

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
**MODERATE**

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

Johnson & Johnson Medical Microshield PVP

### PRODUCT NUMBERS

48242

### PRODUCT USE

Broad spectrum antimicrobial surgical handwash for external use only. Application over large skin areas should be avoided. Use in pregnancy and lactation should be limited.

### SUPPLIER

Company: Johnson & Johnson Medical Pty Ltd  
Address:  
PO Box 134  
North Ryde  
NSW, 2113  
Australia






Company: Johnson & Johnson Medical Pty Ltd  
Address:  
1-5 Khartoum Road  
North Ryde  
NSW, 2113  
Australia  
Telephone: +61 2 9878 9000  
Telephone: 1800 257 210  
Emergency Tel: **13 11 26**  
Emergency Tel: **+64 3 474 7000 NZ**  
Fax: 1800 808 233  
Website: <http://www.jnjaust.com.au/home.aspx>

## Section 2 - HAZARDS IDENTIFICATION


### STATEMENT OF HAZARDOUS NATURE

**HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.**

### CHEMWATCH HAZARD RATINGS

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

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



### POISONS SCHEDULE

None

#### RISK

- Irritating to eyes.
- Inhalation may produce health damage\*.
- Cumulative effects may result following exposure\*.
- Possible respiratory and skin sensitiser\*.

\* (limited evidence).

#### SAFETY

- Do not breathe gas/ fumes/ vapour/ spray.
- Avoid contact with skin.
- Wear eye/ face protection.
- Use only in well ventilated areas.
- Keep container in a well ventilated place.
- To clean the floor and all objects contaminated by this material, use water.
- Keep container tightly closed.
- 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 Information Centre (show this container or label).

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
<a href="#">povidone-iodine</a>	25655-41-8	7.5
<a href="#">ammonium nonoxynol sulfate</a>	9051-57-4	0-10
<a href="#">glycerol</a>	56-81-5	0-10
<a href="#">sodium lauryl sulfate</a>	151-21-3	0-10
<a href="#">sodium phosphate, dibasic</a>	7558-79-4	0-10
lauryl pyrrolidone		0-10
<a href="#">hydroxyethylcellulose</a>	9004-62-0	0-10
citric acid monohydrate for pH adjustment		0-10
fragrance		0-10
<a href="#">potassium iodide</a>	7681-11-0	0-10
<a href="#">water</a>	7732-18-5	>20

## 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:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

### SKIN

- No adverse effects anticipated from normal use. If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

### INHALED

- 
- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

### NOTES TO PHYSICIAN

- Treat symptomatically.
- Anaphylaxis is possible for sensitive individuals. Esophageal stricture may persist after recovery from immediate symptoms. Starch (15 g flour in 500ml water) may be used to absorb iodine.

## Section 5 - FIRE FIGHTING MEASURES

### EXTINGUISHING MEDIA

- 
- There is no restriction on the type of extinguisher which may be used.

### FIRE FIGHTING

■

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

## FIRE/EXPLOSION HAZARD

- 
- Non combustible.
- Not considered to be a significant fire risk.
- Expansion or decomposition on heating may lead to violent rupture of containers.
- Decomposes on heating and may produce toxic fumes of carbon monoxide (CO).
- May emit acrid smoke.

Other decomposition products include: iodine.

## FIRE INCOMPATIBILITY

- None known.

## HAZCHEM

None

## Personal Protective Equipment

Breathing apparatus.

Gas tight chemical resistant suit.

Limit exposure duration to 1 BA set 30 mins.

## Section 6 - ACCIDENTAL RELEASE MEASURES

### MINOR SPILLS

- 
- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable, labelled container for waste disposal.

### MAJOR SPILLS

- Minor hazard.
- Clear area of personnel.
- Alert Fire Brigade and tell them location and nature of hazard.
- Control personal contact by using protective equipment as required.
- Prevent spillage from entering drains or water ways.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite and place in appropriate containers for disposal.
- Wash area and prevent runoff into drains or waterways.
- If contamination of drains or waterways occurs, advise emergency services.

