

# Benzoyl peroxide

sc-254962



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

Benzoyl peroxide

### 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

Bleaching agent for flour, fats, oils and waxes; polymerisation catalyst; drying agent for unsaturated oils, pharmaceutical and cosmetic purposes; rubber vulcanisation without sulphur. Also used as burn out agent for acetate yarns; production of cheese; embossing vinyl flooring (proprietary).

### SYNONYMS

C14-H10-O4, (C6H5CO)2O2, "benzoyl peroxide, technically pure", "benzoyl peroxide, technically pure or more than 52% with inert solid", "benzoyl peroxide > 52% with inert solid", "benzoic acid, peroxide", "benzoperoxide benzyl peroxide", "benzoyl superoxide", "diphenylglyoxal peroxide", "peroxide, dibenzoyl", "Acetoxyl Acnegel Aztec BPO Benoxyl Benzac Benzaknew BZF-60", "Cadet Cadox Debroxide Fostex Garox Incido Loroxide Lucidol Luperco Luperox FL", "NA 2085 Nayper B and BO Norox BZP-250 Novadelox Oxy-5 Sulfoxyl Oxylite", "Theraderm Panoxyl Persadox Quinolor Compound Topex Vanoxide Xerac"

## Section 2 - HAZARDS IDENTIFICATION

### CANADIAN WHMIS SYMBOLS



### EMERGENCY OVERVIEW

#### RISK

Risk of explosion by shock, friction, fire or other sources of ignition.

Irritating to eyes.

May cause SENSITIZATION by skin contact.

May cause fire.

### 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.

■ Ingestion of organic peroxides may produce nausea, vomiting, abnormal pain, stupor, bluish discoloration of skin and mucous membranes. Inflammation of the heart muscle may also occur.

### EYE

■ Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals. Prolonged eye contact may cause inflammation characterized by a temporary redness of the conjunctiva (similar to windburn).

■ Eye contact with organic peroxides can cause clouding, redness, swelling and burns of the eye on prolonged contact.

### SKIN

■ Skin contact is not thought to have harmful health effects, however the material may still produce health damage following entry through wounds, lesions or abrasions.

■ There is some evidence to suggest that 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.

■ All organic peroxides are irritating to the skin and if allowed to remain on the skin, may produce inflammation; some are allergenic.

■ 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

■ 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.

■ The inhalation of organic peroxide dusts or vapors can produce throat and lung irritation and cause an asthma-like effect. Over-exposure can cause tears, salivation, lethargy, slow breathing, breathing difficulties, headache, weakness, tremor, stupor and swelling of the lung.

■ 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.

## CHRONIC HEALTH EFFECTS

■ Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.

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

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

There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.

Prolonged or repeated skin contact with benzoyl peroxide may result in allergic reactions such as sensitisation dermatitis.

Diluted forms of benzoyl peroxide when used as acne and skin bleach treatment results in 1-2% of these applications showing allergic responses and / or sensitisation.

Ingestion of material results in abdominal pain, cyanosis and severe depression.






Chronic effects of exposure include allergic reactions characterised by redness, itching, oozing, crusting, and scaling of the skin and asthmatic wheezing. Patch testing (Draize procedure) the upper lateral portion of the arms of volunteers to 5% dibenzoyl peroxide produce reactions in 32% of the volunteers following ten epicutaneous applications administered for induction of a response.

When repeatedly applied to the skin of mice dibenzoyl peroxide was not carcinogenic. However dibenzoyl peroxide is a tumour promoter in mice and hamsters producing papillomas and squamous cell carcinomas. It does not however exhibit complete carcinogenic or tumour-initiating activity.

