

Cresyl diphenyl phosphate

sc-234422

Material Safety Data Sheet



The Power is Question

Hazard Alert Code Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

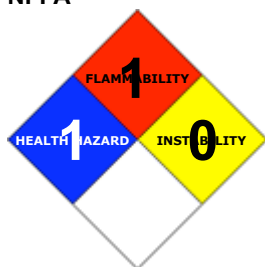
PRODUCT NAME

Cresyl diphenyl phosphate

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

Plasticiser; extreme pressure lubricant; hydraulic fluids; gasoline additive; food packaging.

SYNONYMS

C19-H17-O4-P, (CH₃C₆H₄)(C₆H₅)₂PO₄, "methylphenyl diphenyl phosphate", "phosphoric acid, methylphenyl diphenyl ester", "diphenyl tolyl phosphate", "phosphoric acid methylphenyl diphenyl ester", CDP, "cresyl diphenyl phosphate", "cresol diphenyl phosphate", "diphenyl cresol phosphate", "diphenyl cresyl phosphate", "monocresol diphenyl phosphate", "phenyl tolyl phosphate", "phosphoric acid, cresyl diphenyl ester", "phosphoric acid, diphenyl tolyl ester", "tolyl diphenyl phosphate", "cresyl phenyl phosphate", "mono-2-cresyl-diphenyl phosphate", "mono-2-cresyl-diphenyl phosphate", MOCP, "mono-o-cresyl diphenyl phosphate", "mono-o-cresyl diphenyl phosphate", "Disflamoll DPK", "Phosflex 112"

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS

None

EMERGENCY OVERVIEW

RISK

May cause long-term adverse effects in the aquatic environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

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■ 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.

■ Considered an unlikely route of entry in commercial/industrial environments.

■ Ingestion may result in nausea, pain, vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

EYE

■ Although the material is not thought to be an irritant, direct contact with the eye may produce transient discomfort characterized by tearing or conjunctival redness (as with windburn).

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.

■ The liquid may produce skin discomfort following prolonged contact. Defatting and/or drying of the skin may lead to dermatitis.

INHALED

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

■ Inhalation hazard is increased at higher temperatures.

■ Acute effects from inhalation of high vapor concentrations may be chest and nasal irritation with coughing, sneezing, headache and even nausea.

■ Inhalation of vapor may aggravate a pre-existing respiratory condition.

CHRONIC HEALTH EFFECTS

■ Principal routes of exposure are usually by skin contact/absorption and inhalation of vapor.

Prolonged or continuous skin contact with the liquid may cause defatting with drying, cracking, irritation and dermatitis following.

No human exposure data available. For this reason health effects described are based on experience with chemically related materials.

As with any chemical product, contact with unprotected bare skin; inhalation of vapor, mist or dust in work place atmosphere; or ingestion in any form, should be avoided by observing good occupational work practice.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS

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

NAME	CAS RN	%
cresyldiphenyl phosphate	26444-49-5	>98
commercial product may contain contaminant as		
tri-ortho-cresyl phosphate	78-30-8	

Section 4 - FIRST AID MEASURES

SWALLOWED

■ If poisoning occurs, contact a doctor or Poisons Information Center.

● 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.

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- 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:

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
- 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.
- Seek medical attention without delay.

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

■ All persons handling organic phosphorus ester materials regularly should undergo regular medical examination with special stress on the central nervous systems. Whilst atropine or pyridine-2-aldoxime methiodide (PAM) are beneficial antidotes for acute phosphate ester poisonings, they are of little value in reversing acute or chronic neurological damage due to phosphites and some types of aryl phosphate.

Section 5 - FIRE FIGHTING MEASURES

Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	1.2
Lower Explosive Limit (%):	Not available
Relative Vapor Density (air=1):	>1

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 full body protective clothing with breathing apparatus.
- 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.
- 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

■

- Combustible.

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- Slight fire hazard when exposed to heat or flame.
 - Heating may cause expansion or decomposition leading to violent rupture of containers.
 - On combustion, may emit toxic fumes of carbon monoxide (CO).
 - May emit acrid smoke.
 - Mists containing combustible materials may be explosive.
- Combustion products include: carbon monoxide (CO) and phosphorus oxides (PO_x).

FIRE INCOMPATIBILITY

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

PERSONAL PROTECTION

Glasses:

Safety Glasses.

Gloves:

Respirator:

Type A-P 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 spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labeled container for waste disposal.

MAJOR SPILLS

-
- Clear area of personnel and move upwind.
- 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.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Neutralize/decontaminate residue.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL

WARNING

MAY DECOMPOSE EXPLOSIVELY AT HIGH TEMPERATURES.

