

1,3-Dioxolane

sc-208777



The Power is Question

Material Safety Data Sheet

Hazard Alert Code
Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

1,3-Dioxolane

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

■ The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation. Solvent extraction processes requiring a low boiling point, highly volatile solvent. Do not use as nitrocellulose solvent. Intermediate

SYNONYMS

C3-H6-O2, dioxolane, "1, 3-dioxalan", "1, 3-dioxalan", "1, 3-dioxacyclopentane", "1, 3-dioxacyclopentane", "ethylene glycol formal", "formal glycol", dioxacyclopentane

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Highly flammable.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Although ingestion is not thought to produce harmful effects, the material may still be damaging to the health of the individual following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Present definitions of harmful or

toxic substances are generally based on doses producing mortality (death) rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

EYE

- There is evidence that material may produce eye irritation in some persons and produce eye damage 24 hours or more after instillation. Severe inflammation may be expected with pain. There may be damage to the cornea. Unless treatment is prompt and adequate there may be permanent loss of vision. Conjunctivitis can occur following repeated exposure.
- The vapour when concentrated has pronounced eye irritation effects and this gives some warning of high vapour concentrations. If eye irritation occurs seek to reduce exposure with available control measures, or evacuate area.

SKIN

- The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED






- Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.
 - Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
 - There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
 - Inhalation of high concentrations of gas/vapor causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and inco-ordination.
 - If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death.
 - The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing.
- Before starting consider control of exposure by mechanical ventilation.

CHRONIC HEALTH EFFECTS

- Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
- Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes. [PATTYS].

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS

		Min	Max	
Flammability:	3			
Toxicity:	2			
Body Contact:	2			
Reactivity:	1			
Chronic:	2			
				Min/Nil=0 Low=1 Moderate=2 High=3 Extreme=4



NAME	CAS RN	%
1,3-dioxolane	646-06-0	> 99
stabilised with		
triethylamine	121-44-8	0.01
BHT as		
2,6-di-tert-butyl-4-methylphenol	128-37-0	0.005
or		
triethylamine	121-44-8	0.007 ^

Section 4 - FIRST AID MEASURES

SWALLOWED

-
- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Center or a doctor.

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 or hair contact occurs:

- 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

Vapor Pressure (mmHg):	69.831 @ 20 C.
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	1.06
Lower Explosive Limit (%):	Not available

EXTINGUISHING MEDIA

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

FIRE FIGHTING

-
- Alert Emergency Responders and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- Fight fire from a safe distance, with adequate cover.
- If safe, switch off electrical equipment until vapor fire hazard removed.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- 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.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

-
- Liquid and vapor are highly flammable.
- Severe fire hazard when exposed to heat, flame and/or oxidizers.
- Vapor may travel a considerable distance to source of ignition.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).

Combustion products include: carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.
Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.

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:

Type AK Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

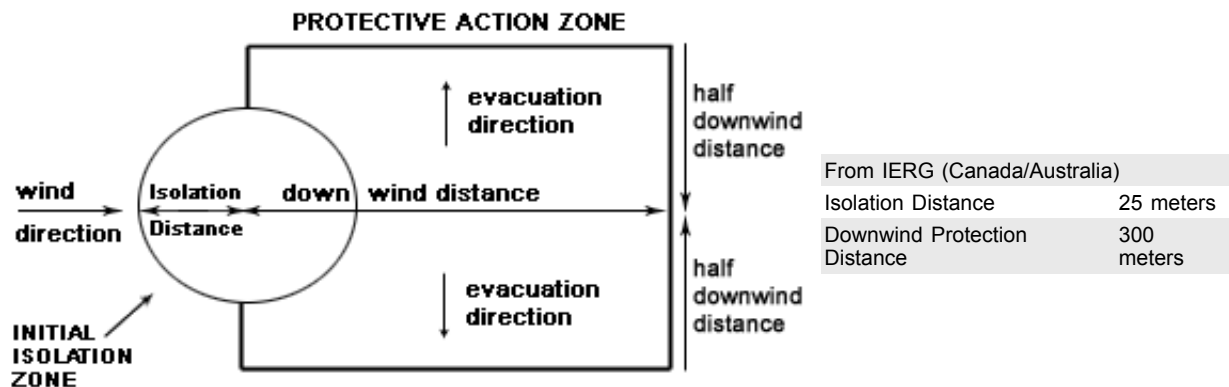
-
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb small quantities with vermiculite or other absorbent material.
- Wipe up.
- Collect residues in a flammable waste container.

