



Manufacturers of UTHANE Polyurethane Coatings  
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Date of Issue : 17/04/12

**MATERIAL SAFETY DATA SHEET**

Page 1 of 24

**UW2173 AQUAFLOX 2K WATERBORNE COATING - PART "A"**

Ref msds 00267A

**1. IDENTIFICATION**

PRODUCT NAME : UW2173 AQUAFLOX 2K Waterborne Coating - Part "A"  
CORRECT SHIPPING NAME : None Allocated  
OTHER NAMES : UW2173 AQUAFLOX - PART "A"  
AVAILABLE COLORS : 0925 Red, 1010 Bright Red, 1102 Maroon, 1980 Violet, 2616 G/S Blue, 2730 Blue, 3300 Green, 4026 Primrose, 4095 Med. Yellow, 4621 Yellow Oxide, 5870 Scarlet, 6219 Red Oxide, 7023 White, 7500 Black, Clear  
All colors are available in a range of gloss levels from full gloss to matte.  
A selected range of tinted colors is also available.  
ALL PIGMENTS USED ARE LEAD FREE.  
UN NUMBER : None Allocated CAS NUMBER : None Allocated  
AICS STATUS : All components listed  
DANGEROUS GOODS CLASS : None Allocated  
IMO HAZARD CLASS : None Allocated  
PACKAGING GROUP : None Allocated AS 1940 CLASS : None Allocated  
SUBSIDIARY RISK : Not Applicable HAZCHEM CODE : None Allocated  
POISONS SCHEDULE : None Allocated EPG : None Allocated  
USE : Waterborne / water reducible surface coating

**For Industrial Use Only In Areas Complying With Relevant Regulations.**

**This product is one component of a two component system.**

**Both components must be mixed together immediately prior to use.**

**COMPANY / UNDERTAKING**

BC COATINGS  
2 Hume Road, Smithfield, N.S.W. 2164  
PHONE +612 9729-2000, FAX +612 9729-2279  
Emergency Telephone No. +612 9634-5560 / +61 412 226 505

The following personnel should be contacted depending on the nature of the inquiry.

TECHNICAL MANAGER                      PRODUCTION MANAGER  
MANAGING DIRECTOR                      SALES                      MANAGER

AUSTRALIAN POISONS INFORMATION CENTRE                      24 HOUR SERVICE : 13 11 26

POLICE OR FIRE BRIGADE                      : 000                      (exchange) : 1100

This Fact Sheet is a summary of potential and the most severe health hazards that may result from exposure.

Always read the Material Safety Data Sheets (MSDS) for any products you use at work.

They contain useful information on hazards and control measures.

Safety Data Sheets are current for a maximum of five years but may be updated more frequently.

Please ensure that you have a current copy.

The information given in this bulletin and by the company's technical staff is provided as a general guide only to facilitate the adoption of appropriate measures in relation to handling, storage and disposal of the product.

Although BC Coatings has taken all reasonable care to ensure that the information is accurate, it accepts no responsibility for any loss or damage however caused that results there from and does not warrant such accuracy whether or not the information originated with BC Coatings .

BC Coatings urges each recipient of this MSDS to study it carefully to become aware of and understand the hazards associated with the product.

The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, and fire prevention, as necessary or appropriate to use and understand the data contained in this MSDS.

To promote safe handling, each customer or recipient should notify its employees, agents, contractors and others whom it knows or believes will use this material or the information in this MSDS and any other information regarding hazards or safety.

Users of the product are requested to contact BC Coatings technical section for detailed information regarding the qualities and characteristics of the product before it is used.

We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.



## 2. HAZARDS IDENTIFICATION

Classified as hazardous according to criteria of Safe Work Australia

Not a Dangerous Good according to the criteria of Australian Dangerous Goods (ADG) Code.