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

## Section 7 - HANDLING AND STORAGE

### PROCEDURE FOR HANDLING

- Avoid mixing with detergents.
- Avoid contact with other chemicals.
- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

## SUITABLE CONTAINER

- 
- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

## STORAGE INCOMPATIBILITY

Avoid contact with reducing agents, alkaloid salts, chloral hydrate, and metallic salts.

## STORAGE REQUIREMENTS

- 
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Keep cool. Store below 25 deg.C.

## SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



*X: Must not be stored together*

*O: May be stored together with specific precautions*

*+: 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
Australia Exposure Standards	glycerol (Glycerin mist (a))		10						(see Chapter 14)

The following materials had no OELs on our records

- povidone-iodine: CAS:25655-41-8
- ammonium nonoxynol sulfate: CAS:9051-57-4 CAS:37226-45-2
- sodium lauryl sulfate: CAS:151-21-3 CAS:1335-72-4 CAS:3088-31-1 CAS:9004-82-4
- sodium phosphate, dibasic: CAS:7558-79-4 CAS:10028-24-7
- hydroxyethylcellulose: CAS:9004-62-0
- potassium iodide: CAS:7681-11-0
- water: CAS:7732-18-5

### MATERIAL DATA

AMMONIUM NONOXYNOL SULFATE:

GLYCEROL:

POTASSIUM IODIDE:

SODIUM LAURYL SULFATE:

SODIUM PHOSPHATE, DIBASIC:

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

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

(Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

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

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

AMMONIUM NONOXYNOL SULFATE:

POTASSIUM IODIDE:

POVIDONE-IODINE:

SODIUM LAURYL SULFATE:

SODIUM PHOSPHATE, DIBASIC:

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

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

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

JOHNSON & JOHNSON MEDICAL MICROSHIELD PVP:

■ None assigned. Refer to individual constituents.

GLYCEROL:

The mist is considered to be a nuisance particulate which appears to have little adverse effect on the lung and does not produce significant organic disease or toxic effects. OSHA concluded that the nuisance particulate limit would protect the worker from kidney damage and perhaps, testicular effects.

WATER:

■ No exposure limits set by NOHSC or ACGIH.

## PERSONAL PROTECTION



### EYE

■ No special equipment for minor exposure i.e. when handling small quantities.

● OTHERWISE:

- Safety glasses with side shields.
- 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]

### HANDS/FEET

■ No special equipment needed when handling small quantities.

OTHERWISE: Wear chemical protective gloves, eg. PVC.

Stains may be removed with dilute sodium thiosulfate solution.

### OTHER

- 
- Overalls.
- Eyewash unit.

### GLOVE SELECTION INDEX

■ Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the computer-generated selection: water, potassium iodide, glycerol

■ Protective Material CPI \*

NATURAL RUBBER

B

■ \* CPI - Chemwatch Performance Index

A: Best Selection

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

\* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

■ 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 P	-
1000	50	-	A-AUS P
5000	50	Airline *	-
5000	100	-	A-2 P
10000	100	-	A-3 P
	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

■ General exhaust is adequate under normal operating conditions. If risk of overexposure exists, wear SAA approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air)	0.25-0.5 m/s (50-100 f/min)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

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

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### APPEARANCE

Dark brown viscous liquid with faint iodine odour; mixes with water.

### PHYSICAL PROPERTIES

Liquid.

Mixes with water.

State	Liquid	Molecular Weight	Not applicable.
Melting Range (°C)	Not available.	Viscosity	Not Available

# Johnson & Johnson Medical Microshield PVP

**Hazard Alert Code:**  
**MODERATE**

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

Boiling Range (°C)	Not available	Solubility in water (g/L)	Miscible
Flash Point (°C)	Not applicable	pH (1% solution)	Not available.
Decomposition Temp (°C)	Not available.	pH (as supplied)	5.0
Autoignition Temp (°C)	Not applicable	Vapour Pressure (kPa)	Not available.
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	1.05
Lower Explosive Limit (%)	Not applicable	Relative Vapour Density (air=1)	Not available.
Volatile Component (%vol)	Not available.	Evaporation Rate	Not available

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

- Product is considered stable and hazardous polymerisation will not occur.

