 2436

2255 (1-800-CHEMCALL) or call +613 9573 3112

PRODUCT USE

Insecticide synergist, especially for pyrethrins, allethrin and methoxychlor. Isolated from the bark of Fugara species, from sesame oil, and from fruit of Piper lowong.

SYNONYMS

C20-H18-O6, "5, 5' -(tetrahydro-1H, 3H-furo[3, 4-c]-furan-1, 4-diyl)bis-1, 3-", benzodioxole, "5, 5' -(tetrahydro-1H, 3H-furo[3, 4-c]-furan-1, 4-diyl)bis-1, 3-", benzodioxole, "tetrahydro-1, 4-bis[3, 4-methylenedioxy]phenyl]-1H, 3H-furo[3, 4-c]furan", "tetrahydro-1, 4-bis[3, 4-methylenedioxy]phenyl]-1H, 3H-furo[3, 4-c]furan", "2, 6-bis(3, 4-methylenedioxyphenyl)-3, 7-dioxabicyclo[3.3.0]octane", "2, 6-bis(3, 4-methylenedioxyphenyl)-3, 7-dioxabicyclo[3.3.0]octane", "methylenedioxybenzene synergist"

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Very toxic to aquatic organisms.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- Accidental ingestion of the material may be damaging to the health of the individual.
- Methylenedioxybenzene synergists cause loss of appetite, vomiting, diarrhea, inflamed bowel with bleeding, bleeding from the lung, wasting and possible central depression.
- Central nervous system (CNS) depression may include general discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.
- Studies suggest that by interfering with the metabolism of hormones, methylenedioxyphenol synergists such as the piperonyls (as piperonyl butoxide - PBO) may damage humeral organs such as the thyroid, adrenal, and pituitary glands. PBO has a low to moderate toxicity based on short-term laboratory animal studies. The acute oral LD50, or dose that kills half the

test population, was determined to be 6.15 g/kg for rats. It is predicted that the oral lethal dose for a human is 5.15 g/kg, or between 1 pint and 1 quart for a 150 lb person. Symptoms caused by ingestion of PBO in large doses include nausea, cramps, vomiting, and diarrhea. Overdoses of PBO have been shown to cause hyperexcitability, unsteadiness, coma, seizures, and brain damage in animals. Laboratory animals exposed to single, large oral doses exhibit anorexia, vomiting, diarrhoea, unsteadiness, rough coat, watery eyes, irritability, prostration, haemorrhagic enteritis, inanition, pulmonary haemorrhage, mild central system depression, bloody discharge from eyes and nose, liver damage, coma and death. Onset may be as early as 20 minutes after dosing and death may be delayed for a week. Most rat deaths in studies are attributed to hemorrhages in the digestive tract, particularly the large intestine. Acute exposure in animals has also triggered hepatic (liver) changes and injury, anemia and loss of appetite, as well as changes in the kidneys, nasal bleeding, loss of muscle coordination, and abdominal swelling.

Chemical Watch Fact Sheet.

EYE

■ Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

■ Acute and repeated eye contact with piperonyls (as piperonyl butoxide - PBO) has been shown to be slightly irritating, but is not linked to long-term damage.

SKIN

■ The material is not thought to be a skin irritant (as classified using animal models). Abrasive damage however, may result from prolonged exposures. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

■ Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.

■ 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.

■ Acute and repeated dermal (skin) contact with piperonyls (as piperonyl butoxide - PBO) has been shown to be slightly irritating, but is not linked to long-term damage.

In one study a lethal dose in rabbits by dermal absorption was 200 mg/kg but this result is thought to be anachronistic. A dermal application of PBO, at the rate of 1880 mg/kg as a 20% solution in dimethyl phthalate, produced hyperexcitability and convulsions in rabbits.

INHALED

■ The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of dusts, or fume, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.

■ Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.

■ Methylenedioxybenzene synergists cause loss of appetite, vomiting, diarrhea, inflamed bowel with bleeding, bleeding from the lung, wasting and possible central depression.

