

POWERS KF2

Chemwatch Independent Material Safety Data Sheet

Issue Date: 23-Sep-2009

NC317ECP

CHEMWATCH 59224

Version No:5

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

POWERS KF2

SYNONYMS

"KF2 - 380 ml tube", "SF.150 - 150 ml tube"

PROPER SHIPPING NAME

ORGANIC PEROXIDE TYPE E, SOLID

PRODUCT USE

■ The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation.

• Material is mixed and used in accordance with manufacturers directions.

Resin anchor system cartridge includes resin and catalyst that are mixed and cured in the bolthole by the screwing action of bolting.

SUPPLIER

Company: Powers Fasteners Australasia Pty Ltd

Address:

Factory 3, 205 Abbots Road

Dandenong South

VIC, 3175

AUS

Telephone: +61 3 8795 4600

Fax: +61 3 8787 5899

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

HAZARDOUS SUBSTANCE. DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE

S5

RISK

- Contact with combustible material may cause fire.
- Flammable.
- Harmful by inhalation and if swallowed.
- Irritating to eyes and skin.
- Limited evidence of a carcinogenic effect.
- May cause SENSITISATION by skin contact.

SAFETY

- Keep away from combustible material.
- Use only in well ventilated areas.
- Keep container in a well ventilated place.
- Avoid exposure - obtain special instructions before use.
- To clean the floor and all objects contaminated by this material use water and detergent.
- Keep away from food drink and animal feeding stuffs.
- In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
- If swallowed IMMEDIATELY contact Doctor or Poisons

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Section 2 - HAZARDS IDENTIFICATION

Information Centre (show this container or label).

■ This material and its container must be disposed of as hazardous waste.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
sealed twin compartment cartridge one compartment containing polyester resin (unsaturated) styrene	100-42-5	25-50
inorganic filler second compartment containing dibenzoyl peroxide as catalyst/hardener	94-36-0	<3.5

Section 4 - FIRST AID MEASURES

SWALLOWED

- For advice, contact a Poisons Information Centre or a doctor.
- 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 Centre 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

- 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.

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Section 4 - FIRST AID MEASURES

NOTES TO PHYSICIAN

- For acute or short term repeated exposures to styrene:

INHALATION:

- Severe exposures should have cardiac monitoring to detect arrhythmia.
- Catecholamines, especially epinephrine (adrenaline) should be used cautiously (if at all).
- Aminophylline and inhaled beta-two selective bronchodilators (e.g. salbutamol) are the drugs of choice for treatment of bronchospasm.

INGESTION:

- Ipecac syrup should be given for ingestions exceeding 3ml (styrene)/kg.
- For patients at risk of aspiration because of obtundation, intubation should precede lavage.
- Pneumonitis is a significant risk. Watch the patient closely in an upright (alert patient) or left lateral head-down position (obtunded patient) to reduce aspiration potential. [Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Mandelic acid in urine	800 mg/gm creatinine	End of shift	NS
2. Phenylglyoxylic acid in urine	300 mg/gm creatinine	Prior to next shift	NS
	240 mg/gm creatinine	End of shift	NS
3. Styrene in venous blood	100 mg/gm creatinine	Prior to next shift	
	0.55 mg/L	End of shift	SQ
	0.02 mg/L	Prior to next shift	SQ

NS: Non-specific determinant; also seen after exposure to other materials.

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

B: Background levels occur in specimens collected from subjects NOT exposed.

Section 5 - FIRE FIGHTING MEASURES

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 Fire Brigade 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 courses.
- Consider evacuation (or protect in place).

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Section 5 - FIRE FIGHTING MEASURES

- 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.

When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 1000 metres in all directions.

FIRE/EXPLOSION HAZARD

- Combustible solid which burns but propagates flame with difficulty.
 - Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust (420 micron or less) may burn rapidly and fiercely if ignited.; once initiated larger particles up to 1400 microns diameter will contribute to the propagation of an explosion.
 - A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people.
 - Usually the initial or primary explosion takes place in a confined space such as plant or machinery, and can be of sufficient force to damage or rupture the plant. If the shock wave from the primary explosion enters the surrounding area, it will disturb any settled dust layers, forming a second dust cloud, and often initiate a much larger secondary explosion. All large scale explosions have resulted from chain reactions of this type.
 - Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
 - Build-up of electrostatic charge may be prevented by bonding and grounding.
 - Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.
 - All movable parts coming in contact with this material should have a speed of less than 1-meter/sec.
- Combustion products include: carbon monoxide (CO), carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.
May emit clouds of acrid smoke.