### CLASSIFICATION AND LABELLING ACCORDING TO NOHSC CODES

**CLASSIFICATION / SYMBOL** : Not applicable

**CLASSIFICATION / SYMBOL** : HARMFUL / Xn - IRRITANT / Xi

**GOVERNING DIRECTIVE** : National Code of practice for the Labelling of Hazardous Substances.

### HAZARDS IDENTIFICATION

R20/21/22	Harmful in contact with skin, by inhalation and if swallowed
R36/38	Irritating to eyes and skin
R37	Irritating to respiratory system
R43	May cause sensitization by skin contact
R66	Repeated exposure may cause skin dryness or cracking

### SAFETY ADVICE

S02	Keep out of the reach of children
S09	Keep container in a well ventilated place
S20/21	Do not eat, drink or smoke when using
S23	Do not breathe gas/fumes/vapour/spray
S24/25	Avoid contact with skin and eyes
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S28	Wash off immediately with soap and plenty of water
S36/37	Wear suitable protective clothing and gloves
S51	Use only in well ventilated areas.



## 2. HAZARDS IDENTIFICATION - continued

### HEALTH EFFECTS - ACUTE EXPOSURE

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Principal routes of exposure are usually by inhalation of vapour and skin/eye contact/absorption. Acute (short term) health effects may occur immediately or shortly after exposure to this product. High vapor concentrations are irritating to the eyes and the respiratory tract, may cause vomiting, coughing, pulmonary irritation, headaches and dizziness, and may have other central nervous system effects. Prolonged, repeated skin contact with low viscosity materials may defat the skin resulting in possible irritation and dermatitis. Effects of chemicals on human health and the environment depend on how much chemical is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

### SWALLOWED

Considered an unlikely route of entry in commercial/industrial environments. Single dose oral toxicity is considered to be low. Ingestion can result in nausea, cramps, pain, vomiting, diarrhoea and central nervous system depression.

### EYE

The liquid is moderately irritating to the eye, but it is unlikely to cause any more than mild transient discomfort. However, immediate flushing of the eyes with water will minimize any irritative effect. High concentration of vapours may cause irritation. It is also unlikely to cause any lasting effects.

### SKIN

Exposure to this product is not likely to cause significant irritation, nor is it likely to be absorbed through skin in harmful amounts. Repeated or prolonged exposure may cause irritation and dermatitic effects. Open cuts, abraded or irritated skin should not be exposed to this material. The material may accentuate any pre-existing skin condition.

### INHALED

No inhalation hazards incidental to normal handling operations are anticipated from this product when used at room temperatures. Acute effects from inhalation of vapor/mist concentrations above recommended exposure levels produce dryness of the mouth and throat, may be irritating to the eyes, mucous membranes and the upper respiratory tract. Inhalation hazard is increased at higher temperatures. Toxic effects are increased by consumption of alcohol. Repeated exposure may cause sensitization and/or allergic reactions.

### HEALTH EFFECTS - CHRONIC EXPOSURE

Chronic (long term) health effects can occur at some time after exposure to this product and can last for months or years. Principal routes of exposure are usually by skin contact/absorption and inhalation of vapour. Prolonged or continuous skin contact with liquid may cause de-fatting with drying, cracking, irritation and dermatitis following. Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes

[PATTYS]

This chemical has not been adequately evaluated to determine whether brain or other nerve damage could occur with repeated exposure. However, many solvents and other petroleum-based chemicals have been shown to cause such damage. Effects may include reduced memory and concentration, personality changes (withdrawal, irritability), fatigue, sleep disturbances, reduced coordination, and/or effects on nerves supplying internal organs (autonomic nerves) and/or nerves to the arms and legs (weakness, "pins and needles").

### MIXED EXPOSURES

Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems. Because more than light alcohol consumption can cause liver damage, drinking alcohol can increase the liver damage caused by this product.