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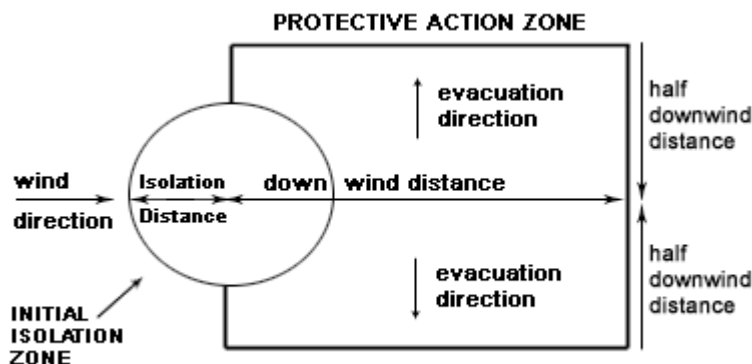
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From IERG (Canada/Australia)

Isolation Distance -

Downwind Protection Distance 10 meters

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 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

-
- 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 or ignition sources.
- 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.

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- 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.

RECOMMENDED STORAGE METHODS

- Metal can or drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- 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
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	cresyldiphenyl phosphate (Cresol, all isomers)	5	22						
US - Washington Permissible exposure limits of air contaminants	cresyldiphenyl phosphate (Cresol (all isomers))	5		10					
US OSHA Permissible Exposure Levels (PELs) - Table Z1	cresyldiphenyl phosphate (Cresol, all isomers)	5	22						
US - Idaho - Limits for Air Contaminants	cresyldiphenyl phosphate (Cresol, all isomers)	5	22						
Canada - Alberta Occupational Exposure Limits	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1						

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Canada - British Columbia Occupational Exposure Limits	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		Skin
Canada - Ontario Occupational Exposure Limits	tri-ortho-cresyl phosphate (Tri-ortho-cresyl phosphate)		0.1		Skin
US OSHA Permissible Exposure Levels (PELs) - Table Z1	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		
US ACGIH Threshold Limit Values (TLV)	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		TLV Basis: cholinesterase inhibition. BEI-Aon
US NIOSH Recommended Exposure Limits (RELs)	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		
US - Minnesota Permissible Exposure Limits (PELs)	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		
US - California Permissible Exposure Limits for Chemical Contaminants	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		
US - Idaho - Limits for Air Contaminants	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		
US - Hawaii Air Contaminant Limits	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		
US - Alaska Limits for Air Contaminants	tri-ortho-cresyl phosphate (Tri-ortho-cresyl phosphate)		0.1		
US - Michigan Exposure Limits for Air Contaminants	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		

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Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)	-	0.1	-	0.3	
US - Washington Permissible exposure limits of air contaminants	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		0.3	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		0.3	Skin
Canada - Prince Edward Island Occupational Exposure Limits	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1			TLV Basis: cholinesterase inhibition. BEI-Aon
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	tri-ortho-cresyl phosphate (Tri-o-cresyl phosphate)		0.1			
US - Oregon Permissible Exposure Limits (Z1)	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1			
Canada - Northwest Territories Occupational Exposure Limits (English)	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1		0.3	
Canada - Nova Scotia Occupational Exposure Limits	tri-ortho-cresyl phosphate (Triorthocresyl phosphate)		0.1			TLV Basis: cholinesterase inhibition. BEI-Aon

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
cresyldiphenyl phosphate		250 [Unch]
tri-ortho-cresyl phosphate	40 [Unch]	

MATERIAL DATA

CRESYLDIPHENYL PHOSPHATE:

■ No exposure limits set by NOHSC or ACGIH.

TRI-ORTHO-CRESYL PHOSPHATE:

■ Exposure to TOCP causes central and peripheral neuropathies with paralysis of the distal muscles of the lower and upper extremities.

Air concentrations between 0.55 and 1.7 mg/m3 have been associated with polyneuritis, reduced cholinesterase activity has been related to air concentrations of 0.27 - > 3 mg/m3.

PERSONAL PROTECTION

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Consult your EHS staff for recommendations

EYE

- Safety glasses.
- 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 protective gloves, e.g. PVC.

OTHER

- No special equipment needed when handling small quantities.

OTHERWISE:

- Overalls.
- Barrier cream.
- Eyewash unit.

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

- General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in specific circumstances. If risk of overexposure exists, wear an approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. 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.)
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

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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.

Does not mix with water.

Sinks in water.

State	Liquid	Molecular Weight	340.33
Melting Range (°F)	-49 pour point	Boiling Range (°F)	455- 491 (4 mm)
Solubility in water (g/L)	Partly miscible	Flash Point (°F)	449.6
pH (1% solution)	Not applicable	Decomposition Temp (°F)	Not available
pH (as supplied)	Not applicable	Autoignition Temp (°F)	Not available
Vapour Pressure (mmHG)	Not available	Upper Explosive Limit (%)	Not available
Specific Gravity (water=1)	1.2	Lower Explosive Limit (%)	Not available
Relative Vapor Density (air=1)	>1	Volatile Component (%vol)	Not available
Evaporation Rate	Not available	Gas group	IIA

APPEARANCE

Colourless liquid with faint odour; does not mix well with water. Soluble in most organic solvents. Mixture of o-, m-, and p-cresyl isomers.