MAJOR SPILLS

■

- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation.
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse / absorb vapor.
- Contain spill with sand, earth or vermiculite.
- Use only spark-free shovels and explosion proof equipment.
- Collect recoverable product into labeled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL



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 127 is taken from the US DOT emergency response guide book.
- 6 IERG information is derived from CANUTEC - 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

- Containers, even those that have been emptied, may contain explosive vapors.
 - Do NOT cut, drill, grind, weld or perform similar operations on or near containers.
- Contains low boiling substance:
Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.
- Check for bulging containers.
 - Vent periodically
 - Always release caps or seals slowly to ensure slow dissipation of vapors
 - DO NOT allow clothing wet with material to stay in contact with skin
 - 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.
- Avoid smoking, naked lights, heat or ignition sources.
- When handling, DO NOT eat, drink or smoke.
- Vapor may ignite on pumping or pouring due to static electricity.
- DO NOT use plastic buckets.
- Earth and secure metal containers when dispensing or pouring product.
- Use spark-free tools when handling.
- Avoid contact with incompatible materials.
- Keep containers securely sealed.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- 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.

RECOMMENDED STORAGE METHODS

- Packing as supplied by manufacturer. Plastic containers may only be used if approved for flammable liquid. Check that containers are clearly labeled and free from leaks.
- For low viscosity materials (i): Drums and jerricans must be of the non-removable head type. (ii): Where a can is to be used as an inner package, the can must have a screwed enclosure.
- For materials with a viscosity of at least 2680 cSt. (23 deg. C)
- For manufactured product having a viscosity of at least 250 cSt. (23 deg. C)
- Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (23 deg. C) - (i): Removable head packaging; (ii): Cans with friction closures and (iii): low pressure tubes and cartridges may be used.
- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages
- In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.

STORAGE REQUIREMENTS

-
- Store in original containers in approved flame-proof area.
- No smoking, naked lights, heat or ignition sources.
- DO NOT store in pits, depressions, basements or areas where vapors may be trapped.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry well ventilated area.
- Protect containers against physical damage and check regularly for leaks.
- 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
Canada - Alberta Occupational Exposure Limits	1,3-dioxolane (1,3-Dioxolane)	20	61						
Canada - British Columbia Occupational Exposure Limits	1,3-dioxolane (1,3-Dioxolane)	20							R
Canada - Ontario Occupational Exposure Limits	1,3-dioxolane (1,3-Dioxolane)	20							
US ACGIH Threshold Limit Values (TLV)	1,3-dioxolane (1,3-Dioxolane)	20							TLV Basis: hematologic effects
Canada - Saskatchewan Occupational Health and	1,3-dioxolane (1,3-Dioxolane)	20			30				