Date of Issue : 17/04/12

**MATERIAL SAFETY DATA SHEET**

Page 4 of 24

**UW2173 AQUAFLOX 2K WATERBORNE COATING - PART "A"** Ref msds 00267A

**3. COMPOSITION**

<u>CHEMICAL ENTITY</u>	<u>CAS No.</u>	<u>ANNEX I INDEX No.</u>	<u>EINECS No.</u>	<u>Proportion (% w/w)</u>
Ethylene Glycol Mono-Butyl Ether	111-76-2	603-014-00-0	203-905-0	< 10
Di-Propylene Glycol Butoxy Ether	29911-28-2	Not Available	249-951-5	< 10
Diethylene Glycol Mono-butyl Ether	112-34-5	603-096-00-8	Not Available	< 10
Miscellaneous Additives (Proprietary Blend)	Not Available	Not Available	Not Available	< 10
Synthetic Polymers (Proprietary Composition)	Not Available	Not Available	Not Available	10 - 30
Silicon dioxide, chemically prepared	112945-52-5 / 7631-86-9	Not Available	231-545-4	0 - < 10 (depending on gloss)
Miscellaneous Pigments (Proprietary Composition) Not considered to be dangerous	Not Available	Not Available	Not Available	0 - < 20 (depending on color)
Water	7732-18-5	Not Available	231-791-2	to 100
			<b>TOTAL</b>	<b>100</b>

All components are registered in accordance with Australian Inventory of Chemical Substances.

More detailed information available to medical staff in case of an emergency.

**4. FIRST AID MEASURES**

Poison Information Centres in each State capital city can provide additional assistance for scheduled poisons.

**SWALLOWED**

Thoroughly rinse mouth out with plenty of water and give water to drink to dilute the chemical.

Never give anything by mouth to an unconscious person.

If swallowed, do **NOT** induce vomiting due to the hazard of aspiration into the lungs which may cause mild to severe pulmonary injury and possibly death.

Should vomiting occur, place patient's head downwards, head lower than hips, to prevent vomit entering the lungs.

Call a doctor and/or transport to an emergency facility or hospital **IMMEDIATELY**.

**EYE**

Immediately and continuously irrigate with copious quantities of fresh, low pressure, running water for at least 15 minutes.

Eyelids should be held open.

Ensure irrigation under the eyelids by occasionally lifting upper and lower lids.

Remove any contaminated clothing and flush area with water until irritation subsides.

If easy to do so, remove contact lenses.

Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Seek **IMMEDIATE** medical attention.

**SKIN**

Immediately soak contaminated clothing, including footwear, with water and then remove.

Gently wash the affected areas thoroughly with water, then mild soap and water.

If exposure has been prolonged or severe or if swelling, redness or irritation occur seek medical advice.

Laundry contaminated clothing before re-use.

Thoroughly dry contaminated shoes before re-use.

Discard internally contaminated gloves and footwear.

**INHALED**

If fumes or combustion products are inhaled :-

Remove affected person(s) to fresh air, taking care not to become affected yourself.

Remove any contaminated clothing and loosen remaining clothing.

If breathing is normal, allow the patient to assume the most comfortable position and keep warm.

Keep at rest until fully recovered.

If breathing is difficult and/or patient is cyanotic (blue), ensure airways are clear and have a qualified person give oxygen through a face mask.

If breathing has stopped, commence Expired Air Resuscitation (E.A.R.).

In the event of cardiac arrest, commence Cardio-Pulmonary Resuscitation (C.P.R.).

For all but the most minor symptoms, seek **IMMEDIATE** medical attention or transport to hospital, or doctor, without delay.

**FIRST AID FACILITIES**

Facilities storing or utilizing this material should be equipped with an eyewash facility.

**ADVICE TO DOCTOR**

Treat symptomatically.

Principal routes of exposure are skin contact/absorption and inhalation of the vapor/spray mist.

Onset of symptoms may be delayed several hours after exposure.

Primary threat to life from ingestion and/or inhalation, is respiratory failure.

Extreme care must be taken to prevent aspiration. Material if aspirated into lungs may cause chemical pneumonitis.

Gastric lavage with a cuffed endotracheal tube to prevent further aspiration should be done.

In the absence of depression or convulsions, or impaired gag-reflex, ipecic emesis can also be done without increasing the hazard of aspiration.

When vomiting occurs, hold patient with head below the hips to prevent pulmonary aspiration.

**5. FIRE FIGHTING MEASURES****FOR LARGE SPILLS AND FIRES IMMEDIATELY CALL YOUR FIRE DEPARTMENT.****FIRE AND EXPLOSION HAZARD**

**NOT** considered to be a significant fire risk because of its high water content.

Non-combustible.

Dry polymer film can burn.

Containers may burn.