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

cresyldiphenyl phosphate

TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 6400 mg/kg	Nil Reported
Oral (mouse) LD50: 6400-12800 mg/kg	
Oral (g.pig) LD50: 1600-3200 mg/kg	

CARCINOGEN

Triorthocresyl phosphate	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4
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SKIN

cresyldiphenyl	US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air	Skin Designation	X
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phosphate	Contaminants - Skin				
cresyldiphenyl phosphate	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin			Skin Designation	X
cresyldiphenyl phosphate	US - Washington Permissible exposure limits of air contaminants - Skin			Skin	X
cresyldiphenyl phosphate	US - Minnesota Permissible Exposure Limits (PELs) - Skin			Skin Designation	X
cresyldiphenyl phosphate	US - Hawaii Air Contaminant Limits - Skin Designation			Skin Designation	X
cresyldiphenyl phosphate	ND			Skin Designation	X
cresyldiphenyl phosphate	US OSHA Permissible Exposure Levels (PELs) - Skin			Skin Designation	X
cresyldiphenyl phosphate	US - California Permissible Exposure Limits for Chemical Contaminants - Skin			Skin	X
tri-ortho-cresyl phosphate	Canada - Ontario Occupational Exposure Limits - Skin			Notes	Skin
tri-ortho-cresyl phosphate	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin			Notes	Skin
tri-ortho-cresyl phosphate	US NIOSH Recommended Exposure Limits (RELs) - Skin			Skin	Yes
tri-ortho-cresyl phosphate	Canada - Quebec Permissible Exposure Values for Airborne Contaminants - Skin (French)			Notes	Skin
tri-ortho-cresyl phosphate	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin			Skin Designation	X
tri-ortho-cresyl phosphate	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin			Skin Designation	X
tri-ortho-cresyl phosphate	US - Washington Permissible exposure limits of air contaminants - Skin			Skin	X
tri-ortho-cresyl phosphate	US ACGIH Threshold Limit Values (TLV) - Skin			Skin Designation	Yes
tri-ortho-cresyl phosphate	Canada - British Columbia Occupational Exposure Limits - Skin			Notation	Skin
tri-ortho-cresyl phosphate	US - Minnesota Permissible Exposure Limits (PELs) - Skin			Skin Designation	X
tri-ortho-cresyl phosphate	US - Hawaii Air Contaminant Limits - Skin Designation			Skin Designation	X
tri-ortho-cresyl phosphate	ND			Skin Designation	X
tri-ortho-cresyl phosphate	US OSHA Permissible Exposure Levels (PELs) - Skin			Skin Designation	X
tri-ortho-cresyl phosphate	US - California Permissible Exposure Limits for Chemical Contaminants - Skin			Skin	X
tri-ortho-cresyl phosphate	US - California Permissible Exposure Limits for Chemical Contaminants - Skin			Skin	S
tri-ortho-cresyl phosphate	Canada - Alberta Occupational Exposure Limits - Skin			Substance Interaction	1

Section 12 - ECOLOGICAL INFORMATION

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Refer to data for ingredients, which follows:

TRI-ORTHO-CRESYL PHOSPHATE:

CRESYLDIPHENYL PHOSPHATE:

■ The principal problems of phosphate contamination of the environment relates to eutrophication processes in lakes and ponds. Phosphorus is an essential plant nutrient and is usually the limiting nutrient for blue-green algae. A lake undergoing eutrophication shows a rapid growth of algae in surface waters. Planktonic algae cause turbidity and flotation films. Shore algae cause ugly muddying, films and damage to reeds. Decay of these algae causes oxygen depletion in the deep water and shallow water near the shore. The process is self-perpetuating because anoxic conditions at the sediment/ water interface causes the release of more adsorbed phosphates from the sediment. The growth of algae produces undesirable effects on the treatment of water for drinking purposes, on fisheries, and on the use of lakes for recreational purposes.

CRESYLDIPHENYL PHOSPHATE:

Kow 31622

log Kow 3.83

BCF 1548.82

TRI-ORTHO-CRESYL PHOSPHATE:

Marine Pollutant:	Severe
■ Fish LC50 (96hr.) (mg/l):	7000- 8700

■ 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 tricresyl phosphate (TCP):

Environmental fate:

Because of its low water solubility and high adsorption to particulates, TCP is rapidly adsorbed onto river or lake sediment and soil. The ortho isomer is degraded slightly faster than the meta or para isomers. TCP is readily biodegraded in sewage sludge with a half-life of 7.5 h, the degradation within 24 h being up to 99%. The major metabolite extracted with ethyl ether from the aqueous phase was identified as p-hydroxybenzoic acid.