■ The LD50 for inhalation of the methylenedioxyphenol synergist, piperonyl butoxide (PBO), by rats is greater than 5.9 g/kg. Inhalation of large amounts of PBO may cause tearing, salivation, labored breathing, accumulation of fluids in the lungs, and may be linked to respiratory problems, including asthma.

Exposure to high concentrations of PBO vapour may cause asthma, inflammation of the nose and mucous membrane irritation.

CHRONIC HEALTH EFFECTS

■ There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Based on experience with animal studies, there is a possibility that exposure to the material may result in toxic effects to the development of the fetus, at levels which do not cause significant toxic effects to the mother.

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.

The primary effect of long-term exposure to methylenedioxyphenol insect synergists such as the piperonyls (such as piperonyl butoxide - PBO) in animals is an increase in liver and thyroid weight, liver and kidney damage, and a decrease in body weight. These symptoms were observed in a diet of 52.8 mg/kg or more a day in a chronic study with dogs.

PBO is a possible human carcinogen. Currently there is no data from accidental exposure available regarding its carcinogenicity in humans; the only information is from animal studies. Several studies have shown that PBO treatment in rats causes an increase in liver cancer at high doses. The incidence of hepatocellular carcinoma, in male and female rats given 2.4% piperonyl butoxide was 80.0% and 57.7% respectively. Preneoplastic hepatic lesions such as nodular hyperplasia, cholangiofibrosis, and nodular hyperplasia were also seen.

Some studies have shown that PBO treatment in rats corresponds with a very slight increase in thyroid cancer.

Rats fed diets containing from 0.6 to 2.4% piperonyl butoxide for approximately two years showed dose-related decreases in body weight. Roughened hair, lethargy, epistaxis, abdominal swelling, and decreased food consumption were observed at 2.4%. All dose rates induced skin tumours after about 1 year. Cumulative mortality varied from around 15 to 50%. Caecal haemorrhage was the cause of death. Dead rats with hepatic tumours were seen from week 74, but caecal haemorrhage or possible leukaemia was the cause of death. At necropsy in rats surviving to the end of the study, hepatocellular adenomas and carcinomas occurred in both sexes in a dose-related manner. A dose-related increase in thrombocythemia was seen in male rats. The authors * of this study concluded that the primary feature of chronic piperonyl-butoxide toxicity is hepatocarcinogenicity.

It is generally accepted that PBO does not demonstrate any significant potential for mutagenicity (genetic damage) but debate still exists

PBO weakens the immune system by inhibiting lymphocyte response. Lymphocytes are a class of white blood cells that consume potentially dangerous pathogens and release antibodies. Inhibiting lymphocyte response weakens the body's ability to defend against foreign invaders. Preventing the breakdown of toxic chemicals, may exacerbate potentially toxic effects.

PBO has been shown to adversely affect a variety of reproductive functions. Two-generational laboratory studies on rats show that litter weight and size are less for mothers exposed to high concentrations of PBO, and there is an increase in birth defects and fetal death. In one study the difference in the average weight of PBO-exposed offspring immediately after birth is negligible, but 7-14 days post-natal is significantly greater for those mothers that are exposed to PBO than for those that are not. The U.S. EPA maintains that results for teratogenicity (the ability to produce birth defects) in animals have been mixed, and while some studies suggest some teratogenicity, most do not. PBO may also interfere with sexual development because the enzymes it inhibits are responsible not only for the breakdown of toxic chemicals but also for the metabolism of other compounds such as steroids, which include the sex hormones. Rats exposed to PBO over the course of two years experience an atrophy of the testes a decrease in weight of the seminal vesicles (sperm producing structures), and an increase in ovarian weights. There is no evidence that PBO affects fertility.