In the case of incomplete combustion may form toxic materials such as carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), oxides of silica, oxides of nitrogen, various hydrocarbons, chlorinated compounds, fluorinated compounds, fumes and smoke. Heating may cause expansion or decomposition leading to violent rupture of containers.

If safe to do so, remove containers from the path of the fire and keep cool with water spray.

Material can splatter above 100 °C.

Keep storage tanks, pipelines, fire exposed surfaces etc. cool with water spray.

If a leak or spill has not ignited, use water spray to disperse the vapours and to protect personnel attempting to stop leak.

Minimize breathing gases, vapour, fumes or decomposition products.

Firefighters should wear self-contained breathing apparatus with a full face piece and operated in positive pressure mode.

Water spray may be used to flush spills away from exposures.

Prevent run off from fire control or dilution from entering waterways, sewers or drinking water supply.

**FIRE FIGHTING MEDIA :**

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

Use extinguishing media appropriate for surrounding fire.

For small fires use water spray, water fog in large quantities, foam, dry agent (carbon dioxide, dry chemical powder).

For large fires either allow fire to burn under controlled conditions or extinguish with foam, carbon dioxide (CO<sub>2</sub>), or dry chemical.

Try to cover liquid spills with foam.

Water spray should be used to keep fire-exposed containers cool.

Avoid spraying water directly into storage containers due to danger of boilover.

If a leak or spill has not ignited, use water spray to disperse the vapours and to protect men attempting to stop leak.

Fire-men have to wear self-contained breathing apparatus.

**6. ACCIDENTAL RELEASE MEASURES****FOR LARGE SPILLS AND FIRES IMMEDIATELY CALL YOUR FIRE DEPARTMENT.**

There should a written emergency plan developed for each workplace or work operation.

Clean up spills immediately.

Keep chemicals out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build up of explosive concentrations.

Do not empty into drains.

Keep unauthorized persons away at a safe distance and move upwind until clean up is complete.

Shut off all possible sources of ignition ensure adequate ventilation / exhaust ventilation.

Stop liquid at the source if safe to do so.

Dry polymer film may burn if involved in a fire.

Containers may burn.

No smoking, naked lights or ignition sources.

Use only spark-free and/or explosion proof equipment.

Increase ventilation.

Ventilate confined spaces.

Open all windows and doors.

Water spray or fog may be used to disperse /absorb vapour.

Water spray may be used to flush spills away from exposures.

Avoid breathing vapours and contact with skin and eyes.

Control personal contact by using protective equipment.

If a leak or spill has not ignited, use water spray or fog to disperse the vapours and to protect men attempting to stop leak.

Advise authorities if product has entered or may enter sewers, watercourses or extensive land areas.

Take measures to minimize the effect on ground water.

**MINOR SPILLS**

Clean up spills immediately.

Small spills may be absorbed onto any absorbent material such as sand, soil or vermiculite or other absorbent material.

Collect residues and place in sealed, labelled, waste container for later disposal.

Ventilate area well to evaporate remaining liquid and to dispel vapor.

**MAJOR SPILLS**

Consider evacuation.

Warn occupants of down wind areas of possible fire hazard.

Alert Fire Brigade and tell them location and nature of hazard.

Avoid breathing vapors and contact with skin and eyes.

Wear breathing apparatus, protective gloves and full protective clothing.

Dyke the area by any means available to prevent spreading and to prevent it entering sewers, drains or natural waterways.

Advise authorities product has entered or may enter sewers, watercourses, low areas, or has contaminated soil or vegetation.

Pump the liquid to a salvage tank for recycling or later disposal.

Dilute contained spill with water.

Absorb remaining material with suitable absorbent (sand, soil, fire retardant treated sawdust, vermiculite, diatomaceous earth & etc.).

Collect solid residues and seal in labelled, waste containers for later disposal.

Ventilate area well to evaporate remaining liquid and to dispel vapor.

Clean area with detergent and water - do not allow product to enter drains, sewers or water courses - inform the local authorities or emergency services if this occurs.

Consult an expert on disposal of recovered material and ensure conformity to local disposal regulations.

Dispose of at an appropriate licensed waste disposal site or facility in accordance with current applicable laws and regulations and product characteristics at time of disposal.