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.

The liquid is discomforting.

Ingestion may result in nausea, abdominal irritation, pain and vomiting.

##### EYE

- The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

##### SKIN

- Not considered an irritant through normal use.

The liquid may be slightly discomforting to the skin if exposure is prolonged and is capable of causing transient staining of the skin and skin reactions which may lead to dermatitis from repeated exposures over long periods.

##### INHALED

- Not normally a hazard due to non-volatile nature of product.

Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be harmful.

#### CHRONIC HEALTH EFFECTS

- There is limited evidence that, skin contact with this product is more likely to cause a sensitisation reaction in some persons compared to the general population.

#### TOXICITY AND IRRITATION

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

WATER:

HYDROXYETHYLCELLULOSE:

- No significant acute toxicological data identified in literature search.

SODIUM LAURYL SULFATE:

SODIUM PHOSPHATE, DIBASIC:

AMMONIUM NONOXYNOL SULFATE:

- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

SODIUM PHOSPHATE, DIBASIC:

POVIDONE-IODINE:

■ 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.

JOHNSON &amp; JOHNSON MEDICAL MICROSHIELD PVP:

■ Not available. Refer to individual constituents.

POVIDONE-IODINE:

TOXICITY

Oral (rat) LD50: &gt;8000 mg/k

Oral (rat) LD50: 5990 mg/kg \* [\* = Manufacturer]

Dermal (human) TDLo: 3400 mg/Kg/24h

IRRITATION

Skin (rabbit): 500 mg Mild

**TOXICITY****IRRITATION****AMMONIUM NONOXYNOL SULFATE:**

Oral (rat) LD50: 8000 mg/kg

Nil  
Reported

**GLYCEROL:**

Oral (Rat) LD50: 12600 mg/kg

Oral (Guinea pig) LD50: 7750 mg/kg

Oral (Human) TDLo: 1428 mg/kg

Intraperitoneal (Rat) LD50: 4420 mg/kg

Subcutaneous (Rat) LD50: 100 mg/kg

Intravenous (Rat) LD50: 5566 mg/kg

Oral (Mouse) LD50: 4090 mg/kg

Intraperitoneal (Mouse) LD50: 8700 mg/kg

Subcutaneous (Mouse) LD50: 91 mg/kg

Intravenous (Mouse) LD50: 4250 mg/kg

■ At very high concentrations, evidence predicts that glycerol may cause tremor, irritation of the skin, eyes, digestive tract and airway. Otherwise it is of low toxicity. There is no significant evidence to suggest that it causes cancer, genetic, reproductive or developmental toxicity.

**SODIUM LAURYL SULFATE:**

Oral (rat) LD50: 1288 mg/kg

Skin  
(human):  
25  
mg/24 hr  
- Mild

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

■ Alkyl sulfates are irritating to the skin, harmful if swallowed and at risk of causing serious damage to the eyes. They are metabolised by the liver and excreted via urine. They produce dose-dependent toxicity depending on their structure. They do not cause cancer, reproductive or genetic defects. However, at levels that are toxic to the mother, it may produce foetal defects during organ formation.



# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

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

Eye (None) None: None None rabbit None 250 ugSkin (rabbit):25 mg/24 hr-moderate

Skin (None) None: None rabbit None 50 mg/24Eye (rabbit) 10: mg-

## SODIUM PHOSPHATE, DIBASIC:

Oral (rat) LD50: 17000 mg/kg

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

Intravenous (Rabbit) LD: 1075 mg/kg

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

■ The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

## HYDROXYETHYLCELLULOSE: POTASSIUM IODIDE:

Oral (mouse) LDLo: 1862 mg/kg

Nil  
Reported

■ 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.

Allergic reactions involving the respiratory tract are usually due to interactions between IgE antibodies and allergens and occur rapidly. Allergic potential of the allergen and period of exposure often determine the severity of symptoms. Some people may be genetically more prone than others, and exposure to other irritants may aggravate symptoms. Allergy causing activity is due to interactions with proteins.