FIRE INCOMPATIBILITY

- Avoid storage with reducing agents.
 - Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous.
- Avoid reaction with oxidising agents, strong acids, peroxides, ferrous salts, metal halides, alkalies and ultra-violet radiation.

HAZCHEM: 1W

Personal Protective Equipment

Gas tight chemical resistant suit.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

Accidentally activated or crushed cartridges rapidly become hot and give off vapour, so are best dropped in a bucket of water. Care: several cartridges in a small amount of water may cause water to boil. Add more water.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.

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Section 6 - ACCIDENTAL RELEASE MEASURES

- 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 courses.
- 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 or cloth.
- Use spark-free and explosion-proof equipment.
- Collect any recoverable product into labelled containers for possible recycling.
- Avoid contamination with organic matter to prevent subsequent fire and explosion.
- DO NOT mix fresh with recovered material.
- Collect residues and seal in labelled 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.

Contain spill / secure load if safe to do so

Accidentally activated or crushed cartridges rapidly become hot and give off vapour, so are best dropped in a bucket of water. Care: several cartridges in a small amount of water may cause water to boil. Add more water.

Bundle / collect recoverable product and label for recycling.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

styrene 1000ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

styrene 250ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:

styrene 50ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid personal contact and inhalation of dust, mist or vapours.
- 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.

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Section 7 - HANDLING AND STORAGE

- 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.

SUITABLE CONTAINER

Cartridge.

STORAGE INCOMPATIBILITY

- 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.
- Peroxides decompose over time and give off oxygen.
- Peroxides require controlled storage for stability.
- DANGER: Explosion hazard, never mix peroxides with accelerators or promoters.

Styrene:

- requires inhibition with adequate levels of substituted phenol (such as tert-butylcatechol to prevent polymerisation - material that has had inhibitor removed, e.g. is uninhibited, must be refrigerated and used within 24 hours, i.e. not stored; contact with alkali solutions or glycols will remove inhibitor and render material unstable on storage
 - polymerisation may cause container to explode
 - polymerisation may be caused by elevated temperatures (above 66 deg C.), butyl lithium, peroxides, UV light, or sunlight
 - reacts violently with chlorosulfonic acid, strong oxidisers, sulfuric acid, xenon tetrafluoride
 - is incompatible with acids, rust, catalysts for vinyl polymerisation, 2,5-dimethyl-2,5-di(tert-butylperoxy)hexane, peroxides, metals salts (e.g., aluminium chloride, copper chlorate, manganese nitrate, etc.)
 - corrodes copper and its alloys
 - attacks some plastics, rubber or coatings
 - flow or agitation may generate electrostatic charges due to low conductivity
 - uninhibited monomer vapour may block vents and confined spaces by forming solid polymer.
- Uncured material corrodes copper and its alloys.

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.

Easily peroxidisable.

- Products formed as a result of peroxidation are not only safety hazards but may chemically alter the chemical behavior of the parent compound.
- Should have a warning label affixed bearing the date of receipt in the laboratory and the date on which the

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Section 7 - HANDLING AND STORAGE

container label is first opened, or laboratory synthesised materials are the responsibility of the individual chemist.

- **WARNING:**This product may form peroxides which themselves are not themselves particularly hazardous but which on decomposition may initiate explosive polymerisation of the bulk monomer (Trommsdorf effect).
- Should be evaluated every 12 months, redated if safe or else discarded.
- Quantities of uninhibited monomers exceeding 500 ml should not be stored for more than 24 hours.
- The oxidation of iodide to iodine or the conversion of colourless ferrothiocyanate to red ferrithiocyanate by peroxides are simple and convenient tests for most peroxides.
- Before distilling or evaporating a suitable polymerisation inhibitor should be added.
- Leave at least 10% bottoms.
- Use a shield when evaporating or distilling mixtures which may contain peroxidisable compounds.
- Store away from heat and light.
- Particular attention should be paid to the adequacy of the closure on storage containers.