Data has shown that PBO alone interferes with enzymes that maintain homeostasis of sodium and calcium in the brain and nervous system, possibly affecting neural response. Additionally, it increases the neurotoxicity of other compounds. Despite this data, EPA believes that these neurotoxic effects are slight and maintains that PBO poses no neurological risk.

Behavioral changes have been noted with PBO as well. In a laboratory experiment, exposed rats experience more trouble navigating a maze than unexposed rats. The exposed rats travel longer distances and turned more frequently in the maze. PBO also induces changes in olfactory behavior of the offspring of exposed mothers. Offspring of exposed mothers are less likely to enter a compartment that smells like home than unexposed mothers. Exploratory behavior in mice increases as the dose of PBO they were treated with increased. This data shows that PBO has the ability to affect behaviors in mammals.

Research on rats has found that PBO can cause intestinal ulcers and bleeding. Liver damage is common in studies, and kidney damage has been found as well. Long-term ingestion of PBO causes anemia, a decrease in the amount of hemoglobin (oxygen-transporting molecules) in blood, and increases the blood cholesterol level in rats. PBO can also damage the larynx, and there have been reports that it can cause labored breathing, an accumulation of fluid in the lungs, nasal bleeding,

abdominal swelling, and loss of the ability to coordinate muscle movement. There has been a fair amount of investigation into the effects of dermal contact with PBO since it is used as a topical agent for lice, but there has been no evidence of it causing any local or systemic toxicity, and the amount of PBO absorbed from skin contact is characterized by some researchers as low. ChemicalWatch Fact Sheet
Takahashi, O.,S. et al: Fundamental and Applied Toxicology: Vol 22., pp 293-303, Feb 1994.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS

	Min	Max
Flammability:	1	
Toxicity:	2	
Body Contact:	2	
Reactivity:	1	
Chronic:	2	



Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

NAME	CAS RN	%
sesamin	607-80-7	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

EYE

- If this product comes in contact with the eyes:
 - Wash out immediately with fresh 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.
 - If pain persists or recurs seek medical attention.
 - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

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.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

- Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Negligible
Upper Explosive Limit (%):	Not available.
Specific Gravity (water=1):	Not available
Lower Explosive Limit (%):	Not available.

EXTINGUISHING MEDIA

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

FIRE FIGHTING

- Alert Emergency Responders 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 course.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach containers suspected to be hot.

- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

-
- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.

FIRE INCOMPATIBILITY

- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Particulate

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 by using protective equipment.
- Use dry clean up procedures and avoid generating dust.
- Place in a suitable, labelled container for waste disposal.

Environmental hazard - contain spillage.

MAJOR SPILLS

- Environmental hazard - contain spillage.

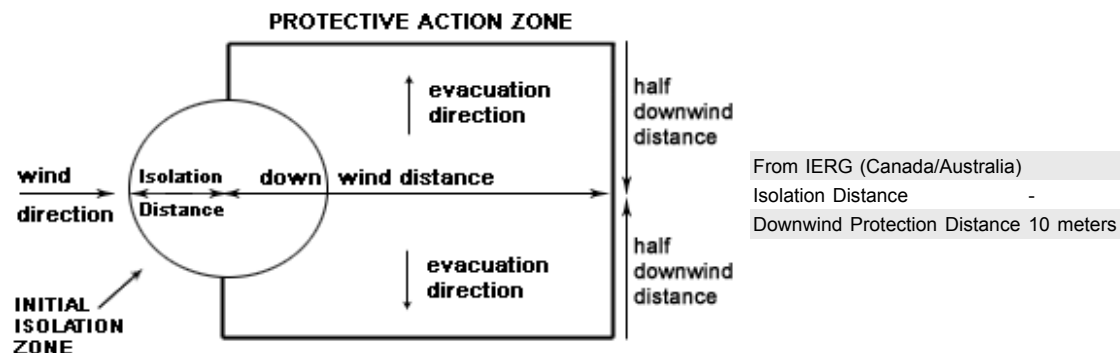
Moderate hazard.