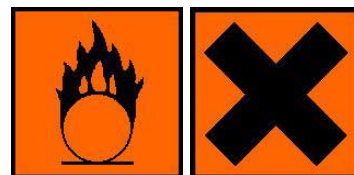
Persistent exposure over a long period of time to peroxides produces allergic skin reactions ( redness and scaling of the skin ) and asthmatic wheezing.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

### HAZARD RATINGS

	Min	Max
Flammability:	1	
Toxicity:	0	
Body Contact:	2	
Reactivity:	3	
Chronic:	2	

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



NAME	CAS RN	%
dibenzoyl peroxide	94-36-0	>95
<a href="#">water</a>	7732-18-5	<5

## 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:
  - Immediately hold the eyelids apart and flush the eye with 2% sodium carbonate solution or 5% sodium ascorbate solution then wash continuously for at least 15 minutes 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.
  - Transport to hospital (or doctor) without further delay.
  - Removal of contact lenses should only be undertaken by trained personnel.

## SKIN

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

## INHALED

- 
- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

## NOTES TO PHYSICIAN

- Toxic myocarditis may follow ingestion of oxidizing agents such as peroxides.

## BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary edema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures .
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.
- DO NOT attempt neutralization as exothermic reaction may occur.
- Skin burns should be covered with dry, sterile bandages, following decontamination.

## ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary edema.
- Hypotension with signs of hypovolemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.

## Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	< 0.13 @ 20 C.
Upper Explosive Limit (%):	Not available.
Specific Gravity (water=1):	1.33
Lower Explosive Limit (%):	Not available.

## EXTINGUISHING MEDIA

- FOR SMALL FIRE:
  - Water spray, foam, CO2 or dry chemical.
  - DO NOT use water jets.

FOR LARGE FIRE:

- Flood fire area with water from a distance.

## 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.
- Fight fire from a safe distance, with adequate cover.
- Extinguishers should be used only by trained personnel.
- 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.
- If fire gets out of control withdraw personnel and warn against entry.
- Equipment should be thoroughly decontaminated after use.

### **GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**

- Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), other pyrolysis products typical of burning organic material.
- Benzoyl peroxide decomposes when heated with formation of dense white toxic smoke of benzoic acid, phenyl benzoate, terphenyls, biphenyls, and carbon dioxide.
- Hot organic vapors or mist are capable of sudden spontaneous combustion when mixed with air even at temperatures below their published autoignition temperatures.
- The temperature of ignition decreases with increasing vapor volume and vapor/air contact times and is influenced by pressure change.
- Ignition may occur under elevated-temperature process conditions especially in processes performed under vacuum subjected to sudden ingress of air or in processes performed at elevated pressure, where sudden escape of vapors or mists to the atmosphere occurs.
- Organic peroxides provide internal oxygen for combustion, so burn intensely.
- Simple smothering actions are not effective against established fires.

### **FIRE INCOMPATIBILITY**

- Avoid storage with reducing agents.
- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous

### **PERSONAL PROTECTION**

Glasses:

Safety Glasses.

Full face- shield.

Gloves:

Respirator:

Particulate dust filter.