Safety Regulations - Contamination Limits

Canada - Nova Scotia Occupational Exposure Limits	1,3-dioxolane (1,3-Dioxolane)	20			TLV Basis: hematologic effects
Canada - Prince Edward Island Occupational Exposure Limits	1,3-dioxolane (1,3-Dioxolane)	20			TLV Basis: hematologic effects
Canada - British Columbia Occupational Exposure Limits	2,6-di-tert-butyl-4-methylphenol (Butylated hydroxytoluene (BHT), Inhalable, (2,6-Di-tert-butyl-p-cresol))	2 (V)			
Canada - Ontario Occupational Exposure Limits	2,6-di-tert-butyl-4-methylphenol (2,6-Bis(1,1-dimethylethyl)-4-methylphenol, also known as Butylated hydroxytoluene (BHT), inhalable, vapour and aerosol)	2			
Canada - Alberta Occupational Exposure Limits	2,6-di-tert-butyl-4-methylphenol (Butylated hydroxytoluene (BHT) (2,6-Di-tert-butyl-p-cresol))	10			
US ACGIH Threshold Limit Values (TLV)	2,6-di-tert-butyl-4-methylphenol (Butylated hydroxytoluene [BHT])	2			TLV Basis: upper respiratory tract irritation
US NIOSH Recommended Exposure Limits (RELs)	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	10			
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	10			
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	10			
US - Minnesota Permissible Exposure Limits (PELs)	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	10			
US - California Permissible Exposure Limits for Chemical Contaminants	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	10			
US - Hawaii Air Contaminant Limits	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	10	20		
US - Alaska Limits for Air Contaminants	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	10			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol (butylated hydroxytoluene or BHT) (inhalable fraction++ and vapour))	2	4		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	-	10	-	20
US - Washington Permissible exposure limits of air contaminants	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	10			20
Canada - Prince Edward Island Occupational Exposure Limits	2,6-di-tert-butyl-4-methylphenol (Butylated hydroxytoluene [BHT])	2			TLV Basis: upper respiratory tract irritation
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)			10	
Canada - Nova Scotia Occupational Exposure Limits	2,6-di-tert-butyl-4-methylphenol (Butylated hydroxytoluene [BHT])	2			TLV Basis: upper respiratory tract

							irritation
US - Michigan Exposure Limits for Air Contaminants	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol (Butylated hydroxytoluene))	10					
Canada - Northwest Territories Occupational Exposure Limits (English)	2,6-di-tert-butyl-4-methylphenol (2,6-Di-tert-butyl-p-cresol)	10		20			
Canada - Ontario Occupational Exposure Limits	triethylamine (Triethylamine)	1		3			
US - Minnesota Permissible Exposure Limits (PELs)	triethylamine (Triethylamine)	10	40	15	60		
US ACGIH Threshold Limit Values (TLV)	triethylamine (Triethylamine)	1		3			TLV Basis: visual impairment
Canada - Alberta Occupational Exposure Limits	triethylamine (Triethylamine)	1	4.1	3	12		
Canada - British Columbia Occupational Exposure Limits	triethylamine (Triethylamine)	1		3			Skin
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	triethylamine (Triethylamine)	10	40	15	60		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	triethylamine (Triethylamine)	25	100				
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	triethylamine (Triethylamine)	10	40	15	60		
US - California Permissible Exposure Limits for Chemical Contaminants	triethylamine (Triethylamine)					1	4.1
US - Idaho - Limits for Air Contaminants	triethylamine (Triethylamine)	25	100				
US OSHA Permissible Exposure Levels (PELs) - Table Z1	triethylamine (Triethylamine)	25	100				
US - Hawaii Air Contaminant Limits	triethylamine (Triethylamine)	10	40	15	60		
US - Alaska Limits for Air Contaminants	triethylamine (Triethylamine)	10	40	15	60		
US - Michigan Exposure Limits for Air Contaminants	triethylamine (Triethylamine)	10	40	15	60		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	triethylamine (Triethylamine)	25	100	40	150		
US - Washington Permissible exposure limits of air contaminants	triethylamine (Triethylamine)	10		15			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	triethylamine (Triethylamine)	1		3			Skin
Canada - Prince Edward Island Occupational Exposure Limits	triethylamine (Triethylamine)	1		3			TLV Basis: visual impairment
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air	triethylamine (Triethylamine)	25	100				

Contaminants

Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	triethylamine (Triethylamine)	5	20.5	15	61.5	
US - Oregon Permissible Exposure Limits (Z1)	triethylamine (Triethylamine)	25	100			
Canada - Northwest Territories Occupational Exposure Limits (English)	triethylamine (Triethylamine)	25	104	40	166	
Canada - Nova Scotia Occupational Exposure Limits	triethylamine (Triethylamine)	1		3		TLV Basis: visual impairment

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
triethylamine		200

ODOR SAFETY FACTOR (OSF)

OSF=2.1 (1,3-dioxolane)

■ Exposed individuals are NOT reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded. Odor Safety Factor (OSF) is determined to fall into either Class C, D or E.