## **7. HANDLING and STORAGE**

Observe manufacturer's storing and handling recommendations.

Prior to working with this product you should be trained on its proper handling and storage.

Store in original containers in an approved cool, dry, area out of direct sunlight.

Many plastics are unsuitable as storage and handling materials

Do NOT store in pits, depressions, basements or areas where vapours may be trapped.

Sources of ignition, such as smoking naked lights, heat, sparks and open flames, are prohibited where this product is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

Avoid exposure to temperatures above 50 °C or below 5 °C.

Keep from freezing; material may coagulate.

Monomer vapors can be evolved when material is heated during processing operations.

Use non-sparking tools and equipment.

Handle containers with care and protect against physical damage.

Open slowly in order to control possible pressure release.

Keep containers dry and tightly closed when not in use.

Check all containers are clearly labelled and check regularly for leaks.

Materials are stable on storage, but should be stored in a cool, dry, well ventilated place away from sources of ignition, oxidizing agents, mineral acids and alkalis since violent reactions may occur.

Ensure adequate ventilation (equivalent to outdoors), or exhaust ventilation in the working area to prevent build up of harmful fumes.

Exhaust ventilation necessary if product is sprayed.

Irritating to eyes, skin and mucous membranes.

Harmful in contact with or absorbed through the skin.

Avoid prolonged, repeated contact with eyes, skin contact and breathing vapours or mists.

Strong smelling.

Keep away from, food, drink, animal feeding stuffs clothing and odor sensitive materials.

Refer to AS 2865 - Safe working in a confined space, for more specific information on these subjects.

Do NOT pressurise, cut, heat, or weld containers. Empty product containers may contain product residue.

Do NOT reuse empty containers without commercial cleaning or reconditioning.

## **PROCESS HAZARD**

Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperatures and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without the presence of obvious ignition sources.

Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions.

Any use of this product in elevated temperature processes should be thoroughly evaluated to establish and maintain safe operating conditions.

Further information is available in a technical bulletin entitled "Ignition Hazards of Organic Chemical Vapors".





## 8. EXPOSURE CONTROLS

### ENGINEERING CONTROLS :

None required when handling small quantities.

### OTHERWISE :

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure.

The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release.

Isolating operations can also reduce exposure.

Respirators serve as supplemental protection to reduce employee exposures when engineering and work practice controls are not sufficient to achieve the necessary reduction to or below the TWAs.

This product is **NOT** considered to be a significant fire risk because of its high water content.

Use in a well ventilated area sufficient to maintain airborne concentration levels below exposure standard or general exhaust is adequate under normal operating conditions.

Where vapors or mists are generated, particularly in enclosed areas, and natural ventilation is inadequate, a flame proof local exhaust ventilation system ( > 20 m/min) is recommended.

In confined areas where there is inadequate ventilation, or if risk of overexposure exists, wear SAA (supplied air type) respirator meeting the requirements of AS1715 & AS1716.

The effectiveness of an air purifying respirator is limited.

Use it only for a single, short term exposure.

Correct fit is essential to ensure adequate protection.

Keep containers closed when not in use.

No smoking or open lights

Use away from all ignition sources.

Refer to AS 1940 - The storage and handling of flammable and combustible liquids and AS 2430 - Explosive gas atmospheres for further information concerning ventilation requirements.

**NOTE** : Vapor is heavier than air and may collect in hollows, pits storage tanks or sumps.

Do **NOT** enter confined spaces where vapor may have collected without using an approved, positive pressure, self-contained breathing apparatus (meeting the requirements of AS1715 and AS1716 ) and an observer present for assistance.

**LOCAL EXHAUST** : Face velocity > 20 m/min.

### FLAMMABILITY :

This product is **NOT** considered to be a significant fire risk because of its high water content.

Non-combustible.

Dry polymer film can burn.

Containers may burn.

Avoid direct sources of heat, naked lights, sparks, all ignition sources and oxidising materials.

Ensure ventilation is adequate to prevent build up of explosive atmosphere.

Refer to AS 2865 - Safe working in a confined space, for more specific information on these subjects.