Attention should be paid to atopic diathesis, characterised by increased susceptibility to nasal inflammation, asthma and eczema.

Exogenous allergic alveolitis is induced essentially by allergen specific immune-complexes of the IgG type; cell-mediated reactions (T lymphocytes) may be involved. Such allergy is of the delayed type with onset up to four hours following exposure.

## WATER:

## Section 12 - ECOLOGICAL INFORMATION

### POTASSIUM IODIDE: POVIDONE-IODINE:

■ Iodine is an important element in studies of environmental protection and human health, global-scale hydrologic processes and nuclear nonproliferation. Biogeochemical cycling of iodine is complex, because iodine occurs in multiple oxidation states and as inorganic and organic species that may be hydrophilic, atmophilic, and biophilic. Experiments illustrate complex behavior with various processes occurring, including iodate reduction, irreversible retention or mass loss of iodide, and rate-limited and nonlinear sorption. There was an appreciable iodate reduction to iodide, presumably mediated by the structural Fe(II) in some clay minerals; therefore, careful attention must be given to potential interconversion among species when interpreting the biogeochemical behavior of iodine in the environment.

Iodine (I<sub>2</sub>) is electrochemically reduced to ionic iodide by natural processes but humic acid appears to promote the reaction. The different oxidation species of iodine have markedly different sorption properties. Hence, changes in iodine redox states can greatly affect the mobility of iodine in the environment. A major microbial role has been suggested in the past to account for at least some of these redox changes. Both soluble ferrous iron and sulfide, as well as iron monosulfide (FeS) were shown to abiotically reduce iodate to iodide. These results indicate that ferric iron and/or sulfate reducing bacteria are capable of mediating both direct, enzymatic, as well as abiotic reduction of iodate in natural anaerobic environments.

Environmental and geological evidence indicates that iodine can become associated with natural organic matter (NOM) in soils and sediments. Previous studies have shown that iodine (including I<sub>2</sub>) can be strongly retained in organic-rich surface soils and sediment and that soluble iodine may be associated with dissolved humic material. Iodine and iodate undergo an abiotic pseudo first-order reaction with peat leading to either reduction of iodate or iodine to iodide or incorporation of the iodine atoms into the organic matrix. Iodine appears to be incorporated in sphagnum peat by aromatic substitution for hydrogen on phenolic constituents of the peat.

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

AMMONIUM NONOXYNOL SULFATE:

GLYCEROL:

SODIUM LAURYL SULFATE:

SODIUM PHOSPHATE, DIBASIC:

POTASSIUM IODIDE:

POVIDONE-IODINE:

■ DO NOT discharge into sewer or waterways.

POVIDONE-IODINE:

AMMONIUM NONOXYNOL SULFATE:

■ For surfactants:

Environmental fate:

Octanol/water partition coefficients cannot easily be determined for surfactants because one part of the molecule is hydrophilic and the other part is hydrophobic. Consequently they tend to accumulate at the interface and are not extracted into one or other of the liquid phases. As a result surfactants are expected to transfer slowly, for example, from water into the flesh of fish. During this process, readily biodegradable surfactants are expected to be metabolised rapidly during the process of bioaccumulation. This was emphasised by the OECD Expert Group stating that chemicals are not to be considered to show bioaccumulation potential if they are readily biodegradable.

Several anionic and nonionic surfactants have been investigated to evaluate their potential to bioconcentrate in fish. BCF values (BCF - bioconcentration factor) ranging from 1 to 350 were found. These are absolute maximum values, resulting from the radiolabelling technique used. In all these studies, substantial oxidative metabolism was found resulting in the highest radioactivity in the gall bladder. This indicates liver transformation of the parent compound and biliary excretion of the metabolised compounds, so that "real" bioconcentration is overstated. After correction it can be expected that "real" parent BCF values are one order of magnitude less than those indicated above, i.e. "real" BCF is <100. Therefore the usual data used for classification by EU directives to determine whether a substance is "Dangerous to the Environment" has little bearing on whether the use of the surfactant is environmentally acceptable.