The Odor Safety Factor (OSF) is defined as:

OSF= Exposure Standard (TWA) ppm/ Odor Threshold Value (OTV) ppm

Classification into classes follows:

Class	OSF	Description
A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV-TWA for example) is being reached, even when distracted by working activities
B	26-550	Idem for 50-90% of persons being distracted
C	1-26	Idem for less than 50% of persons being distracted
D	0.18-1	0-50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	Idem for less than 10% of persons aware of being tested

Amoore and Hautala * have determined that it is only at an OSF value of 26 that 50% of distracted persons can detect the substance at the Exposure Standard value. In the case of alerted persons, an OSF of 26 means that 99% of them can detect the odor at the Exposure Standard value. It is ONLY for substances belonging to Class A and B that there is a reasonable chance of being warned in time, that the Exposure Standard is being exceeded. * Journal Applied Toxicology: Vol 3, 1983, p272

NOTE: The use of the OSF may be inappropriate for mixtures where substances mask the odor of others.

MATERIAL DATA

1,3-DIOXOLANE:

■ Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

TRIETHYLAMINE:

■ For triethylamine:

Odour Threshold Value: <0.1-0.65 ppm (detection), 0.27-29.0 ppm (recognition)

NOTE: Detector tubes for triethylamine, measuring in excess of 5 ppm, are commercially available.

Exposure at or below the recommended TLV-TWA or STEL is thought to provide worker protection against acute ocular, upper respiratory tract and pulmonary irritation. Nevertheless reports of visual disturbance in workers exposed at concentrations as low as 3 ppm have been cited in literature.

Odour Safety Factor (OSF)

OSF=2.1 (TRIETHYLAMINE).

2,6-DI-TERT-BUTYL-4-METHYLPHENOL:

■ 2,6-di-tert-butyl-4-methylphenol (syn: butylated hydroxytoluene - BHT)

Because high dose levels are required to produce toxic effects and because there is little evidence of either acute or chronic effects amongst workers the recommended TLV-TWA is identical to that proposed for nuisance particulates.

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. DO NOT wear contact lenses.

HANDS/FEET

- 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.

Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

OTHER

-
- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

RESPIRATOR

■ Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	AK-1	-
1000	50	-	AK-1
5000	50	Airline*	-
5000	100	-	AK-2
10000	100	-	AK-3
	100+		Airline* *

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

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

■ For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapors, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
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.)

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 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 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

Liquid.

Mixes with water.

State	Liquid	Molecular Weight	74.09
Melting Range (°F)	-14.8	Viscosity	Not Available
Boiling Range (°F)	165.2- 167	Solubility in water (g/L)	Soluble
Flash Point (°F)	26.6	pH (1% solution)	Not available
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not available
Autoignition Temp (°F)	525.2	Vapor Pressure (mmHg)	69.831 @ 20 C.
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	1.06
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	2.6
Volatile Component (%vol)	100	Evaporation Rate	Fast
Gas group	IIB		

APPEARANCE

Clear highly flammable liquid; dissolves in water. Strong odour. Contains amine (triethylamine) or other stabiliser.

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.