- CAUTION: Advise personnel in area.
- Alert Emergency Responders and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.
- Recover product wherever possible.
- IF DRY: Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal. IF WET: Vacuum/shovel up and place in labelled containers for disposal.
- ALWAYS: Wash area down with large amounts of water and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL

WARNING

MAY DECOMPOSE EXPLOSIVELY AT HIGH TEMPERATURES.



FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.

5 Guide 171 is taken from the US DOT emergency response guide book.

6 IERG information is derived from CANUTECH - Transport Canada.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

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.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS

- Glass container.
- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS

- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X: Must not be stored together
 O: May be stored together with specific preventions
 +: May be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes
US - Oregon Permissible Exposure Limits (Z3)	sesamin (Inert or Nuisance Dust: (d) Total dust)		10						*
US OSHA Permissible Exposure Levels (PELs) - Table Z3	sesamin (Inert or Nuisance Dust: (d) Respirable fraction)		5						
US OSHA Permissible Exposure Levels (PELs) - Table Z3	sesamin (Inert or Nuisance Dust: (d) Total dust)		15						
US - Hawaii Air Contaminant Limits	sesamin (Particulates not otherwise regulated - Total dust)		10						
US - Hawaii Air Contaminant Limits	sesamin (Particulates not otherwise regulated - Respirable fraction)		5						
US - Oregon Permissible Exposure Limits (Z3)	sesamin (Inert or Nuisance Dust: (d) Respirable fraction)		5						*
Canada - Quebec Permissible Exposure Values for Airborne	sesamin (Particulates Not Otherwise Classified (PNOC))		10						

Contaminants (English)	Otherwise Classified (PNOC)			
Canada - Prince Edward Island Occupational Exposure Limits	sesamin (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)	3		See Appendix B current TLV/BEI Book
US ACGIH Threshold Limit Values (TLV)	sesamin (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10		See Appendix B current TLV/BEI Book
Canada - British Columbia Occupational Exposure Limits	sesamin (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))	10 (N)		
US ACGIH Threshold Limit Values (TLV)	sesamin (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)	3		See Appendix B current TLV/BEI Book
US - Washington Permissible exposure limits of air contaminants	sesamin (Particulates not otherwise regulated - Respirable fraction)	5	10	
US - Washington Permissible exposure limits of air contaminants	sesamin (Particulates not otherwise regulated - Total particulate)	10	20	
Canada - Nova Scotia Occupational Exposure Limits	sesamin (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10		See Appendix B current TLV/BEI Book
Canada - Prince Edward Island Occupational Exposure Limits	sesamin (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10		See Appendix B current TLV/BEI Book
Canada - Nova Scotia Occupational Exposure Limits	sesamin (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)	3		See Appendix B current TLV/BEI Book
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	sesamin (Particulates not otherwise regulated Respirable fraction)	5		
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	sesamin (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction)	5		
US - Michigan Exposure Limits for Air Contaminants	sesamin (Particulates not otherwise regulated, Respirable dust)	5		

MATERIAL DATA

SESAMIN:

■ 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). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

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

PERSONAL PROTECTION



Consult your EHS staff for recommendations

EYE

- Safety glasses with side shields
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time

greater than 240 minutes according to EN 374) is recommended.

- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

RESPIRATOR

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x PEL	P1 Air-line*	- -	PAPR-P1 -
50 x PEL	Air-line**	P2	PAPR-P2
100 x PEL	-	P3 Air-line*	-
100+ x PEL	-	Air-line**	PAPR-P3

* - Negative pressure demand ** - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 65°C).

Type B for use against certain inorganic gases and other acid gases and vapors.

Type E for use against sulfur dioxide and other acid gases and vapors.

Type K for use against ammonia and organic ammonia derivatives

Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.

Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.

Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

(a): particle dust respirators, if necessary, combined with an absorption cartridge;

(b): filter respirators with absorption cartridge or canister of the right type;

(c): fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.

