

Triclosan

sc-220326

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

Triclosan

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

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877-715-9305

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

PRODUCT USE

Bacteriostat and preservative for cosmetic and detergent preparations. Reagent

SYNONYMS

C12-H7-Cl3-O2, "Ciba Geigy Irgasan DP-300", "2' -hydroxy-2, 4, 4' -trichlorodiphenyl ether", "2' -hydroxy-2, 4, 4' -trichlorodiphenyl ether", "ether, 2' -hydroxy-2, 4, 4' -trichlorodiphenyl", "ether, 2' -hydroxy-2, 4, 4' -trichlorodiphenyl", "phenol, 5-chloro-2-(2, 4-dichlorophenoxy)-", "phenol, 5-chloro-2-(2, 4-dichlorophenoxy)-", "phenyl ether, 2' -hydroxy-2, 4, 4' -trichloro-", "phenyl ether, 2' -hydroxy-2, 4, 4' -trichloro-", "CH 3635", "Irgasan CH 3635", TCC

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Toxic by inhalation.

Irritating to eyes and skin.

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

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- Accidental ingestion of the material may be damaging to the health of the individual.
- Digestion of PCBs and related substances can lead to nausea and vomiting, abdominal pain, loss of appetite, jaundice, liver damage, coma and death. Headache, dizziness, lethargy, depression, nervousness, loss of libido and muscle and joint pain may also occur. Symptoms and death may be delayed for months; the substance occurs in the breastmilk of women and is toxic to babies.
- At sufficiently high doses the material may be hepatotoxic (i.e. poisonous to the liver).

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.
- Vapors of PCBs may be irritating and may be absorbed by the eye.

SKIN

- The material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.
- Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
- 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.
- Chlorinated diphenyl ethers may produce skin irritation; systemic toxicity may occur following absorption.

INHALED

- Inhalation of vapors, aerosols (mists, fumes) or dusts, generated by the material during the course of normal handling, may produce toxic effects.
- 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.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
- Inhalation of vapors containing PCBs may cause respiratory irritation, eczema and skin burns.

CHRONIC HEALTH EFFECTS

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

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

There is some evidence that human exposure to the material may result in developmental toxicity. This evidence is based on animal studies where effects have been observed in the absence of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not secondary non-specific consequences of the other toxic effects.

Exposure to the material may cause concerns for human fertility, on the basis that similar materials provide some evidence of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects, but which are not a secondary non-specific consequence of other toxic effects.

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

Prolonged contact with chlorinated diphenyl ethers may cause skin irritation, weight loss and liver injury. Repeated absorption has produced liver damage in animals.

Exposure to polychlorinated biphenyls (PCBs) over a long time can cause eczema and internal effects; various systems may be affected. On the skin, there may be thickening, swelling of the eyelids, feet and hands, itchy red eruptions, discoloration of nails and changes in hair follicles, hair loss, acne, eye discharge, and discoloration of the oral cavity. Effects on the digestive system include nausea and vomiting, abdominal pain and loss of appetite. There may be damage to the liver indicated by jaundice, which can be fatal. Nervous system effects include headache, dizziness, fatigue, impotence, joint and muscle pain. The airways may also be irritated and lung capacity reduced. PCBs cross the placenta and cause a variety of defects in the fetus and newborn including browning of the skin and liver damage. Growth may be retarded for many years with learning difficulties. The risk of miscarriages and stillbirths is increased. There may be a relationship between exposure to PCBs and the risk of developing various cancers, including melanomas, growths of the digestive system, lymphomas and leukemias.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS

	Min	Max
Flammability:	1	1
Toxicity:	3	3
Body Contact:	2	2
Reactivity:	1	1

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





NAME	CAS RN	%
2,4,4'-trichloro-2'-hydroxydiphenyl ether	3380-34-5	100

Section 4 - FIRST AID MEASURES

SWALLOWED

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

EYE

- If this product comes in contact with the eyes:
 - Immediately hold eyelids apart and flush the eye continuously with 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.
 - Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
 - Transport to hospital or doctor without delay.
 - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin contact occurs:
 - Immediately remove all contaminated clothing, including footwear
 - Flush skin and hair with running water (and soap if available).
 - Seek medical attention in event of irritation.

INHALED

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- 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, without delay.

NOTES TO PHYSICIAN

- Treat symptomatically.

Presentation:

A: Acute symptoms related to overexposure to the PCBs and dioxins (PCDDs and PCDFs) and, presumably, other polyhalogenated polyaromatics (PHAHs) include irritation of the skin, eyes and mucous membranes and nausea, vomiting and myalgias.