## **Section 6 - ACCIDENTAL RELEASE MEASURES**

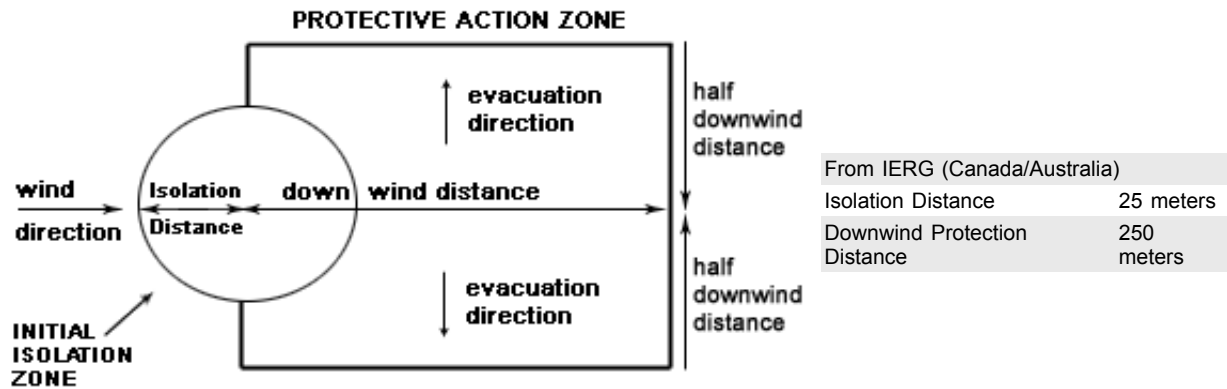
### **MINOR SPILLS**

- 
- Clean up all spills immediately.
- No smoking, naked lights, ignition sources.
- Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials; as ignition may result.
- Avoid breathing dust or vapors and all contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with dry sand, earth, inert material or vermiculite
- DO NOT use sawdust as fire may result.
- Scoop up solid residues and seal in labeled drums for disposal.
- Neutralize/decontaminate area.

### **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, flames or ignition sources.
- Increase ventilation.
- Contain spill with sand, earth or other clean, inert materials.
- NEVER use organic absorbents such as sawdust, paper, cloth; as fire may result.
- Avoid any contamination by organic matter.
- Use spark-free and explosion-proof equipment.
- Collect any recoverable product into labeled containers for possible recycling.
- DO NOT mix fresh with recovered material.
- Collect residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- Decontaminate equipment and launder all protective clothing before storage and re-use.
- 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 146 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

- - Mix only as much as is required
  - DO NOT return the mixed material to original containers
  - Avoid personal contact and inhalation of dust, mist or vapors.
  - Provide adequate ventilation.
  - Always wear protective equipment and wash off any spillage from clothing.
  - Keep material away from light, heat, flammables or combustibles.
  - Keep cool, dry and away from incompatible materials.
  - Avoid physical damage to containers.
  - DO NOT repack or return unused portions to original containers.
  - Withdraw only sufficient amounts for immediate use.
  - Contamination can lead to decomposition leading to possible intense heat and fire.
  - When handling NEVER smoke, eat or drink.
  - Always wash hands with soap and water after handling.
  - Use only good occupational work practice.
  - Observe manufacturer's storing and handling directions.
- 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

- 
- Metal packagings meeting the test criteria of Packing Group I, must NOT be used; this avoids unnecessary confinement.
- Packagings for organic peroxides must be constructed so that none of the materials, which are in contact with the contents, will catalyze or otherwise dangerously affect the properties of their contents.
- For combination packages, cushioning materials must not be readily combustible and must NOT cause decomposition of the organic peroxide if leakage occurs.
- Some plastics may be incompatible with this material, check with manufacturer for storage suitability.
- DO NOT repack. Use containers supplied by manufacturer only.

- Check that containers are clearly labeled
- Type B Solid Organic Peroxides, UN 3102, UN 3104, UN 3112 and UN 3114 are to be packed to the requirements of Packing method OP2B of the the UN Dangerous Goods Code, with maximum unit mass of 0.5 kg.
- Plastic drum / container or plastic inner receptacle in fiber-board, or plastic outer container.
- Metal drums or outer containers are prohibited.
- Type B Solid Organic Peroxides, UN 3102, UN 3112 and UN 3114 are to be packed to the requirements of Packing method OP5B of the UN Dangerous Goods Code, with maximum mass of 25 kg.
- Plastic drum / container or plastic inner receptacle in fiber-board, or plastic outer container.
- Metal drums or outer containers are prohibited.

### STORAGE REQUIREMENTS

- Store in original containers in an isolated approved flammable materials storage area.
- Keep containers securely sealed as supplied.
- **WARNING:** Gradual decomposition during storage in sealed containers may lead to a large pressure build-up and subsequent explosion.
- No smoking, naked lights, heat or ignition sources.
- Store in a cool, dry, well ventilated area.
- Store under cover and away from sunlight.
- Store below safe storage (control) temperature.
- Always store below 35 deg.C.
- Store away from flammable or combustible materials, debris and waste.
- Contact may cause fire or violent reaction.
- Store away from incompatible materials.
- Store away from foodstuff containers
- DO NOT stack on wooden floors or wooden pallets.
- Protect containers against physical damage.
- Check regularly for spills and leaks.
- Observe manufacturer's storage and handling recommendations.
- Keep locked up.
- Restrictions may apply on quantities and to other materials permitted in the same location.