Dioxolane:

- reacts strongly with strong oxidisers
- is incompatible with fluorine, germanium, lead diacetate, magnesium, mercurous chloride, nitrates, silicon, silver nitrate, titanium

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

Section 11 - TOXICOLOGICAL INFORMATION

1,3-dioxolane

TOXICITY AND IRRITATION

2,6-DI-TERT-BUTYL-4-METHYLPHENOL:

TRIETHYLAMINE:

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.
- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

IRRITATION

Oral (rat) LD50: 3000 mg/kg	Skin (rabbit): 530 mg (open)-Mild
Inhalation (rat) LC50: 20650 mg/m ³ /4h	Eye (rabbit): 0.75 mg (open) -
Inhalation (rabbit) LCLo: 32000 ppm/4h SEVERE	
Dermal (rabbit) LD50: 8480 mg/kg	

■ The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

for dioxolane:

Dioxolane demonstrates a low order of acute toxicity to mammals by the oral, inhalation and dermal routes. Genotoxicity has been evaluated using multiple in vitro and in vivo experimental procedures covering both mutation and chromosome aberration. The weight of evidence indicates lack of significant genotoxic properties. Reliable repeat-dose studies have been conducted by the oral and inhalation routes and a high-reliability 13-week inhalation study is available. The blood forming system was found to be the most sensitive target organ with a clear 13-week NOAEL of 300 ppm by inhalation.

Reproductive toxicity has been evaluated in one-generation drinking water and inhalation studies. Adverse reproductive effects are absent at dosage levels below maternally toxic doses.

Developmental toxicity results are available indicating that dioxolane is not a specific developmental toxin.

Subchronic administration of dioxolane produced effects similar to those reported in the repeated-dose studies. The most sensitive target organ in the subchronic inhalation study was the blood forming system, manifest as reduction in WBCs and platelets and changes in spleen weight appear in rats. The inhalation NOEL for these effects was found to be 300 ppm for females and 1000 ppm for males in a 13-week study. The seven-month gavage study indicated low toxicity for the test material. The potential for neurotoxicity, suggested by the perceived neuromuscular effects at the high-dose level, was investigated by measurement of blood cholinesterase activity at the end of the exposure period. The statistically significant reduction in cholinesterase at the high dose was not supported by the lower dose, which showed higher activity than control. In addition, the correlation between blood cholinesterase and acetylcholinesterase in the neuronal receptor is weak and the magnitude of the observed depression is not convincing, especially in light of the length of exposure. No other indication of neurotoxicity, other than transient solvent depression of the CNS, has been reported for dioxolane and there is insufficient evidence to suggest neurotoxic potential based on these data.

Bacterial cell mutagen

TOXICITY	IRRITATION
TRIETHYLAMINE:	
Inhalation (rat) LCLo: 1000 ppm/4 hours	Skin (rabbit): 365 mg Open Mild
Dermal (rabbit) LD50: 570 mg/kg	Eye (rabbit): 0.25 mg/24h SEVERE
	Eye(rabbit): 50ppm/30d int SEVERE

■ The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

Inhalation (human) TCLo: 12mg/m³/11W contin.Skin (rabbitmild)

2,6-DI-TERT-BUTYL-4-METHYLPHENOL:

Oral (woman) TDLo: 80 mg/kg	Skin (human): 500 mg/48h - Mild
Oral (rat) LD50: 890 mg/kg	Skin (rabbit):500 mg/48h-Moderate
	Eye (rabbit): 100 mg/24h-Moderate

■ The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

For hindered phenols:

Acute oral and dermal toxicity data are available for all but two of the substances in the group. The data show that acute toxicity of these substances is low.

Mutagenicity. Data from bacterial reverse mutation assays and in vitro and in vivo chromosome aberration studies were reviewed. All assays, with and without metabolic activation, were negative. The weight of evidence for mutagenic potential for this category indicates these substances are not mutagenic.

In Vitro Chromosome Aberration Studies. In vitro chromosome aberration studies are available for several members All except 2,6-di-tert-butyl-p-cresol were negative

In Vivo Chromosome Aberration Studies. In vivo studies evaluating chromosome damage are available for six of the hindered phenols. All in vivo evaluations were negative.