B: After a latency period which may be prolonged (up to several weeks or more), chloracne, porphyria cutanea tarda, hirsutism, or hyperpigmentation may occur. Elevated levels of hepatic transaminases and blood lipids may be found. Polyneuropathies with sensory impairment and lower-extremity motor weakness may also occur.

C: Useful laboratory studies might include glucose, electrolytes, BUN, creatinine, liver transaminase, and liver function tests, and uroporphyrins (where porphyria is suspected)

Treatment:

A: Emergency and Supportive Measures: Treat skin, eye and respiratory irritation symptomatically

B: There is no specific antidote

C: Decontamination:

- Inhalation; remove victims from exposure and give supplemental oxygen if available.
- Eyes and Skin: remove contaminated clothing and wash affected skin with copious soap and water; irrigate exposed eyes with copious tepid water or saline.
- Ingestion; (a) Prehospital: Administer activated charcoal if available. Ipecac-induced vomiting may be useful for initial treatment at the scene if it can be given within a few minutes exposure (b) Hospital: Administer activated charcoal. Gastric emptying is not necessary if activated charcoal can be given promptly.

D: Enhanced elimination: There is no known role for these procedures.

POISONING and DRUG OVERDOSE, Californian Poison Control System Ed. Kent R Olson; 3rd Edition

- If large amounts of PCB are ingested, gastric lavage is suggested.
- In the case of splashes to the eyes, a petrolatum-based ophthalmic ointment may be applied to the eye to relieve the irritating effects of PCBs.
- If electrical equipment arcs over, PCB dielectric fluids may decompose to produce hydrogen chloride (HCl), a respiratory irritant. [MONSANTO] Preplacement and annual medical examination of workers, likely to be exposed to PCBs and their congeners, is recommended; examination should emphasize liver function, skin condition, and reproductive history. [ILO]

Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	30.002x10-6mm Hg(20 C)
Upper Explosive Limit (%):	Not applicable
Specific Gravity (water=1):	1.2
Lower Explosive Limit (%):	Not applicable

EXTINGUISHING MEDIA

-
- Water spray or fog.
- Alcohol stable foam.
- Dry chemical powder.
- Carbon dioxide.

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 fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

-
- Combustible.
- 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. May emit corrosive fumes.

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

PCBs decompose on heating to produce acrid black soot and toxic fumes of aldehydes, hydrogen chlorides (HCl), chlorides and extremely toxic polychlorinated dibenzofurans (PCDF) and polychlorinated dibenzodioxin (PCDD).

Other halogenated analogues may produce corresponding decomposition products.

May emit poisonous fumes.

FIRE INCOMPATIBILITY

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

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

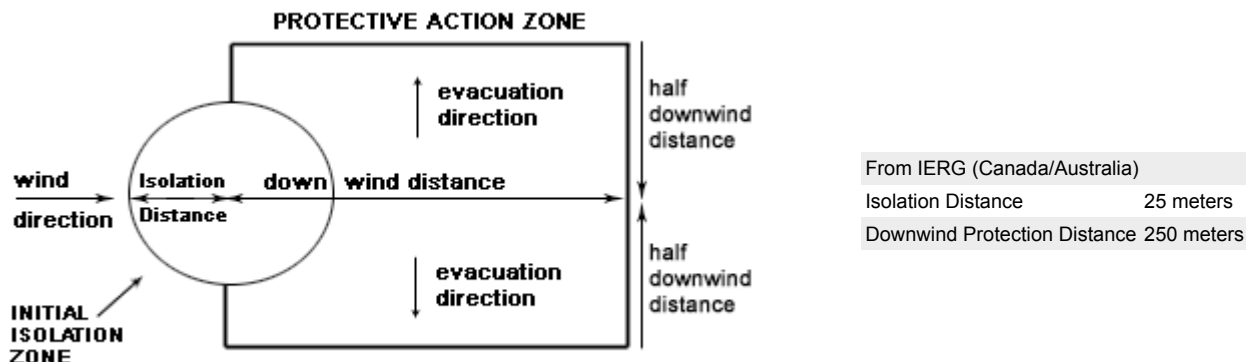
- Environmental hazard - contain spillage.
- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
- Dampen with water to prevent dusting before sweeping.
- Place in suitable containers for disposal.

MAJOR SPILLS

- Environmental hazard - contain spillage.
- Clear area of personnel and move upwind.
- 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.
- 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



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 154 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.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- Use good occupational work practice.