#### FOR MINOR QUANTITIES:

Ensure that:

- packages are not opened in storage area,
- the goods are kept at least 3 metres from sources of heat as well as all other dangerous goods and all other materials which might react with this material might react to cause a fire, a chemical reaction or explosion,
- materials for absorbing and neutralising spills are kept near the storage;
- procedures are displayed at the storage describing actions to be taken in the event of a spill or fire.
- adequate numbers and types of portable fire extinguisher are provided in or near the storage area.

#### FOR PACKAGE STORAGE:

- If the material is stored in an indoor fireproof cabinet, the cabinet must be vented to outside the building containing the cabinet.
- Packages must be protected from exposure to weather unless the packages are: (i) sole packages of more than 20 l capacity (ii) of metallic or plastic construction (iii) securely closed and are not to be opened in the storage area (iv) stored in such a manner that rain water, contaminated with the material, is collected and disposed of safely.
- Packages must NOT be located in a basement or other place below ground level.
- The store has a smooth non-combustible floor or a floor coated to prevent impregnation by the material.
- There are no open drains, traps, tunnels or pits under the floor where molten material might collect or be confined.
- Drainage must be provided so that in the event of fire, molten material may be collected and confined.
- Drainage and kerbing must be provided so that in the event of fire, molten material will flow clear of buildings and other storage areas.
- Pallets and dunnage used to store the material must be coated to prevent impregnation
- Materials for absorbing and neutralising spills must be kept near the storage.
- Adequate portable fire extinguishers are provided.
- Ensure proper stock-control measures are maintained to prevent prolonged storage of dangerous goods.

### 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 <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
Canada - Alberta Occupational Exposure Limits	dibenzoyl peroxide (Benzoyl peroxide)		5						
Canada - British Columbia	dibenzoyl peroxide		5						

Occupational Exposure Limits	(Benzoyl peroxide)	5				
Canada - Ontario Occupational Exposure Limits	dibenzoyl peroxide (Benzoyl peroxide)	5				
US OSHA Permissible Exposure Levels (PELs) - Table Z1	dibenzoyl peroxide (Benzoyl peroxide)	5				
US ACGIH Threshold Limit Values (TLV)	dibenzoyl peroxide (Benzoyl peroxide)	5				TLV Basis: upper respiratory tract & skin irritation
US NIOSH Recommended Exposure Limits (RELs)	dibenzoyl peroxide (Benzoyl peroxide)	5				
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	dibenzoyl peroxide (Benzoyl peroxide)	5				
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	dibenzoyl peroxide (Benzoyl peroxide)	5				
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	dibenzoyl peroxide (Benzoyl peroxide)	5				
US - Minnesota Permissible Exposure Limits (PELs)	dibenzoyl peroxide (Benzoyl peroxide)	5				
US - California Permissible Exposure Limits for Chemical Contaminants	dibenzoyl peroxide (Benzoyl peroxide; dibenzoyl peroxide)	5				
US - Idaho - Limits for Air Contaminants	dibenzoyl peroxide (Benzoyl peroxide)	5				
US - Hawaii Air Contaminant Limits	dibenzoyl peroxide (Benzoyl peroxide)	5				
US - Alaska Limits for Air Contaminants	dibenzoyl peroxide (Benzoyl peroxide)	5				
US - Michigan Exposure Limits for Air Contaminants	dibenzoyl peroxide (Benzoyl peroxide)	5				
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	dibenzoyl peroxide (Benzoyl peroxide)	5	-	5	-	5
US - Washington Permissible exposure limits of air contaminants	dibenzoyl peroxide (Benzoyl peroxide)	5				10
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	dibenzoyl peroxide (Benzoyl peroxide)	5				10
Canada - Prince Edward Island Occupational Exposure Limits	dibenzoyl peroxide (Benzoyl peroxide)	5				TLV Basis: upper respiratory tract & skin irritation
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	dibenzoyl peroxide (Benzoyl peroxide)	5				
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	dibenzoyl peroxide (Benzoyl peroxide)	5				
US - Oregon Permissible Exposure Limits (Z1)	dibenzoyl peroxide (Benzoyl peroxide)	5				
Canada - Northwest Territories Occupational Exposure Limits (English)	dibenzoyl peroxide (Benzoyl peroxide)	5				10
Canada - Nova Scotia Occupational Exposure Limits	dibenzoyl peroxide (Benzoyl peroxide)	5				TLV Basis: upper respiratory tract & skin irritation