Peroxides may be removed by;

- passing the material over a column of ordinary activated alumina (care should be taken in disposal of the activated alumina);
 - shaking with a concentrated solution of ferrous salt (provided the carrier solvent is water-insoluble);
 - agitation with an approximately equimolar mixture of ferrous sulfate and sodium bisulfate;
 - commercial quantities may be treated with a 5% solution of aqueous sodium carbonate.
- Jackson et al: Control of Peroxizable Compounds; Safety in the Chemical Laboratory, Journal of Chemical Education; Vol 47, 1970, pp A175-A188
- When solvents have been freed from peroxides by percolation through a column of activated alumina, the adsorbed peroxides must promptly be desorbed by treatment with polar solvents, methanol or water, which must in turn be discarded safely.***.
 - Storage requires stabilising inhibitor content and dissolved oxygen content to be monitored. Refer to manufacturer's recommended levels.
 - DO NOT overfill containers so as to maintain free head space above product.
 - Blanketing or sparging with nitrogen or oxygen free gas will deactivate stabiliser.
- Inhibitor level should be regularly checked to maintain stability.
Store below 20 deg. C. and protect from frost. Refer to use-by date on cartridge.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³
Australia Exposure Standards	styrene (Styrene, monomer)	50	213	100	426
Australia Exposure Standards	dibenzoyl peroxide (Benzoyl peroxide)		5		

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m ³)	Revised IDLH Value (ppm)
styrene		700
dibenzoyl peroxide	1, 500	

MATERIAL DATA

POWERS KF2:

Not available

STYRENE:

■ for styrene:

Odour Threshold: 0.017 to 1.9 with a geometric average threshold of 0.32 ppm.

NOTE:Detector tubes measuring styrene at greater than 10 ppm are available.

The recommended TLV-TWA and STEL is based on the influence of styrene exposure on the central and

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

peripheral nervous systems At the TWA, total daily styrene exposure to the standard 70 kg medium-frame man who inhales 10 m³ and who retains 70% of the inspired compound is 21 mg/kg with 0.5 mg/kg absorbed through the skin. The total absorbed dose can be increased six-fold with physical work and increased respiration rate.

Measurement of styrene and its metabolites in the urine can be an indication of recent exposure though this approach may be limited by factors such as the influence of alcohol consumption on styrene pharmacodynamics. Exposure at or below the TLV-TWA is thought to protect the worker against the significant risks of narcosis, neuropathies and irritation although other findings suggest that neuro-optical effects are significant amongst workers exposed at 4 ppm.

Odour Safety Factor(OSF)

OSF=63 (STYRENE).

Exposed individuals are reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odour Safety Factor (OSF) is determined to fall into either Class A or B.

The Odour Safety Factor (OSF) is defined as:

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

Classification into classes follows:

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

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/m³. Whether this is sufficiently low to prevent cumulative effects in man is not known.

PERSONAL PROTECTION

EYE

- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

HANDS/FEET

- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber.

NOTE:

- The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.
- Neoprene rubber gloves.

OTHER

- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.

RESPIRATOR

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

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

* - Continuous Flow

** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

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.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Paste with a sickly sweet odour; does not mix with water. Supplied in a sealed twin compartment cartridge. Contents liberated and mixed down hole only at time of fixing anchor bolt.

When components mix the catalyst rapidly causes the resin to solidify with generation of heat and, in open spaces, evolution of irritating styrene vapour. When used as designed, in a bolt hole, little styrene is generated and the product presents minimal risk.

PHYSICAL PROPERTIES

Does not mix with water.

Sinks in water.

Molecular Weight: Not Applicable

Melting Range (°C): Not Applicable

Solubility in water (g/L): Immiscible

pH (1% solution): Not Applicable

Volatile Component (%vol): Not Available

Relative Vapour Density (air=1): >1

Lower Explosive Limit (%): Not Available

Autoignition Temp (°C): 490

State: DIVIDED SOLID

Boiling Range (°C): Not Available

Specific Gravity (water =1): 1.80 when mixed.

pH (as supplied): Not Applicable

Vapour Pressure (kPa): 1.0 @ 20 degC

Evaporation Rate: Not Available

Flash Point (°C): 32

Upper Explosive Limit (%): Not Available

Decomposition Temp (°C): Not Available

Viscosity: Not Available

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

■ 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.