- Observe manufacturer's storing and handling recommendations.
 - Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
- Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
- Do NOT cut, drill, grind or weld such containers.
 - In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS

- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

For low viscosity materials

- Drums and jerricans must be of the non-removable head type.
- 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) and solids (between 15 C deg. and 40 deg C.):

- Removable head packaging;
- Cans with friction closures and
- 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 and II 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.
- 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

X

+

X

X

+

X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes
US - Oregon Permissible Exposure Limits (Z3)	2,4,4'-trichloro-2'-hydroxydiphenyl ether (Inert or Nuisance Dust: (d) Total dust)		10						*
US OSHA Permissible Exposure Levels (PELs) - Table Z3	2,4,4'-trichloro-2'-hydroxydiphenyl ether (Inert or Nuisance Dust: (d) Respirable fraction)		5						
US OSHA Permissible Exposure Levels (PELs) - Table Z3	2,4,4'-trichloro-2'-hydroxydiphenyl ether (Inert or Nuisance Dust: (d) Total dust)		15						
US - Hawaii Air Contaminant Limits	2,4,4'-trichloro-2'-hydroxydiphenyl ether (Particulates not other wise regulated - Total dust)		10						
US - Hawaii Air Contaminant Limits	2,4,4'-trichloro-2'-hydroxydiphenyl ether (Particulates not other wise regulated - Respirable fraction)		5						

US - Oregon Permissible Exposure Limits (Z3)	2,4,4'-trichloro-2'-hydroxydiphenyl ether (Inert or Nuisance Dust: (d) Respirable fraction)	5	*
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	2,4,4'-trichloro-2'-hydroxydiphenyl ether (Particulates not otherwise regulated Respirable fraction)	5	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	2,4,4'-trichloro-2'-hydroxydiphenyl ether (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)	5	
US - Michigan Exposure Limits for Air Contaminants	2,4,4'-trichloro-2'-hydroxydiphenyl ether (Particulates not otherwise regulated, Respirable dust)	5	

MATERIAL DATA

2,4,4'-TRICHLORO-2'-HYDROXYDIPHENYL ETHER:

• It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

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

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
- accustom the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

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

• Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

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

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

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

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

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

OTHER

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- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.
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- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

RESPIRATOR

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

* - Negative pressure demand ** - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

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

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

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

Type K for use against ammonia and organic ammonia derivatives

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

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

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

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

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

ENGINEERING CONTROLS

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

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

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

(c): fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.

- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

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

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

Within each range the appropriate value depends on:

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

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

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.
Does not mix with water.
Sinks in water.

State	Divided solid	Molecular Weight	289.54
Melting Range (°F)	131- 134.6	Viscosity	Not Applicable
Boiling Range (°F)	365	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	433.4 (open)	pH (1% solution)	Not available
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	>662	Vapor Pressure (mmHg)	30.002x10 ⁻⁶ mm Hg(20 C)
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	1.2
Lower Explosive Limit (%)	Not applicable	Relative Vapor Density (air=1)	Not available.
Volatile Component (%vol)	Negligible	Evaporation Rate	Not available

APPEARANCE

White powder with no odour or very slight aromatic odour; does not mix well with water (17 mg/l). May forms cloudy solutions. Ignition point = > 500 deg C.

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

2,4,4'-trichloro-2'-hydroxydiphenyl ether

TOXICITY AND IRRITATION

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

TOXICITY	IRRITATION
Oral (rat) LD50: 3700 mg/kg	Skin (human):0.75 mg/3d-I- Mild
Inhalation (rat) LC50: >140 mg/kg*	Skin (rabbit): 10% - Mild
Dermal (rabbit) LD50: >6000 mg/kg*	Eye: SEVERE **

• For triclosan:

Triclosan is readily absorbed in humans by the skin , through the oral mucous membranes (Lin 2000), through the gastrointestinal tract , and through mucosal tissues following intra-vaginal administration
Triclosan was excreted into the urine and faeces essentially unchanged with some evidence of conjugation. Triclosan has been detected in the liver and fat.

In a 13-week dermal subchronic study of triclosan in rats signs of severe dermal irritation were seen in the treated groups, especially in the

high-dose group. These signs were erythema, edema, desquamation, and eschar formation. Microscopically, hyperplasia of sebaceous glands, inflammation, and focal necrosis were seen on the skin of treated animals. The dermal effects were reversible during the recovery period. There were no systemic effects that could be treatment-related, although liver masses were observed in two treated animals .