Repeated Dose Toxicity. Repeated dose toxicity data of approximately three months (90-day, 12- and 13-week) are available for most of the substances in this group. The liver was the target organ in rats for almost all of the substances with subchronic toxicity data in that species. Other target organs included thyroid and kidney and mesenteric lymph nodes. NOAELs in rats ranged from 100 ppm (approximately 5 mg/kg/day) to 10,000 ppm (500 mg/kg/day)

Carcinogenicity:

Data is available for 2,6-di-tert-butyl-p-cresol (128-37-0); and 4,4'-thiobis-6-(t-butyl-m-cresol) (96-69-5). Liver adenomas were reported for 2,6-di-tert-butyl-p-cresol (128-37-0) and a NOAEL was established for the study at 25 mg/kg/day. 4,4'-Thiobis-6-(t-butyl-m-cresol) (96-69-5) was not carcinogenic in rats or mice, but the kidney was identified as a target organ in female rats.

The substance is classified by IARC as Group 3:

NOT classifiable as to its carcinogenicity to humans.

Evidence of carcinogenicity may be inadequate or limited in animal testing.

NOTE: Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.

CARCINOGEN

Triethylamine	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4
Butylated hydroxytoluene (BHT)	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	3
Butylated hydroxytoluene [BHT]	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4

SKIN

triethylamine	US ACGIH Threshold Limit Values (TLV) - Skin	Skin Designation	Yes
triethylamine	Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
triethylamine	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S
triethylamine	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1
2,6-di-tert-butyl-4-methylphenol	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

TRIETHYLAMINE:

2,6-DI-TERT-BUTYL-4-METHYLPHENOL:

1,3-DIOXOLANE:

■ DO NOT discharge into sewer or waterways.

1,3-DIOXOLANE:

■ log Kow (Sangster 1997): - 0.37

■ for dioxolane:

The physicochemical properties of dioxolane are well defined. High water solubility and moderate volatility are defining characteristics. Environmental fate data are available from a combination of experimental and modeling data. Dioxolane is not readily biodegradable, is stable in water for over a year in the pH 4 to 9 range and has an estimated photodegradation half-life in air in the range of 10 to 30 hours. Predicted values for fugacity have been calculated with the MacKay model, which indicate an initial primary distribution in water; however, experience shows that in open systems it rapidly volatilises to air where it will be destroyed by photooxidation. Fish, daphnia and green algae are only acutely affected by dioxolane at concentration levels greater than several hundred ppm.

TRIETHYLAMINE:

■ Hazardous Air Pollutant: Yes

■ Fish LC50 (96hr.) (mg/l): 50- 80 (24h)

■ BCF<100: 7.45

■ log Kow (Prager 1995): 1.45

■ log Kow (Sangster 1997): 1.45

■ log Pow (Verschueren 1983): 1.44

■ For triethylamine:

log Kow : 1.44-1.45

Koc : 11-146

Half-life (hr) air : 4.5

Half-life (hr) H2O surface water : 9.3

Henry's atm m³/mol: 1.38E-04

BCF : 7.45

Nitrif. inhib. : nil at 100 mg/L

Environmental fate:

Terrestrial fate: An estimated Koc value of 150, determined from a log Kow of 1.45 indicates that triethylamine is expected to have high mobility in soil. The pKa of triethylamine is 10.78 indicates that this compound will exist almost entirely in the cation form in the environment and cations generally adsorb more strongly to soils containing organic carbon and clay than their neutral counterparts. Volatilisation of triethylamine from moist soil surfaces is not expected to be an important fate process given its cationic state. Triethylamine is expected to volatilise from dry soil surfaces based upon a vapor pressure of 57.1 mm Hg. Triethylamine reached 9 and 28% of its Theoretical BOD using an activated sludge inoculum and the Japanese MITI test.

Aquatic fate: The estimated Koc value of 150 indicates that triethylamine is not expected to adsorb to suspended solids and sediment. The pKa indicates triethylamine will exist almost entirely in the cation form at pH values of 5 to 9 and therefore volatilisation from water surfaces is not expected to be an important fate process. A BCF of <5 in carp, suggests the bioconcentration in aquatic organisms is low. Triethylamine, present at 100 mg/L, reached 9% and 28% of its theoretical BOD in 4 weeks using an activated sludge inoculum at 30 mg/L and 100 mg/L, respectively, and the Japanese MITI test.