BRETHERRICK: Handbook of Reactive Chemical Hazards, 4th Edition.

- Stable under controlled storage conditions provided material contains adequate stabiliser / polymerisation inhibitor.
 - Bulk storages may have special storage requirements
 - WARNING: Gradual decomposition in strong, sealed containers may lead to a large pressure build-up and subsequent explosion. Rapid and violent polymerisation possible at temperatures above 32 deg c.
- For incompatible materials - refer to Section 7 - Handling and Storage.*

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

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

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

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Section 11 - TOXICOLOGICAL INFORMATION

EYE

■ The vapour when concentrated has pronounced eye irritation effects and this gives some warning of high vapour concentrations. If eye irritation occurs seek to reduce exposure with available control measures, or evacuate area.

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

SKIN

■ 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.

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.

Absorption by skin may readily exceed vapour inhalation exposure. Symptoms for skin absorption are the same as for inhalation.

INHALED

■ Inhalation hazard is increased at higher temperatures.

Inhalation of high concentrations of gas/vapour causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and inco-ordination.

Inhalation of vapour may aggravate a pre-existing respiratory condition such as asthma, bronchitis, emphysema. During curing a small amount of vapour may be emitted from the small exposed surface of the hole.

CHRONIC HEALTH EFFECTS

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

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

Exposure to styrene may aggravate central nervous system disorders, chronic respiratory disease, skin disease, kidney disease and liver disease. Exposure to styrene at work causes effects on the nervous system. It causes a reversible loss in the ability to tell apart colours, and effects on hearing have been reported. Animal testing has revealed toxicity to the lung and nose. It is unclear whether styrene can cause miscarriage.

Styrene can cause chromosomal damage, but there is little evidence that it causes congenital deformities in humans.

Sensitisation may result in allergic dermatitis responses including rash, itching, hives or swelling of extremities.

Excessive exposure to styrene may occur if capsules are crushed.

High vapour concentrations may have a toxic and anaesthetic effects, which may lead to unconsciousness or death. At 400-1000 ppm, the vapour may produce systemic effects such as dizziness, nausea and headache.

Exposure at 1000 ppm can rapidly lead to unconsciousness.

Exposure at 10000 ppm may cause death in less than one hour.

Exposure to styrene may aggravate central nervous system disorders, chronic respiratory disease, skin disease, kidney disease and liver disease.

TOXICITY AND IRRITATION

■ Not available. Refer to individual constituents.

STYRENE:

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

TOXICITY

Oral (Rat) LD50: 2650 mg/kg

Intraperitoneal (Rat) LD50: 898 mg/kg

Oral (Mouse) LD50: 316 mg/kg

Inhalation (Mouse) LC50: 9500 mg/m³/4h

Intraperitoneal (Mouse) LD50: 660 mg/kg

Intravenous (Mouse) LD50: 90 mg/kg

IRRITATION

Skin (rabbit): 500 mg - Mild

Eye (rabbit): 100 mg/24h - Moderate

Skin (rabbit): 500 mg - Mild

Eye (rabbit): 100 mg/24h - Moderate

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Section 11 - TOXICOLOGICAL INFORMATION

Inhalation (Rabbit) LC: 4000 ppm/4h

Inhalation (Rat) LC50: 24000 mg/m³/4h

Inhalation (Human) LCLo: 10000 ppm/30 m

■ 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.

WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

DIBENZOYL PEROXIDE:

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

TOXICITY

Oral (rat) LD50: 7710 mg/kg

Inhalation (human) TCLo: 12 mg/m³

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 oedema. 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 sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising 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 pre-coital 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.