Skin Sensitisation:

Subchronic dermal studies were conducted by applying 0.4 mL of a 2.5% or 5% suspension of triclosan in gum Arabic five times each week for four weeks to the shaved backs of male and female rats (5/sex) No local dermal irritation or systemic toxicity was reported.

Human Skin Irritation and Sensitisation:

Studies were conducted on the skin of human volunteers to determine the compatibility of dermal application of triclosan . The subjects were topically treated with 0.5% triclosan in 1% soap solution according to the Draize method . In the soap control, 0/50 subjects had sensitization or irritation, while 2/50 subjects receiving 0.5% triclosan had a very mild reaction. The conclusion was that triclosan was not a sensitiser or irritant.

Reproductive/Developmental Toxicity:

Reproductive studies were cited in which a NOEL of 50 mg/kg/day was reported for the dams based on effects on the pups. A NOEL based on developmental outcomes was listed as 150-300 mg/kg/day ; however, no reproductive tract or fertility abnormalities were reported

Oral administration of triclosan to pregnant mice (gestation days 1-16) resulted in maternal and foetal toxicity at 50 and 100 mg/kg. The authors report no indications of teratogenesis in the mice, or in rats (50 and 100 mg/kg) or in rabbits (10, 25, 50, 100 mg/kg) following administration during gestation.

In a two-generational dose study conducted in rats at doses of 0, 300, 1000, and 3000 ppm in the diet (equivalent to 0, 15, 50, 150 mg/kg), toxicity was noted in the neonates from dams consuming the highest dose, and reductions in survival were seen in f1 and f2 populations with increased kidney dilations.

Triclosan has also been detected in human breast milk, and is probably associated with the fat due to its high lipophilicity

Cellular toxicity:

Triclosan has also been shown to inhibit cell growth in MCF-7 and SK Br-3 human breast cancer cell lines resulting in cellular apoptosis . The authors demonstrated that triclosan reversibly inhibited mammalian fatty acid synthesis (enzyme from SK Br-3 cells and goose uropygial gland). Triclosan was shown also to induce apoptosis in Smulow-Glickman human gingival epithelial cells in vitro

Genetic toxicity: The results of 18 mutagenicity tests were summarised, of which 13 were conducted by industry and not reported in the literature. Only one test indicated that triclosan was a mutagen (mammalian spot test), and a repeat of that study was negative.

Endocrine disruption: There have been several reports on endocrine disruptor activity of triclosan. In one study triclosan was weakly androgenic as evidenced by altered fin length and sex ratio in Japanese Medaka fish starting at age 2 days. Additional studies indicated that triclosan was toxic and had weak oestrogenic activity in Medaka . Oestrogen antagonism was induced in frogs following intraperitoneal administration of high doses of triclosan, while lower doses reduced testosterone in male frogs . Additional studies with frogs showed that triclosan bound to thyroid hormone receptor

In another study triclosan exhibited oestrogenic activity as evidenced by competitive binding with estradiol at the estrogen receptor and supported growth of the oestrogen-dependent MCF-7 cell line. The same study demonstrated triclosan bound to the rat androgen receptor, demonstrating androgenic activity.

Nomination Profile Supporting Information for Toxicological Evaluation by the National Toxicology Program July 2008.

Side-reactions during manufacture of the parent compound may result in the production of trace amounts of polyhalogenated aromatic hydrocarbon(s). Halogenated phenols, and especially their alkali salts, can condense above 300 deg. C . to form polyphenoxyphenols or, in a very specific reaction, to form dibenzo-p-dioxins.

Polyhalogenated aromatic hydrocarbons (PHAHs) can cause effects on hormones and mimic thyroid hormone. Acne, discharge in the eye, eyelid swellings and visual disturbances may occur. Babies born to exposed mothers can also exhibit these effects. There is an increased risk of liver cancer among those who have taken PHAHs.

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.

[Van Waters & Rogers]* [Thompson Research]**

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

2,4,4'-TRICHLORO-2'-HYDROXYDIPHENYL ETHER:

- On the basis of available evidence concerning either toxicity, persistence, potential to accumulate and or observed environmental fate and behaviour, the material may present a danger, immediate or long-term and /or delayed, to the structure and/ or functioning of natural ecosystems.