The following materials had no OELs on our records

- water: CAS:7732-18-5

#### EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
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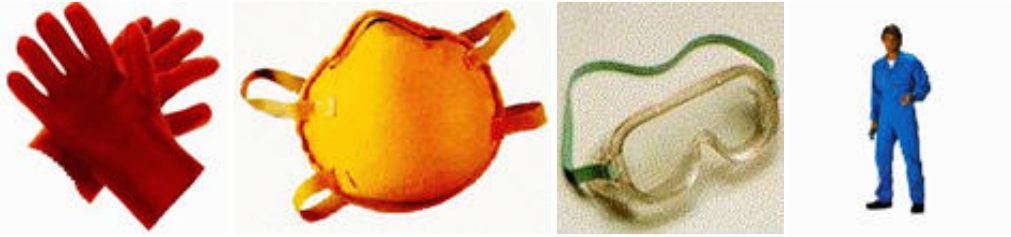
**MATERIAL DATA****DIBENZOYL PEROXIDE:**

## ■ For benzoyl peroxide:

The recommendation for the TLV-TWA is based on the absence of subjective symptoms of irritation of the nose and throat in humans exposed to 5.25 mg/m<sup>3</sup>. Whether this is sufficiently low to prevent cumulative effects in man is not known.

**WATER:**

## ■ No exposure limits set by NOHSC or ACGIH.

**PERSONAL PROTECTION**

Consult your EHS staff for recommendations

**EYE**

- 
- Chemical goggles.
- Full face shield.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

**HANDS/FEET**

## ■ Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

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.

- Polyethylene gloves
- DO NOT wear cotton or cotton-backed gloves.
- DO NOT wear leather gloves.
- Promptly hose all spills off leather shoes or boots or ensure that such footwear is protected with PVC over-shoes.

**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.
- 
- 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.

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

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

**ENGINEERING CONTROLS**

■



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

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

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

(c): fresh-air hoods or masks

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

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

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

Within each range the appropriate value depends on:

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

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

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Does not mix with water.

Sinks in water.

State	DIVIDED SOLID	Molecular Weight	242.24
Melting Range (°F)	217.4- 221	Viscosity	Not Applicable
Boiling Range (°F)	Detonates.	Solubility in water (g/L)	Immiscible
Flash Point (°F)	>199.4 detonates.	pH (1% solution)	Not applicable.
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	176	Vapour Pressure (mmHG)	< 0.13 @ 20 C.
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	1.33
Lower Explosive Limit (%)	Not available.	Relative Vapor Density (air=1)	Not applicable
Volatile Component (%vol)	Not available.	Evaporation Rate	Not applicable

### APPEARANCE

White, granular, crystalline solid with faint odour of benzaldehyde. Tasteless. Slightly soluble in water, alcohols and vegetable oils. Soluble in nearly all organic solvents. Active oxygen content 6.5%. Relatively stable if kept pure at > 1% water in its sealed original shipping container below 39 deg. C but must be handled properly to prevent instability and decomposition. May explode if subjected to heat, shock or friction. Never mix unless at least 33% water is present. Self-accelerating decomposition temperature (SADT) 55 deg. C.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

- 
- Presence of incompatible materials.
- Product is considered stable under normal handling conditions.
- Prolonged exposure to heat.
- Hazardous polymerization will not occur.