IRRITATION

Eye (rabbit): 500 mg/24h - Mild

Skin effects (MAK): very weak

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Section 11 - TOXICOLOGICAL INFORMATION

CARCINOGEN

Styrene	International Agency for Research on Cancer (IARC) Carcinogens	Group	2B
Benzoyl peroxide	International Agency for Research on Cancer (IARC) Carcinogens	Group	3

Section 12 - ECOLOGICAL INFORMATION

■ DO NOT discharge into sewer or waterways.
Refer to data for ingredients, which follows:

POWERS KF2:

STYRENE:

■ Hazardous Air Pollutant:	Yes
■ Fish LC50 (96hr.) (mg/l):	25.1- 74.8
■ Algae IC50 (72hr.) (mg/l):	67- 200
■ log Kow (Prager 1995):	2.95
■ log Kow (Sangster 1997):	3.05
■ BOD5:	0.55- 1.95
■ ThOD:	3.07
■ Half- life Soil - High (hours):	672
■ Half- life Soil - Low (hours):	336
■ Half- life Air - High (hours):	7.3
■ Half- life Air - Low (hours):	0.9
■ Half- life Surface water - High (hours):	672
■ Half- life Surface water - Low (hours):	336
■ Half- life Ground water - High (hours):	5040
■ Half- life Ground water - Low (hours):	672
■ Aqueous biodegradation - Aerobic - High (hours):	672
■ Aqueous biodegradation - Aerobic - Low (hours):	336
■ Aqueous biodegradation - Anaerobic - High (hours):	2688
■ Aqueous biodegradation - Anaerobic - Low (hours):	1344
■ Aqueous biodegradation - Removal secondary treatment - High (hours):	99%
■ Aqueous biodegradation - Removal secondary treatment - Low (hours):	8%
■ Photooxidation half- life air - High (hours):	7.3
■ Photooxidation half- life air - Low (hours):	0.9

■ for styrene:

Transport: Styrene is expected to volatilise from surface waters as predicted by its Henry's Law constant. The chemical is also removed from waters by adsorption onto soils and sediments. Under certain conditions, styrene may leach through soil (particularly sandy soils) and enter ground water

Transformation/ Persistence:

Air: In the atmosphere, styrene reacts with both hydroxyl radicals and ozone with estimated half-lives of 3.5 and 9 hours, respectively. The chemical is also degraded in the presence of NOX and natural sunlight. Styrene contributes to the formation of photochemical smog due to indirect photochemical reactions. Smog chamber experiments with simulated sunlight and auto exhaust as a source of styrene, showed a 55% disappearance of styrene in 2 hours .

Soil: Biodegradation is the major route of removal of styrene from soils. Microbes isolated from landfill soil degraded 95% of the styrene present in 16 weeks

Water: Styrene rapidly volatilises from surface water with estimated half-lives from a river or pond of 0.6 days and 13 days, respectively. Microbes isolated from unadapted sewage sludge degraded 42% of the styrene present in 5 days while the microbial degradation with adapted sewage sludge was 80% in 5 days on the fish bioconcentration factor of 13.5 (goldfish) and the water solubility of styrene, the chemical is not likely to accumulate in biological organisms.

Ecotoxicity: Styrene is moderately toxic to aquatic organisms with toxicity values in the range of >1 mg/L to 100 mg/L. Styrene is expected to have low toxicity towards terrestrial animals

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Section 12 - ECOLOGICAL INFORMATION

Fish LC50 (96 h): *Lepomis macrochirus* (blue gill) 25 mg/l; *Pimephales promelas* (fathead minnow) 46.4 mg/l (soft water); *Carassius auratus* (goldfish) 64.74 mg/l; *Lebistes reticulatus* (guppy) 74.83 mg/l
Daphnia magna LC50 (48 h): 23 mg/l; (24 h): 27 mg/l.

■ Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect human health. The potential for surfaces in an enclosed space to facilitate reactions should be considered.