- 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 2,4,4'-trichloro-2'-hydroxydiphenyl ether (triclosan):

BOD 5: 0 mgO2/g

COD: 1116 mgO2/g

TOC: 50%

OECD biological degradation; <10% Oxygen consumption OECD 301C, 302C

Organo-halogen content: 36.7% chloro

Several studies indicate that degradation of triclosan by sunlight is important. Some triclosan is also likely to end up in river sediments. There are limited data to suggest that triclosan may be persistent in sediments. The toxicity of triclosan to sediment dwelling organisms is unknown.

A transformation product of triclosan, methyl triclosan, has been subject to a number of investigations Methyl triclosan can be formed either during the sewage treatment process or in the natural environment. It is typically present at much lower concentrations than triclosan but it is potentially of concern as it is not broken down by sunlight and is therefore more stable than triclosan. It has also been found to bio-accumulate in fish Presently there is very little data available on the toxicity of methyl triclosan, so its risk to aquatic life remains uncertain. Other reported transformation products of triclosan which may be a concern for the environment include 2,8-dichlorodibenzo-p-dioxin, formed under laboratory conditions using light (photolysis) However the extent to which this takes process takes place in the natural environment is unknown and therefore it is difficult to assess the environmental significance.

Biodegradation: Because of the antibacterial effect of triclosan, degradation tests according to OECD 301 ("ready degradability") are not relevant. Thus, data from MITI reporting 0% degradability at a concentration of 100 mg/ml is not valid. Ciba reports results from inherent tests demonstrating degradation, but the removal of triclosan in these studies may be a result of adsorption to sludge. So far, there are no available data to document ready degradability. Based on the insufficient data on degradation, a classification of "not readily biodegradable" by default is proposed.

Bioaccumulation: Triclosan has a log Kow of 4.76, which indicate a high potential for bioaccumulation (molecular weight < 700). Data from Ciba reports BCF-values of 4160 (3 ppb) and 2530 (30 ppb) on Zebra fish (OECD 305C) with 5 weeks exposure. Ciba reports 98% depuration within 2 weeks; most of the triclosan taken up by the fish during the exposure time was excreted.

In another study Another study BCF-values in the range of 3730-8400, at various pH-values, have been reported. This study is according to OECD 305, and valid as a study to document a high potential of bioaccumulation

Ecotoxicity:

The impact of triclosan on the aquatic environment depends on its aquatic toxicity and potential bioaccumulation and degradation properties. Work done at the Institute of Applied Environmental Research (ITM) in Sweden has shown that triclosan is bioavailable to fish in the aquatic environment downstream of municipal treatment works, and it has been found in human breast milk.

The possible harmful effects of wide-ranging use of antibacterial substances like triclosan are not known well enough. Several studies have demonstrated the ability of bacterial strains to evolve resistance to triclosan and other antibiotics. Moreover, ecotoxicological studies demonstrate that triclosan is very toxic to aquatic organisms and has high potential for bioaccumulation.

Fish LC50 (96 h): 0.26 mg/l

Fish LC50 (96 h): zebra Fish LC50: 0.5 mg/l

Daphnia EC50 (48 h): 0.4 mg/l OECD 202

Daphnia magna L(E)C50 48 h): 0.39 mg/l

Algae EC50 (72 h): 0.2 mg/l 72h OECD 201

Algae L(E)C50 (72 h): Scenedesmus sub.0.0014 mg/l; Anabena flos-acuae 0.000966 mg/l

C. dubia (crustacean) L(E)C50 (48 h): 0.13 mg/l

Toxicity to bacteria: 20 mg/l (3h) OECD 209

Test results from studies with fresh water algae reported to the US EPA for the notification of triclosan (US EPA report NTIS/OTS0573798), demonstrate L(E)C50 values of 0.966 ug/l and 4.46 ug/l..

The US EPA studies are performed according to standard methods of EPA and ASTM, except that the algae growth are not measured each day during the exposure period of 4 days, but only at the start and the end. The EC50 value is calculated from the cell density after 96 hours growth.

According to the evaluation of these studies by The Norwegian Institute for Water Research (NIVA), the ca 300x increased cell density of the control (growth rate 1.42d exp-1) within 96 h, indicate an exponential growth during most of the incubation period the Selenastrum study. Thus, the reported EC50 value (4.46 ug/l) corresponds to EbC50 as defined in the OECD Guideline 201. Although the exposure time of 96 hours in the study is longer than the recommended time of 72 hours in the OECD Guideline, the 72h EbC50 will probably not exceed a factor of 2 compared to the 96h EbC50. Based on raw data from the study, the 96h ErC50 (inhibition of growth rate) is calculated to 15.7 ug/l. The EfC50 do not depend on the exposure time like the EbC50

The evaluation of the Selenastrum study thus concludes that the study is valid to document EC50 << 1mg/l for algae.