Ecotoxicity:

Surfactant should be considered to be toxic (EC50 and LC50 values of < 10 mg/L) to aquatic species under conditions that allow contact of the chemicals with the organisms. The water solubility of the chemicals does not impact the toxicity except as it relates to the ability to conduct tests appropriately to obtain exposure of the test species. The acute aquatic toxicity generally is considered to be related to the effects of the surfactant properties on the organism and not to direct chemical toxicity.

In air ammonia is persistent whilst, in water, it biodegrades rapidly to nitrate, producing a high oxygen demand. Ammonia is strongly adsorbed to soil. Ammonia is non-persistent in water (half-life 2 days) and is moderately toxic to fish under normal temperature and pH conditions. Ammonia is harmful to aquatic life at low concentrations but does not concentrate in the food chain.

Drinking Water Standards:

0.5 mg/l (UK max.)

1.5 mg/l (WHO Levels)

Soil Guidelines: none available.

Air Quality Standards: none available.

for alkylphenols and their ethoxylates, or propoxylates:

Environmental fate: Alkylphenols are ubiquitous in the environment after the introduction, generally as wastes, of their alkoxyethylated forms (ethoxylates and propoxylates, for example); these are extensively used throughout industry and in the home.

Alkylphenol ethoxylates are widely used surfactants in domestic and industrial products, which are commonly found in wastewater discharges and in sewage treatment plant (STP) effluent's. Degradation of APEs in wastewater treatment plants or in the environment generates more persistent shorter-chain APEs and alkylphenols (APs) such as nonylphenol (NP), octylphenol (OP) and AP mono- to triethoxylates (NPE1, NPE2 and NPE3). There is concern that APE metabolites (NP, OP, NPE1-3) can mimic natural hormones and that the levels present in the environment may be sufficient to disrupt endocrine function in wildlife and humans. The physicochemical properties of the APE metabolites (NP, NPE1-4, OP, OPE1-4), in particular the high Kow values, indicate that they will partition effectively into sediments following discharge from STPs. The aqueous solubility data for the APE metabolites indicate that the concentration in water combined with the high partition coefficients will provide a significant reservoir (load) in various environmental compartments. Data from studies conducted in many regions across the world have shown significant levels in samples of every environmental compartment examined. In the US, levels of NP in air ranged from 0.01 to 81 ng/m<sup>3</sup>, with seasonal trends observed. Concentrations of APE metabolites in treated wastewater effluents in the US ranged from < 0.1 to 369 ug/l, in Spain they were between 6 and 343 ug/l and concentrations up to 330 ug/l were found in the UK. Levels in sediments reflected the high partition coefficients with concentrations reported ranging from < 0.1 to 13,700 ug/kg for sediments in the US. Fish in the UK were found to contain up to 0.8 ug/kg NP in muscle tissue. APEs degraded faster in the water column than in sediment. Aerobic conditions facilitate easier further biotransformation of APE metabolites than anaerobic conditions.

Nonylphenols are susceptible to photochemical degradation. Using natural, filtered, lake water it was found that nonylphenol had a half-life of approximately 10-15 h under continuous, noon, summer sun in the surface water layer, with a rate approximately 1.5 times slower at depths 20-25 cm. Photolysis was much slower with ethoxylated nonylphenol, and so it is unlikely to be a significant event in removal of the ethoxylates.

Air: Alkylphenols released to the atmosphere will exist in the vapour phase and is thought to be degraded by reaction with photochemically produced hydroxyl radicals, with a calculated half-life, for nonylphenol, of 0.3 days.

Water: Abiotic degradation of alkylphenol is negligible. Biodegradation does not readily take place. The half-life in surface water may be around 30 days.

Degradation: Alkylphenol ethoxylates (APES) may abiotically degrade into the equivalent alkylphenol. During degradation ethylene oxide units are cleaved off the ethylene oxide chain until only short-chain alkylphenol ethoxylates remain, typically mono- and diethylene oxides. Oxidation of these oligomers creates the corresponding carboxylic acids. This leaves several degradation products: short-chain ethoxylates, their carboxylic acids, and alkylphenols.