NOTE:

- A range of exothermic decomposition energies for peroxides is given as 200-340 kJ/mol.
- The relationship between energy of decomposition and processing hazards has been the subject of discussion; it is suggested that values of energy releases per unit of mass, rather than on a molar mass basis (J/g) be used in the assessment. For example, in open vessel processes (with man-hole size openings, in an industrial setting), substances with exothermic decomposition energies below 500 J/g are unlikely to present a danger, whilst those in closed vessel processes (opening is a safety valve or bursting disk) present some danger where the decomposition energy exceeds 150 J/g.

## STORAGE INCOMPATIBILITY

### ■ For benzoyl peroxide:

- Avoid reaction with acids, alkalis, oxidising and reducing agents, metals and metal oxides, and combustible materials.
- Amines and solutions of cobalt salts used as promoters and accelerators in polyester compounds if mixed with benzoyl peroxide will cause spontaneous decomposition (detonation).
- Alkalis cause rapid decomposition of benzoyl peroxide with generation of large volumes of carbon dioxide gas (CO<sub>2</sub>) and may pressurise containers.
- Avoid contact with copper, brass, lead and zinc.
- Confined storage of the dry chemical may lead to decomposition and explosion.
- Extremely reactive oxidiser.
- An explosive that is sensitive to friction, shock, and heat.
- May decompose below its melting point (103 C).
- Fire and/ or explosion may result from contamination with alcohols, amines, aniline, N,N-dimethylaniline, ethers, polymerisation catalysts, lithium aluminium carbide, lithium tetrahydroaluminate, metallic naphthenates, methyl methacrylate, organic matter, charcoal.
- Attacks some plastics, rubber and coatings.

Avoid cross contamination between the two liquid parts of product (kit). If two part products are mixed or allowed to mix in proportions other than manufacturer's recommendation, polymerization with gelation and evolution of heat (exotherm) may occur. This excess heat may generate toxic vapor.

- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous
- Organic peroxides as a class are highly reactive.
- They are thermally unstable and prone to undergoing exothermic self-accelerating decomposition.
- Organic peroxides may decompose explosively, burn rapidly, be impact and/or friction sensitive and react dangerously with many other substances.
- Incidents involving interaction of active oxidants and reducing agents, either by design or accident, are usually very energetic and examples of so-called redox reactions.
- Peroxides decompose over time and give off oxygen.
- Peroxides require controlled storage for stability.
- DANGER: Explosion hazard, never mix peroxides with accelerators or promoters.
- Organic compounds, especially finely divided materials, can ignite on contact with concentrated peroxides.
- Strongly reduced material such as sulfides, nitrides, and hydrides may react explosively with peroxides.
- There are few chemical classes that do not at least produce heat when mixed with peroxides.
- Many peroxide reactions produce explosions or generate gases (toxic and nontoxic).

Avoid storage with reducing agents.

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

## Section 11 - TOXICOLOGICAL INFORMATION

dibenzoyl peroxide

### TOXICITY AND IRRITATION

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

TOXICITY	IRRITATION
Oral (rat) LD50: 7710 mg/kg	Eye (rabbit): 500 mg/24h - Mild
Inhalation (human) TLo: 12 mg/m <sup>3</sup>	Skin effects (MAK): very weak
Subcutaneous (Rat) LD: 40 mg/kg (@ 50%)	
Intraperitoneal (Mouse) LD50: 440 mg/kg	
Intravenous (Rabbit) LD: 16 mg/kg	

■ Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitization potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitizing substance which is widely distributed can be a more important allergen than one with stronger sensitizing potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

The material may be irritating to the eye, with prolonged contact causing 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 benzoyl peroxide:

The acute oral toxicity of benzoyl peroxide is very low: LD50 >2,000 mg/kg bw in mice, and 5,000 mg/kg bw in rats. No deaths occurred in male rats following inhalation of 24.3 mg/L. Visible effects included eye squint, dyspnea, salivation, lacrimation, erythema and changes of respiratory rates and motor activity.