Abiotic degradation is slower with a half-life of 96 days. Bioconcentration factors (BCF) of 165-2768 were measured for several fish species in the laboratory using radiolabelled TCP. The radioactivity was lost rapidly on cessation of exposure, depuration half-lives ranging between 25.8 and 90 h.

The clearance of tri-m-cresyl phosphate has been shown to be biphasic, with higher rates of clearance in the first 6 days after transfer to clean water, especially for rainbow trout. The clearance rate constants for rainbow trout were about 50% more than those for fathead minnows

The uptake and translocation of tri-p-cresyl phosphate by soybean plants has been studied; the initial concentration in soil being 10 mg per kg. Approximately 70% of the compound had disappeared from the soil within 90 days (when the plants were harvested). At that time, the amount per plant was 34 ug (0.17% of the applied TCP). Of this total plant content, 74% was found in the stem, 24% in the leaves, and 2% in the pods. The seeds contained no detectable tri-p- cresyl phosphate.

For alkyl-aryl and triaryl phosphates, increasing the number and size of substituent groups on the phenyl molecule decreases the biodegradability. The degradation pathway for TCP most probably involves stepwise enzymatic hydrolysis to orthophosphate and phenolic moieties. The phenol would then be expected to undergo further degradation. p-Cresol is oxidized to p-hydroxybenzoic acid by a species of *Pseudomonas*.

Ecotoxicity:

Owing to the high biodegradation rate of TCP in aqueous environment, it is not considered to affect aquatic organisms adversely.

Freshwater algae are relatively sensitive to TCP, the 50% growth inhibitory concentration ranging from 1.5 to 5.0 mg/litre. Among fish species, the rainbow trout is adversely affected by TCP concentrations below 1 mg/litre (0.3-0.9 mg/litre), with sign of chronic poisoning, but the tidewater silverside is more resistant (LC50 is 8700 mg/litre). TCP does not inhibit cholinesterase activity in fish or frogs, but it has a synergistic effect on organophosphorus insecticide activity.

■ For alkyl-aryl and triaryl phosphates, increasing the number and size of substituent groups on the phenyl molecule decreases the biodegradability.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
cresyldiphenyl phosphate	HIGH		LOW	LOW
tri-ortho-cresyl phosphate	HIGH		LOW	LOW

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

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

- Recycle wherever possible or consult manufacturer for recycling options.

Cresyl diphenyl phosphate

sc-234422

Material Safety Data Sheet



The Power is Question

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW
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- Consult Waste Management Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	G	Hazard class or Division:	9
Identification Numbers:	UN3082	PG:	III
Label Codes:	9	Special provisions:	8, 146, 335, IB3, T4, TP1, TP29
Packaging: Exceptions:	155	Packaging: Non-bulk:	203
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	S.M.P.:	Severe

Hazardous materials descriptions and proper shipping names:

Environmentally hazardous substance, liquid, n.o.s

Air Transport IATA:

ICAO/IATA Class:	9	ICAO/IATA Subrisk:	III
UN/ID Number:	3082	Packing Group:	III
Special provisions:	A97		

Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. *(CONTAINS CRESYLDIPHENYL PHOSPHATE)

Maritime Transport IMDG:

IMDG Class:	9	IMDG Subrisk:	None
UN Number:	3082	Packing Group:	III
EMS Number:	F-A,S-F	Special provisions:	274 909 944

Limited Quantities: 5 L

Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.(contains cresyldiphenyl phosphate)

Section 15 - REGULATORY INFORMATION

cresyldiphenyl phosphate (CAS: 26444-49-5) is found on the following regulatory lists;

"IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "OECD Representative List of High Production Volume (HPV) Chemicals", "US Department of Transportation (DOT) Marine Pollutants - Appendix B", "US EPA Master Testing List - Index I Chemicals Listed", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 8 (d) - Health and Safety Data Reporting"

Regulations for ingredients

tri-ortho-cresyl phosphate (CAS: 78-30-8) 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 Ingredient Disclosure List (SOR/88-64)", "Canada Toxicological

Cresyl diphenyl phosphate

sc-234422

Material Safety Data Sheet



The Power is Question

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW
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Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "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 Permissible Exposure Limits for Chemical Contaminants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "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 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 - 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 DOE Temporary Emergency Exposure Limits (TEELs)", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 8 (d) - Health and Safety Data Reporting"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Inhalation and/or ingestion may produce health damage*.
 - May produce discomfort of the respiratory system*.
- * (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

Substance CAS Suggested codes tri- ortho- cresyl phosphate 78- 30- 8 Xn Mut3; R68 Repr3; R63 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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