Atmospheric fate: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere, triethylamine and the measured vapor pressure triethylamine is expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase triethylamine is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 4 hours, calculated from its rate constant of 9.3×10^{-11} cu cm/molecule-sec at 25 deg C that was derived using a structure estimation method. Triethylamine does not contain chromophores that absorb at wavelengths >290 nm(4) and therefore is not expected to be susceptible to direct photolysis by sunlight.

Ecotoxicity:

Fish LC50 (48 h): medaka (*Oryzias latipes*) 720 mg/l

Fish LC50 (96 h): fathead minnow (*Pimephales promelas*) 43.7 mg/l (static); guppy (*Lebistes reticulatus*) 330 mg/l (static)

Fish LC100 (24 h): creek chub (*Semotilus atromaculatus*) 80 mg/l

Daphnia magna LC50 (48 h): 200 mg/l.

2,6-DI-TERT-BUTYL-4-METHYLPHENOL:

- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- 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.

■ For hindered phenols:

The hindered phenols in this category consist of a group of chemicals in which a molecule of phenol (hydroxybenzene) has multiple substitutions on the aromatic ring with relatively large aliphatic and/or aromatic groups. At least one of the groups is adjacent to the hydroxyl group (the 2-, or ortho- position). Due to the bulky substituent groups, the substances, which may be either room temperature solids or liquids, have limited water solubility, high partition coefficients and are not readily biodegradable. The vapor pressure of these chemicals is low.

Environmental fate:

Fate and Transport Characteristics. Experimental data show that hindered phenols are not readily biodegradable. With one exception, the low water solubility of these chemicals precludes experimentally obtaining hydrolysis data. Model derived photodegradation indicates that these substances photodegrade rapidly. Fugacity modeling shows that, generally, partitioning would be to soil and sediments rather than air or water.

Ecotoxicity:

Aquatic Toxicology. Hindered phenols have low water solubility and, therefore, low aquatic toxicity. Experimental data are available on acute fish toxicity, acute invertebrate toxicity, and alga toxicity for the majority of chemicals in this category.

One chronic ecotoxicity test is available for butylated hydroxytoluene (BHT) (Daphnia magna NOEC 0.07 mg/l) hence BHT may fulfil the T criterion (for PBT substances) as a borderline case.

- For 2,6-di-tert-butyl-4-methylphenol (syn: butylated hydroxytoluene -BHT)

log Kow : 4.17

BOD 5 if unstated: 0.51

COD: 2.27

Bioaccumulation: little

Environmental fate:

After 8 days exposure to sunlight in water, 25% BHT remains undegraded; in a dark control 60% remains undegraded. BHT transforms to several oxidation products in water under sunlight and in the dark at moderate to rapid rate, whereas sunlight accelerates the rate. The main reaction product of BHT in water and oxygen was a stilbenequinone (dimer of BHT). Indirect photochemical degradation in the atmosphere is considered to be fast based on an estimated half-life of 3 hours for reaction with the OH-radical.

In soil BHT is altered to non-volatile compounds mainly by biological processes; these enhance the rate of primary degradation and mineralisation in a soil-air system.

BHT may meet the P/vP criteria and is not readily biodegradable. Degradation rates in sediment may differ from degradation rates in water due to a different oxygen regime.

BHT does not meet the B criterion; bioconcentration factors of up to 1276 (mon-max: 220-2800) have been measured in a flow through test with fish (parent compound)

Ecotoxicity:

One chronic ecotoxicity test is available (Daphnia magna NOEC 0.07 mg/l) hence BHT may fulfil the T criterion as a borderline case.

BHT was found to be a very weak binder to human oestrogen receptor in an in vitro assay and thus is not considered to fulfil the T-criterion with regard to endocrine disrupting effects.