• PCBs and other polyhalogenated polyaromatic hydrocarbons (including the dioxins and brominated species) are resistant to chemical and biological degradation and because of their solubility in fats and oils they tend to be bioconcentrated in living organisms. The highly chlorinated PCBs are retained in animals longer and seem to delay the excretion of the lower chlorinated PCBs. This is presumably true of other halogenated species and halogenated polyaromatic systems. They have become widely dispersed in the world environment and in the food-chain since their introduction. They are now recognized internationally to be a major environmental pollutant, their persistence causing ecological damage via water pollution. Consequently the loss of these materials to the environment is to be avoided at all costs.

PCBs are exceptionally persistent in the food chain, some even more so than the organochlorine insecticides with which they are often confused. In general the higher the degree of chlorination, the more resistant to degradation and more persistent environmentally they become.

Bioconcentration factors of PCBs in aquatic species such as fish, shrimp, and oysters range from 26000 to 60000. The health effects of PCBs are well established. These include interference with reproduction in wildlife and experimental animals and effects in birds and mammals including microsomal enzyme induction, porphyrogenic activity, tumor promotion, estrogen activity and immunosuppression. Because of their high lipophilicity and their stability, the potential to bioaccumulate is great and long-term effects may be significant.

• DO NOT discharge into sewer or waterways.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
2,4,4'-trichloro-2'-hydroxydiphenyl ether	HIGH		LOW	LOW

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

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

• Puncture containers to prevent re-use and bury at an authorized landfill.

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

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

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

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

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

Due to their environmental persistence and potential health hazards, PCBs and dioxins cannot be disposed of in landfills or dumped at sea. The only environmentally acceptable method of disposal of PCBs and dioxins is by high temperature incineration. However this option is costly and uncertain. Currently, most PCB and dioxin wastes must be stored in an approved manner until satisfactory arrangements can be made for their disposal. All wastes and residues containing PCBs and/or dioxins (e.g. wiping clothes, absorbent materials, used disposable protective gloves, contaminated clothing, etc.) should be collected, placed in proper containers, labelled and disposed of in the manner prescribed by government regulations. Regulations may require the compulsory reporting of all spills.

- 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:	6.1
Identification Numbers:	UN2811	PG:	III
Label Codes:	6.1	Special provisions:	IB8, IP3, T1, TP33
Packaging: Exceptions:	153	Packaging: Non-bulk:	213
Packaging: Exceptions:	153	Quantity limitations: Passenger aircraft/rail:	100 kg
Quantity Limitations: Cargo aircraft only:	200 kg	Vessel stowage: Location:	A
Vessel stowage: Other:	None		

Hazardous materials descriptions and proper shipping names:

Toxic solids, organic, n.o.s.

Air Transport IATA:

ICAO/IATA Class:	6.1	ICAO/IATA Subrisk:	None
UN/ID Number:	2811	Packing Group:	III
Special provisions:	A3		

- Air transport may be forbidden if this material is flammable, corrosive or toxic gases may be released under normal conditions of transport.

Shipping Name: TOXIC SOLID, ORGANIC, N.O.S. *(CONTAINS 2,4,4'-TRICHLORO-2'-HYDROXYDIPHENYL ETHER)

Maritime Transport IMDG:

IMDG Class:	6.1	IMDG Subrisk:	None
UN Number:	2811	Packing Group:	III
EMS Number:	F-A,S-A	Special provisions:	223 274 944
Limited Quantities:	5 kg		

Shipping Name: TOXIC SOLID, ORGANIC, N.O.S.(contains 2,4,4'-trichloro-2'-hydroxydiphenyl ether)

Section 15 - REGULATORY INFORMATION

2,4,4'-trichloro-2'-hydroxydiphenyl ether (CAS: 3380-34-5) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "International Chemical Secretariat (ChemSec) REACH SIN* List (*Substitute It Now!) 1.0", "OECD Representative List of High Production Volume (HPV) Chemicals", "US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Skin contact and/or ingestion may produce health damage*.

- Cumulative effects may result following exposure*.
 - May produce discomfort of the respiratory system*.
 - Limited evidence of a carcinogenic effect*.
 - May be harmful to the fetus/ embryo*.
 - May possibly affect fertility*.
 - Possible risk of harm to breastfed babies*.
- * (limited evidence).

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- Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

- The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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