Benzoyl peroxide was slightly irritating to skins in 24 hr-patch tests. Benzoyl peroxide was not irritating to the eyes of rabbits if washed out within 5 minutes after instillation, however, if the chemical was not washed out until 24 hours later, it proved to be irritating.

Positive results from sensitisation tests in guinea pigs and mice, and from a maximization test in human volunteers, indicate that benzoyl peroxide is a skin sensitizer.

In the combined repeated dose and reproduction/developmental toxicity study (OECD TG 422), benzoyl peroxide did not produce hematological or biochemical adverse effects. Repeated administration by oral gavage up to 1,000 mg/kg bw/day for 29 days resulted in decreased weights of testes and epididymis in male rats. The NOAEL for repeated dose toxicity was 500 mg/kg bw/day.

This substance did not cause gene mutation in bacteria (OECD TG 471 & 472) and in vitro chromosomal aberration in CHL (Chinese Hamster Lung) cells. An in vivo mammalian erythrocytes micronucleus test (OECD TG 474) produced negative result. The available evidence supports the conclusion that benzoyl peroxide is not a mutagen.

There is no evidence to suggest that benzoyl peroxide is a carcinogen. However, there is some evidence from nonguidelines

studies that benzoyl peroxide is a skin tumour promoter.

In the combined repeated dose and reproduction/developmental toxicity study [OECD TG 422], no treatment-related changes in precoital time, rate of copulation, fertility and gestation were noted in any treated group. Adverse effects were shown at the highest dose of 1,000 mg/kg bw/day in parental male rats with the reduction of reproductive organ weight and slight testes degeneration. In parental female rats, no adverse effects were observed during the test period. The NOAEL for reproduction toxicity in male rats was 500 mg/kg bw/day. In the offspring, the only effect seen was that body weight gain of pups at dose of 1,000 mg/kg bw/day was significantly decreased. The NOAEL for developmental toxicity was 500 mg/kg bw/day.

**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.

**WATER:**

- No significant acute toxicological data identified in literature search.

**CARCINOGEN**

Benzoyl peroxide	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	3
Benzoyl peroxide	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4

**Section 12 - ECOLOGICAL INFORMATION**

Refer to data for ingredients, which follows:

**DIBENZOYL PEROXIDE:**

■ Half- life Soil - High (hours):	48
■ Half- life Soil - Low (hours):	4
■ Half- life Air - High (hours):	510
■ Half- life Air - Low (hours):	51
■ Half- life Surface water - High (hours):	168
■ Half- life Surface water - Low (hours):	24
■ Half- life Ground water - High (hours):	336
■ Half- life Ground water - Low (hours):	48
■ Aqueous biodegradation - Aerobic - High (hours):	168
■ Aqueous biodegradation - Aerobic - Low (hours):	24
■ Aqueous biodegradation - Anaerobic - High (hours):	672
■ Aqueous biodegradation - Anaerobic - Low (hours):	96
■ Photolysis maximum light absorption - High (nano- m):	275
■ Photolysis maximum light absorption - Low (nano- m):	235
■ Photooxidation half- life air - High (hours):	510
■ Photooxidation half- life air - Low (hours):	51

■ For benzoyl peroxide:

Benzoyl peroxide has a melting point of 104 -106 °C, vapor pressure of 0.00929 Pa, solubility of 9.1 mg/L in water at 25 C, and log Pow of 3.43 at 25 C.