## 8. EXPOSURE CONTROLS - continued

### EXPOSURE LIMITS

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

The following exposure limits are guides to be used in the control of occupational health hazards and are for air levels only. These TLV's should not be interpreted as the fine line between safe and dangerous conditions.

The listed exposure limits are for air levels only.

When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed below.

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

Contact with eyes and mucous membranes may also contribute to overall exposure and may also invalidate the exposure standard.

All contact with this chemical should be reduced to the lowest possible level.

All atmospheric contamination should be kept to as low a level as is practically possible.

Follow applicable regulations. (refer WORKSAFE Australia Exposure Standards)

No value has been assigned for this specific material by the ACGIH (Worksafe Australia).

Limits shown for guidance only. Follow applicable regulations (refer WORKSAFE Australia Exposure Standards).

Threshold Limit Value (TLV) as recommended by the National Occupational Health & Safety Commission (N.H.M.R.C.) (Worksafe Australia [1991]) for some of the components is :-

### **2-BUTOXYETHANOL (CAS No. 111-76-2)**

TLV-TWA	: 20 ppm (96.9 mg/m <sup>3</sup> ) (NOHSC)
STEL	: 50 ppm (242mg/m <sup>3</sup> ) (NOHSC)
Biological Limit Values	: No biological limit allocated

### **DIPROPYLENE GLYCOL n-BUTYL ETHER (CAS No. 29911-28-2)**

TWA	: 10 mg/m <sup>3</sup> (Aerosol)
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### **DIETHYLENE GLYCOL MONO-BUTYL ETHER (CAS No. 112-34-5)**

TLV	: Not established.
MAK	: 100 mg/m <sup>3</sup>

Peak limitation category: I(1); Pregnancy risk group: C; (DFG 2003).

### **FUMED SILICA (Amorphous - containing no asbestos and < 1% crystalline silica )**

TLV-TWA	(ACGIH)	: 6 mg/m <sup>3</sup> - Inhalable dust
TLV-TWA		: 2 mg/m <sup>3</sup> - Respirable dust
Carcinogenic Effects		: 3 (Not classifiable for human.) by IARC.

Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

### **ALL PIGMENTS**

TLV-TWA	: 10 mg/m <sup>3</sup> Total Dust, 8 hour
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Repeated or prolonged exposure is not known to aggravate medical conditions.

Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and air samples.

You have a legal right to obtain copies of sampling results from your employer.

If you think you are experiencing any work related health problems, see a doctor trained to recognize occupational diseases.

Take this MSDS with you.



## 8. EXPOSURE CONTROLS - continued

### EXPOSURE LIMITS - continued

**TLV-TWA** is the time weighted average concentration of the workplace atmosphere for a normal 8 hour work day and a 40 hour work week, to which nearly all workers may be repeatedly exposed day after day without adverse effect. These TLV's are issued as guidelines only and should not be interpreted as the fine line between safe and dangerous conditions. All atmospheric contamination should be kept to as low a level as is practically possible.

**STEL's** are expressed as airborne concentrations of substances, averaged over a period of 30 minutes.

This short term TWA concentration should not be exceeded at any time during a normal 8 hour working day.

Workers should not be exposed at the STEL concentration continuously for longer than 15 minutes, or for more than four such periods per working day.

A minimum of 250 minutes should be allowed between successive exposures at the STEL concentration.

**STEL** is the concentration to which workers can be exposed continuously for a short period of time without suffering from :

- irritation
- chronic or irreversible tissue damage, or
- narcosis of a sufficient degree to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency, and provided that the daily TLV-TWA is not exceeded.

**Sk NOTICE** - absorption through the skin, mucous membranes and eye may be a significant source of exposure.

The exposure standard is invalidated if such contact should occur.

Exposure limits with "skin" notation indicate that vapor and liquid may be absorbed through intact skin.

Absorption by skin may readily exceed vapor inhalation exposure.

Symptoms for skin absorption are the same as for inhalation.

Contact with eyes and mucous membranes may also contribute to overall exposure and may also invalidate the exposure standard.

**PEAK LIMITATION** - a ceiling concentration which should not be exceeded over a measurement period which should be as short as possible but not exceeding 15 minutes.