- Substance has been evaluated and categorised as not being persistent, bioaccumulative, toxic (PBT) or very persistent, very bioaccumulative (vPvB).

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
1,3-dioxolane	LOW		LOW	HIGH
triethylamine	HIGH		LOW	MED
2,6-di-tert-butyl-4-methylphenol	HIGH		LOW	LOW

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

B. Component Waste Numbers

When triethylamine is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U404 (waste code T).

When triethylamine is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U404 (waste code T).

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. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. 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:	None	Hazard class or Division:	3
Identification Numbers:	UN1166	PG:	II
Label Codes:	3	Special provisions:	IB2, T4, TP1
Packaging: Exceptions:	150	Packaging: Non-bulk:	202
Packaging: Exceptions:	150	Quantity limitations: Passenger aircraft/rail:	5 L
Quantity Limitations: Cargo aircraft only:	60 L	Vessel stowage: Location:	B
Vessel stowage: Other:	40		

Hazardous materials descriptions and proper shipping names:
Dioxolane

Air Transport IATA:

ICAO/IATA Class:	3	ICAO/IATA Subrisk:	None
UN/ID Number:	1166	Packing Group:	II
Special provisions:	None		

Shipping Name: DIOXOLANE

Maritime Transport IMDG:

IMDG Class:	3	IMDG Subrisk:	None
UN Number:	1166	Packing Group:	II
EMS Number:	F-E,S-D	Special provisions:	None

Limited Quantities: 1 L

Shipping Name: DIOXOLANE

Section 15 - REGULATORY INFORMATION

1,3-dioxolane (CAS: 646-06-0) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada Domestic Substances List (DSL)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)","OECD Representative List of High Production Volume (HPV) Chemicals","US - Massachusetts Oil & Hazardous Material List","US - New Jersey Right to Know Hazardous Substances","US - Pennsylvania - Hazardous Substance List","US ACGIH Threshold Limit Values (TLV)","US DOE Temporary Emergency Exposure Limits (TEELs)","US EPA High Production Volume Program Chemical List","US Toxic Substances Control Act (TSCA) - Inventory","US TSCA Section 8 (d) - Health and Safety Data Reporting"

Regulations for ingredients

triethylamine (CAS: 121-44-8) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada National Pollutant Release Inventory (NPRI)","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELS)","US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Toxic Air Contaminant List Category II","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Massachusetts Oil & Hazardous Material List","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","US - Oregon Permissible Exposure Limits (Z1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Hazardous Constituents","US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A

Transitional Limits for Air Contaminants", "US - Washington Dangerous waste constituents list", "US - Washington Discarded Chemical Products List - ""U"" Chemical Products", "US - Washington Permissible exposure limits of air contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)", "US Clean Air Act - Hazardous Air Pollutants", "US CWA (Clean Water Act) - List of Hazardous Substances", "US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA High Production Volume Program Chemical List", "US EPCRA Section 313 Chemical List", "US List of Lists - Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes", "US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 8 (d) - Health and Safety Data Reporting"

2,6-di-tert-butyl-4-methylphenol (CAS: 128-37-0) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Ontario Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada National Pollutant Release Inventory (NPRI)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Alaska Limits for Air Contaminants", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Permissible exposure limits of air contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US Cosmetic Ingredient Review (CIR) Cosmetic ingredients found safe as used", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA High Production Volume Program Chemical List", "US FDA Direct Food Substances Generally Recognized as Safe", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US Food Additive Database", "US NFPA 499 Combustible Dusts", "US NIOSH Recommended Exposure Limits (RELs)", "US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Inhalation may produce health damage*.
- Cumulative effects may result following exposure*.
- May produce discomfort of the eyes and respiratory tract*.
- Vapors potentially cause drowsiness and dizziness*.

* (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

Substance CAS Suggested codes 2, 6- di- tert- butyl- 4- methylphenol 128- 37- 0 Xn Carc3; R40 Mut3; R68 N R50/53

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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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