Source of unsaturated substances	Unsaturated substances (Reactive Emissions)	Major Stable Products produced following reaction with ozone.
Occupants (exhaled breath, ski oils, personal care products)	Isoprene, nitric oxide, squalene, unsaturated sterols, oleic acid and other unsaturated fatty acids, unsaturated oxidation products	Methacrolein, methyl vinyl ketone, nitrogen dioxide, acetone, 6MHQ, geranyl acetone, 4OPA, formaldehyde, nonanol, decanal, 9- oxo- nonanoic acid, azelaic acid, nonanoic acid.
Soft woods, wood flooring, including cypress, cedar and silver fir boards, houseplants	Isoprene, limonene, alpha-pinene, other terpenes and sesquiterpenes	Formaldehyde, 4- AMC, pinoaldehyde, pinic acid, pinonic acid, formic acid, methacrolein, methyl vinyl ketone, SOAs including ultrafine particles
Carpets and carpet backing	4- Phenylcyclohexene, 4-vinylcyclohexene, styrene, 2-ethylhexyl acrylate, unsaturated fatty acids and esters	Formaldehyde, acetaldehyde, benzaldehyde, hexanal, nonanal, 2- nonenal
Linoleum and paints/polishes containing linseed oil	Linoleic acid, linolenic acid	Propanal, hexanal, nonanal, 2-heptenal, 2- nonenal, 2-decenal, 1- pentene- 3- one, propionic acid, n- butyric acid
Latex paint Certain cleaning products, polishes, waxes, air fresheners	Residual monomers Limonene, alpha- pinene, terpinolene, alpha- terpineol, linalool, linalyl acetate and other terpenoids, longifolene and other sesquiterpenes	Formaldehyde Formaldehyde, acetaldehyde, glycoaldehyde, formic acid, acetic acid, hydrogen and organic peroxides, acetone, benzaldehyde, 4- hydroxy- 4-methyl- 5- hexen- 1- al, 5-ethenyl- dihydro- 5- methyl- 2(3H)- furanone, 4- AMC, SOAs including ultrafine particles
Natural rubber adhesive	Isoprene, terpenes	Formaldehyde, methacrolein, methyl vinyl ketone
Photocopier toner, printed paper, styrene polymers	Styrene	Formaldehyde, benzaldehyde
Environmental tobacco smoke	Styrene, acrolein, nicotine	Formaldehyde, benzaldehyde, hexanal, glyoxal, N-methylformamide, nicotinaldehyde, cotinine
Soiled clothing, fabrics, bedding	Squalene, unsaturated sterols, oleic acid and other saturated fatty acids	Acetone, geranyl acetone, 6MHO, 4OPA, formaldehyde, nonanal, decanal, 9- oxo- nonanoic acid, azelaic acid, nonanoic acid
Soiled particle filters	Unsaturated fatty acids from plant waxes, leaf litter, and other vegetative debris; soot; diesel particles	Formaldehyde, nonanal, and other aldehydes; azelaic acid; nonanoic acid; 9- oxo- nonanoic acid and other oxo- acids; compounds with mixed functional groups (=O, - OH, and - COOH)
Ventilation ducts and duct	Unsaturated fatty acids and	C5 to C10 aldehydes

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Section 12 - ECOLOGICAL INFORMATION

liners	esters, unsaturated oils, neoprene	
" Urban grime"	Polycyclic aromatic hydrocarbons	Oxidized polycyclic aromatic hydrocarbons
Perfumes, colognes, essential oils (e.g. lavender, eucalyptus, tea tree)	Limonene, alpha- pinene, linalool, linalyl acetate, terpinene- 4- ol, gamma-terpinene	Formaldehyde, 4- AMC, acetone, 4- hydroxy- 4- methyl- 5- hexen- 1- al, 5- ethenyl- dihydro- 5- methyl- 2(3H) furanone, SOAs including ultrafine particles
Overall home emissions	Limonene, alpha- pinene, styrene	Formaldehyde, 4- AMC, pinonaldehyde, acetone, pinic acid, pinonic acid, formic acid, benzaldehyde, SOAs including ultrafine particles

Abbreviations: 4-AMC, 4-acetyl-1-methylcyclohexene; 6MHQ, 6-methyl-5-heptene-2-one, 4OPA, 4-oxopentanal, SOA, Secondary Organic Aerosols

Reference: Charles J Weschler; Environmental Health Perspectives, Vol 114, October 2006.

log Kow: 2.95-3.05

Koc: 270-550

Half-life (hr) air: 3.5-9

Half-life (hr) H₂O surface water: 3

Henry's atm m³/mol: 2.81E-03

BOD 5 if unstated: 0.55-2.45,65%

COD: 2.80-2.88

ThOD: 3.07

BCF: 13.5

Toxicity Fish: LC50(96)0.87-0.95ppm

Nitrif. inhib.: 75% inhib at 175mg/L

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.