Biodegradation: Alkylphenols are not readily biodegradable. Several mechanisms of microbial aromatic ring degradation have been reported, the most common being formation of catechol from phenol, followed by ring scission between or adjacent to the two hydroxyl groups.

The full breakdown pathway for APES has not yet been determined, and all studies have so far focused on identification of intermediates in bacterial culture media, rather than studying cell-free systems or purified enzymes. It is, however, likely that microbial metabolism usually starts by an attack on the ethoxylate chain, rather than on the ring or the hydrophobic chain. The

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

ethoxylate groups are progressively removed, either by ether cleavage, or by terminal alcohol oxidation followed by cleavage of the resulting carboxylic acid.

Biodegradation of APES produces less biodegradable products: alkylphenol mono- and di-ethoxylates, alkylphenoxy acetic and alkylphenoxy polyethoxy acetic acids, and alkylphenols. These metabolites frequently persist through sewage treatment and in rivers. Anaerobic conditions generally lead to the accumulation of alkylphenols. The rate of biodegradation seems to decrease with increasing length of the ethylene oxide chain.

Bioaccumulation: Metabolites of APES accumulate in organisms, with bioconcentration factors varying from ten to several thousand, depending on species, metabolite and organ.

The metabolites of APES are generally more toxic than the original compounds. APES have LC50s above about 1.5 mg/l, whereas alkylphenols, such as nonylphenol, have LC50s are generally around 0.1 mg/l.

Oestrogenic activity: The role of alkyl chain length and branching, substituent position, number of alkylated groups, and the requirement of a phenolic ring structure was assessed in fish. The results showed that most alkylphenols were oestrogenic, although with 3-300 thousand times lower potency than the endogenous estrogen 17 $\beta$ -estradiol. Mono-substituted tertiary alkylphenols with moderate (C4-C5) and long alkyl chain length (C8-C9) in the para position exhibited the highest oestrogenic potency. Substitution with multiple alkyl groups, presence of substituents in the ortho- and meta-position and lack of a hydroxyl group on the benzene ring reduced the oestrogenic activity, although several oestrogenic alkylated non-phenolics were identified.

Human exposure: Alkylphenols were first found to be oestrogenic (oestrogen-mimicking) in the 1930s, but more recent research has highlighted the implications of these effects. The growth of cultured human breast cancer cells is affected by nonylphenol at concentrations as low as 1  $\mu$ M (220  $\mu$ g/l) or concentrations of octylphenol as low as 0.1  $\mu$ M (20  $\mu$ g/l). Oestrogenic effects have also been shown on rainbow trout hepatocytes, chicken embryo fibroblasts and a mouse oestrogen receptor.

The insecticide chlordecone (Kepone) shows similar behaviour to alkylphenols, accumulating in liver and adipose tissue, and eliciting oestrogenic activity. Workers exposed to this insecticide can suffer reproductive effects such as low sperm counts and sterility. In addition, the oestrogenic effects of chlordecone on MCF7 cells occur at similar concentrations to those of alkylphenols, suggesting that alkylphenols will be a similar health hazard if target cells are exposed to  $\mu$ M levels of these compounds.

By comparing environmental concentrations, bioconcentration factors and in vitro oestrogenic effect levels, current environmental levels of alkylphenolic compounds are probably high enough to affect the hormonal control systems of some organisms. It is also possible that human health could be being affected.

GLYCEROL:

<b>Algae IC50 (72hr.) (mg/l):</b>	2900-10000
<b>log Kow (Sangster 1997):</b>	-1.76
<b>log Pow (Verschueren 1983):</b>	1.07692307
<b>BOD5:</b>	51%
<b>COD:</b>	95%
<b>ThOD:</b>	93%

■ For glycerol

log Kow : -2.66- -2.47

BOD 5: 0.617-0.87,31-51%

COD : 1.16,82-95%

ThOD : 1.217-1.56

Completely biodegradable.