Does not mix with water.

State	Divided solid	Molecular Weight	354.34
Melting Range (°F)	251.6- 253.4	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Immiscible
Flash Point (°F)	Not available	pH (1% solution)	Not applicable.
Decomposition Temp (°F)	Not available.	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available.	Vapour Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available.	Relative Vapor Density (air=1)	Not applicable
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

APPEARANCE

Needles; do not mix with water. Soluble in chloroform, benzene, acetic acid, acetone.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

-
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

- Avoid reaction with oxidizing agents.

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

Section 11 - TOXICOLOGICAL INFORMATION

sesamin

TOXICITY AND IRRITATION

- No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

SESAMIN:

- Very toxic to aquatic organisms.
- Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

- DO NOT discharge into sewer or waterways.
- For piperonyls (as piperonyl butoxide - PBO):

Environmental fate:

PBO is relatively short-lived in the environment and has a low to moderate potential to contaminate groundwater. One study found PBO in river water at a concentration of 9.7 ug/L. It is rapidly degraded when exposed to sunlight, with a degradation half life of about one day in soil exposed to sunlight, and 14 days in soil without sunlight. The rate of degradation is also affected by how much oxygen is in the environment (particularly in aquatic systems), moisture levels, and application methods. There is less information available about PBO's persistence indoors, but one study found that PBO persisted for at least two weeks after a cockroach treatment on toys and in dust in a kindergarten

Ecotoxicity:

Piperonyl is considered moderately toxic to fish, moderately to highly toxic to invertebrates (including crustaceans and insects), and highly toxic to amphibians. In one study, concentrations of less than one part per million (ppm) killed water fleas, shrimp, and oysters. It is also very toxic to a common type of earthworm. Ingested PBO has a low to very low toxicity in birds

Not only does PBO kill organisms, it is known to interfere with the reproduction of many types of wildlife at much lower concentrations than those required for mortality. The bio-concentration potential for PBO is low but can be moderate in some aquatic organisms. PBO also inhibits the breakdown of toxic chemicals in wildlife and the soil, increasing the concentrations of other, more acutely potent, pesticides.

Chemical Watch Fact Sheet.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
sesamin	HIGH		LOW	MED

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

! Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.

- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	G	Hazard class or Division:	9
Identification Numbers:	UN3077	PG:	III
Label Codes:	9	Special provisions:	8, 146, 335, B54, IB8, IP3, N20, T1, TP33
Packaging: Exceptions:	155	Packaging: Non-bulk:	213
Packaging: Exceptions:	155	Quantity limitations: Passenger aircraft/rail:	No limit
Quantity Limitations: Cargo aircraft only:	No limit	Vessel stowage: Location:	A
Vessel stowage: Other:	None		

Hazardous materials descriptions and proper shipping names:
Environmentally hazardous substance, solid, n.o.s

Air Transport IATA:

ICAO/IATA Class:	9	ICAO/IATA Subrisk:	III
UN/ID Number:	3077	Packing Group:	III
Special provisions:	A97		

Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. *(CONTAINS SESAMIN)

Maritime Transport IMDG:

IMDG Class:	9	IMDG Subrisk:	None
UN Number:	3077	Packing Group:	III
EMS Number:	F-A,S-F	Special provisions:	274 909 944

Limited Quantities: 5 kg

Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.(contains sesamin)

Section 15 - REGULATORY INFORMATION

sesamin (CAS: 607-80-7) is found on the following regulatory lists;

"US - Hawaii Air Contaminant Limits", "US - Oregon Permissible Exposure Limits (Z3)", "US OSHA Permissible Exposure Levels (PELs) - Table Z3"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Inhalation skin contact and/or ingestion may produce health damage*.
- Cumulative effects may result following exposure*.
- Limited evidence of a carcinogenic effect*.
- May possibly be harmful to the fetus/ embryo*.

* (limited evidence).

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■ Classification of the mixture 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. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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