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Section 12 - ECOLOGICAL INFORMATION

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.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
Powers KF2		No data		
styrene		No data		
dibenzoyl peroxide		No data		

Section 13 - DISPOSAL CONSIDERATIONS

If used in accordance with instructions, the only item to be disposed of will be the empty cartridge. Solidified material may be buried.

Section 14 - TRANSPORTATION INFORMATION



Labels Required: ORGANIC PEROXIDE

HAZCHEM: 1W (ADG7)

ADG7:

Class or division:	5.2	Subsidiary risk:	None
UN No.:	3108	UN packing group:	None
Special provisions:	122, 274, 323	Packing Instructions:	None
Notes:	None	Limited quantities:	500 g
Portable tanks and bulk containers - Instructions:	None	Portable tanks and bulk containers - Special provisions:	None
Packagings and IBCs - Packing instruction:	P520	Packagings and IBCs - Special packing provisions:	None

Shipping Name:ORGANIC PEROXIDE TYPE E, SOLID

Land Transport UNDG:

Class or division:	5.2	Subsidiary risk:	None
UN No.:	3108	UN packing group:	None

Shipping Name:ORGANIC PEROXIDE TYPE E, SOLID

Air Transport IATA:

ICAO/IATA Class:	5.2	ICAO/IATA Subrisk:	None
UN/ID Number:	3108	Packing Group:	-
Special provisions:	A14 A20		

Shipping Name: ORGANIC PEROXIDE TYPE E, SOLID * †

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Section 14 - TRANSPORTATION INFORMATION

Maritime Transport IMDG:

IMDG Class:	5.2	IMDG Subrisk:	None
UN Number:	3108	Packing Group:	None
EMS Number:	F- J, S- R	Special provisions:	122 274 323
Limited Quantities:	500 g		
Shipping Name:	ORGANIC PEROXIDE TYPE E, SOLID		

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE: S5

REGULATIONS

Regulations for ingredients

styrene (CAS: 100-42-5) is found on the following regulatory lists;

"Australia - Australian Capital Territory - Environment Protection Regulation: Ambient environmental standards (Domestic water supply - organic compounds)", "Australia - Australian Capital Territory Environment Protection Regulation Pollutants entering waterways - Domestic water quality", "Australia Dangerous Goods Code (ADG Code) - Goods Too Dangerous To Be Transported", "Australia Exposure Standards", "Australia Hazardous Substances", "Australia High Volume Industrial Chemical List (HVICL)", "Australia Inventory of Chemical Substances (AICS)", "Australia National Pollutant Inventory", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix E (Part 2)", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix F (Part 3)", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 5", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Agency for Research on Cancer (IARC) Carcinogens", "International Air Transport Association (IATA) Dangerous Goods Regulations", "International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List", "International Chemical Secretariat (ChemSec) REACH SIN* List (*Substitute It Now!) 1.0", "OECD Representative List of High Production Volume (HPV) Chemicals", "WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water"

dibenzoyl peroxide (CAS: 94-36-0) is found on the following regulatory lists;

"Australia Dangerous Goods Code (ADG Code) - List of Currently Assigned Organic Peroxides in Packagings", "Australia Exposure Standards", "Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix E (Part 2)", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Appendix F (Part 3)", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 2", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 4", "Australia Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) - Schedule 5", "International Agency for Research on Cancer (IARC) Carcinogens", "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"

No data for Powers KF2 (CW: 59224)

Section 16 - OTHER INFORMATION

REPRODUCTIVE HEALTH GUIDELINES

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
styrene	85 mg/m3	NAD	0.3	-	

■ These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise.

CR = Cancer Risk/10000; UF = Uncertainty factor:

TLV believed to be adequate to protect reproductive health:

LOD: Limit of detection

Toxic endpoints have also been identified as:

D = Developmental; R = Reproductive; TC = Transplacental carcinogen

Jankovic J., Drake F.: A Screening Method for Occupational Reproductive

American Industrial Hygiene Association Journal 57: 641-649 (1996).

■ Classification of the preparation 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.

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Section 16 - OTHER INFORMATION

■ 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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This is the end of the MSDS.