Environmental fate:

Based on the relevant physical-chemical properties and the fact that glycerol is readily biodegradable, glycerol will partition primarily to water.

Biodegradability: Glycerol is considered to be readily biodegradable in the aquatic environment. Pre-adapted microorganisms can degrade glycerol rapidly under both aerobic and anaerobic conditions.

Bioaccumulation: Based on Log Kow -1.76, glycerol will have a low bioaccumulation potential and is not expected to bioaccumulate.

Photodegradation: The calculated half-life for the photo-oxidation (reaction with hydroxyl radicals) of glycerol in air is 6.8 hours (EPIWIN vs 3.04).

Stability in Water: Glycerol does not contain functional groups that are expected to react with water.

Transport between Environmental Compartments: From the EQC model (Mackay level III), it can be deduced that 100% of glycerol will end up in the water phase. Negligible amounts will be distributed towards soil, air and sediment

Ecotoxicity:

Fish LC50: >5000 mg/l

Algae IC50: >2900 mg/l

Bacteria EC50: .10000 mg/l (*Pseudomonas putida*)

The weight of evidence indicates that glycerol is of low toxicity to aquatic organisms and this conclusion is supported by QSAR predictions. The lowest LC50 for fish is a 24-h LC50 of >5000 mg/l for *Carassius auratus* (Goldfish) and for aquatic invertebrates, a 24 h EC50 of >10000 mg/l for *Daphnia magna* is the lowest EC50. Several tests on algae are available, which suggest very low toxicity to a range of species, however their validity is uncertain. A QSAR prediction for the 96h EC50 to algae was 78000 mg/l. No toxicity towards the microorganism *Pseudomonas putida* was observed at 10000 mg/l after exposure for 16 hours. No long-term aquatic toxicity data is available. Screening studies are available on frog and carp embryos which indicate some effects on growth and hatching rates respectively at very high concentrations of glycerol, >7000 mg/l. However, their ecological relevance is not clear.

SODIUM LAURYL SULFATE:

■ Toxic to aquatic organisms.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

## SODIUM PHOSPHATE, DIBASIC:

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

## HYDROXYETHYLCELLULOSE:

■ Cellulosic products, including cellulose ethers, generally have a low biodegradation rate and are generally of low toxicity to fish. Sugar-based compounds (saccharides), including polysaccharides are generally easily decomposed by biodegradation. Not all polysaccharides decompose with equal rapidity, and polysaccharides are also synthesised by microorganisms during, for example, the compost maturation phases. Water-insoluble species such as cellulose take longer to decompose and those with a significant degree of branching also take longer.

## POTASSIUM IODIDE:

Fish LC50(48 h): 0.09-0.48 mg/L

Invertebrate LC50 (48 h): 0.8 mg/L

Nitrif. inhib.: inhib at 0.05mg/L

## WATER:

## Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
Johnson & Johnson Medical Microshield PVP	No Data Available	No Data Available		
povidone -iodine	No Data Available	No Data Available		
ammonium nonoxynol sulfate	No Data Available	No Data Available		
glycerol	LOW	Data Available	LOW	HIGH
sodium lauryl sulfate	HIGH	No Data Available	LOW	LOW
sodium phosphate, dibasic	No Data Available	No Data Available		
hydroxyethylcellulose	LOW	Data Available	LOW	HIGH
potassium iodide	HIGH	No Data Available	LOW	HIGH

## Section 13 - DISPOSAL CONSIDERATIONS

- - Recycle wherever possible or consult manufacturer for recycling options.
  - Consult State Land Waste Management Authority for disposal.
  - Bury residue in an authorised landfill.
  - Recycle containers if possible, or dispose of in an authorised landfill.
- Iodine is reduced to iodide by addition of thiosulfate. The remaining

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

solution is then suitable for disposal to the sewer. Seek approval from local authorities.