Environmental fate:

For indirect photolysis in the atmosphere, the half-life is estimated to be 3 days. The substance is readily biodegradable (OECD TG 301C: 83% by BOD after 21 days) and hydrolyses rapidly in water [OECD TG 111] with a half-life of 11.87 hrs at pH 4.0 and 5.20 hr at pH 7.0 at 25 C. The main hydrolysis product of benzoyl peroxide is benzoic acid. The estimated BCF of 92 suggests that the chemical has a low potential for bioaccumulation.

If the most realistic emission pattern to water is assumed then the substance will remain in the aquatic compartment.

Ecotoxicity:

Green algae (Selenastrum capricornutum) EbC50 (72 h): 0.07 mg/L (biomass) and 0.44 mg/L (growth rate).

Daphnia magna: EC50 (48 h): 0.07 mg/L.

Fish LC50 (96 h): Oryzias latipes 0.24 mg/L.

Microorganism (activated sludge): EC50 (30 min): 35 mg/L

The toxicity observed is assumed to be due to benzoyl peroxide rather than benzoic acid, which shows much lower toxicity to aquatic organisms. One can assume that effects occur before hydrolysis takes place.

- DO NOT discharge into sewer or waterways.

WATER:

**Ecotoxicity**

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
dibenzoyl peroxide	LOW	HIGH	LOW	MED
water	LOW		LOW	HIGH

**Section 13 - DISPOSAL CONSIDERATIONS**

**US EPA Waste Number & Descriptions**

A. General Product Information

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

**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.

- Recycle wherever possible. Special hazard may exist - specialist advice may be required.
- Consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury or incinerate residue at an approved site.
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
- Puncture containers to prevent re-use and bury at an authorized landfill.

## Section 14 - TRANSPORTATION INFORMATION



### Air Transport IATA:

ICAO/IATA Class:	None	ICAO/IATA Subrisk:	None
UN/ID Number:	None	Packing Group:	-
Special provisions:	None		
Cargo Only			
Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden
Passenger and Cargo		Passenger and Cargo	
Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden
Passenger and Cargo Limited Quantity		Passenger and Cargo Limited Quantity	
Packing Instructions:	-	Maximum Qty/Pack:	-

Shipping Name: DIBENZOYL PEROXIDE, > 51%, WHEN WITH ≤ 48% INERT SOLID (CONTAINS DIBENZOYL PEROXIDE)

### Maritime Transport IMDG:

IMDG Class:	5.2	IMDG Subrisk:	SP181
UN Number:	3102	Packing Group:	None
EMS Number:	F-J,S-R	Special provisions:	122 181 195 274 323
Limited Quantities:	100 g		

Shipping Name: ORGANIC PEROXIDE TYPE B, SOLID (contains dibenzoyl peroxide)  
NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT

## Section 15 - REGULATORY INFORMATION

### dibenzoyl peroxide (CAS: 94-36-0) 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 Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada National Pollutant Release Inventory (NPRI)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Air Transport Association (IATA) Dangerous Goods Regulations", "International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited 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 Permissible Exposure Limits for Chemical Contaminants", "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 Hazardous Materials", "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 List of Highly Hazardous Chemicals, Toxics and Reactives", "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 EPA High Production Volume Program Chemical List", "US EPA Master Testing List - Index I Chemicals Listed", "US EPCRA Section 313 Chemical List", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "US Food Additive Database", "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 NFPA 432 Annex B Typical Organic Peroxide Formulations", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US Toxic Substances Control Act (TSCA) - Inventory" Regulations for ingredients

**water (CAS: 7732-18-5) is found on the following regulatory lists;**

"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)", "IMO IBC Code Chapter 18: List of products to which the Code does not apply", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Pennsylvania - Hazardous Substance List", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 8 (a) Inventory Update Rule (IUR) - Partial Exemptions"

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

- Contact with air may produce sufficient heat to ignite combustible materials.\*.
- Cumulative effects may result following exposure\*.
- May produce discomfort of the respiratory system and skin\*.
- Limited evidence of a carcinogenic effect\*.
- Possible respiratory sensitizer\*.

\* (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](http://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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