## Section 14 - TRANSPORTATION INFORMATION

### HAZCHEM:

None (ADG7)

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: UN, IATA, IMDG

## Section 15 - REGULATORY INFORMATION

### POISONS SCHEDULE

None

### REGULATIONS

#### Regulations for ingredients

**povidone-iodine (CAS: 25655-41-8) is found on the following regulatory lists;**

"Australia Inventory of Chemical Substances (AICS)"

**ammonium nonoxynol sulfate (CAS: 9051-57-4,37226-45-2) is found on the following regulatory lists;**

"Australia Inventory of Chemical Substances (AICS)"

**glycerol (CAS: 56-81-5) is found on the following regulatory lists;**

"Australia Exposure Standards", "Australia High Volume Industrial Chemical List (HVICL)", "Australia Inventory of Chemical Substances (AICS)", "Australia Therapeutic Goods Administration (TGA) Substances that may be used as active ingredients in Listed medicines", "CODEX General Standard for Food Additives (GSFA) - Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 18: List of products to which the Code does not apply", "IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances", "International Council of Chemical Associations (ICCA) - High Production Volume List", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD Representative List of High Production Volume (HPV) Chemicals"

**sodium lauryl sulfate (CAS: 151-21-3,1335-72-4,3088-31-1,9004-82-4) is found on the following regulatory lists;**

"Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6", "FEMA Generally Recognized as Safe (GRAS) Flavoring Substances 24 - Primary Names and Synonyms", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD Representative List of High Production Volume (HPV) Chemicals"

**sodium phosphate, dibasic (CAS: 7558-79-4,10028-24-7) is found on the following regulatory lists;**

"Australia Inventory of Chemical Substances (AICS)", "Australia Therapeutic Goods Administration (TGA) Substances that may be used as active ingredients in Listed medicines", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD Representative List of High Production Volume (HPV) Chemicals"

**hydroxyethylcellulose (CAS: 9004-62-0) is found on the following regulatory lists;**

"Australia Inventory of Chemical Substances (AICS)"

**potassium iodide (CAS: 7681-11-0) is found on the following regulatory lists;**

"Australia Inventory of Chemical Substances (AICS)", "Australia Therapeutic Goods Administration (TGA) Substances that may be used as active ingredients in Listed medicines"

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

"Australia Inventory of Chemical Substances (AICS)", "IMO IBC Code Chapter 18: List of products to which the Code does not apply", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD Representative List of High Production Volume (HPV) Chemicals"

**No data for Johnson & Johnson Medical Microshield PVP (CW: 6039-23)**

## Section 16 - OTHER INFORMATION

### Denmark Advisory list for selfclassification of dangerous substances

Substance	CAS	Suggested codes	
sodium lauryl sulfate		151- 21- 3	Mut3; R68 Rep3; R63 Xn; R22
sodium lauryl sulfate		3088- 31- 1	Carc3; R40 Mut3; R68 Rep3; R63

### Ingredients with multiple CAS Nos

Ingredient Name	CAS
ammonium nonoxynol sulfate	9051-57-4, 37226-45-2
sodium lauryl sulfate	151-21-3, 1335-72-4, 3088-31-1, 9004-82-4
sodium phosphate, dibasic	7558-79-4, 10028-24-7

### REPRODUCTIVE HEALTH GUIDELINES

# Johnson & Johnson Medical Microshield PVP

Hazard Alert Code:  
MODERATE

Chemwatch Material Safety Data Sheet

Version No: 6

Chemwatch 6039-23

Issue Date: 21-Mar-2011

CD 2011/1

NC317TCP

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
potassium iodide	1.0 mg/m <sup>3</sup>	NA	NA	NA	Yes

■ 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).

## EXPOSURE STANDARD FOR MIXTURES

■ "Worst Case" computer-aided prediction of spray/ mist or fume/ dust components and concentration: ■ Composite Exposure Standard for Mixture (TWA) :100 mg/m<sup>3</sup>.

■ 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](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.

*This document is copyright. Apart from any fair dealing for the purposes of private study, research, review or criticism, as permitted under the Copyright Act, no part may be reproduced by any process without written permission from CHEMWATCH. TEL (+61 3) 9572 4700.*

Issue Date: 21-Mar-2011

Print Date:24-Jun-2011