### ODOR THRESHOLD

When considering the odor threshold of a substance, one finds that reported values are widely divergent.

Two major factors which influence odor detection are differences between individuals in the ability to perceive a particular odor and the methodology employed in conducting the odor threshold determination.

In their "Guide to Industrial Respiratory Protection - Appendix C" , NIOSH states:

Amoore and Hautala (33) found that on average, 95% of a population will have a personal odor threshold that lies within the range from about one-sixteenth to sixteen times the reported mean "odor threshold" for a substance.

In further explanation, Amoore and Hautala state:

The ability of members of the population to detect a given odor is strongly influenced by the innate variability of different persons' olfactory powers, their prior experience with that odor, and by the degree of attention they accord the matter.



## 8. EXPOSURE CONTROLS - continued

### PERSONAL PROTECTION

#### WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT.

However, for some jobs personal protective equipment may be appropriate.

In case of hypersensitivity of the respiratory tract and skin (e.g. asthmatics and those who suffer from chronic bronchitis and chronic skin complaint) it is inadvisable to work with the product.

Avoid contact with the skin and eyes, and avoid breathing vapors or mists.

Use adequate general or local exhaust ventilation to meet TLV requirements.

All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Contact lenses should not be worn in areas where eye contact with this product can occur.

Observe good personal hygiene.

Eye wash fountains and safety showers should be available for emergency use.

Keep away from foodstuffs, drinks and tobacco.

Keep working clothes separate.

Take off **IMMEDIATELY** all contaminated clothing.

Launder contaminated clothing and other protective equipment before storing or re-using, and discard internally contaminated gloves and footwear.

**ALWAYS** wash hands carefully before breaks, eating, drinking, smoking, using the toilet and at end of work.

Do **NOT** eat, smoke, or drink where this product is handled, processed, or stored, since the chemical can be swallowed.

Personal protective equipment in should not be worn in lunch areas to prevent migration of this product to an area where other employees may be unknowingly exposed.

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

For further information consult your Occupational Health and Safety Adviser.

For detailed advice on Personal Protective Equipment, refer to the following Australian Standards :-

HB 9 (Handbook 9)	Manual of industrial personal protection.
AS 1377	Eye protectors for industrial applications.
AS 1715	Selection, use and maintenance of respiratory protective devices.
AS 1716	Respiratory protective devices.

When exposure is likely, personal protective equipment in combination appropriate to the degree and nature of exposure, should be selected from the following lists :-

### SKIN

Skin contact should be avoided by wearing chemically resistant work clothing, safety boots and chemical protective gloves if needed to avoid repeated or prolonged skin contact.

Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing for your operation.

All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Do **NOT** use solvent to clean the skin but use skin cleansing cream.

If contamination occurs, immediately remove all contaminated clothing, wash or shower to remove the chemical and change into clean clothing.

At the end of the workshift, wash any areas of the body that may have contacted this product, whether or not known skin contact has occurred.

Launder contaminated clothing and other protective equipment before storing or re-using, and discard internally contaminated gloves and footwear.

### INGESTION

Swallowing small amounts of this material during normal handling is not likely to cause harmful effects.

Swallowing large amounts may be harmful.

**8. EXPOSURE CONTROLS - continued****PERSONAL PROTECTION - continued****EYES**

Eyes should be protected by chemical splash goggles(AS1337 or approved equivalent), safety glasses fitted with side shields or full face shield.

Contact lenses should NOT be worn; soft lenses may absorb irritants and all lenses concentrate irritants.

If vapor causes eye irritation or if an inhalation risk exists a full-face, organic vapor respirator (meeting the requirements of AS1715 & AS1716) should be used.

Eye wash fountains (capable of maintaining an appropriate water pressure for an appropriate length of time to remove the product from the eyes) and safety showers should be available for emergency use.

Selection and use of personal protective equipment should be in accordance with the recommendations in one or more of the relevant Australian/New Zealand Standards, including:

AS/NZS 1336 : Recommended practices for eye protection in the industrial environment.

AS/NZS 1337 : Eye protectors for industrial applications.

**RESPIRATORY**

Avoid breathing vapors.

Enclose operations and use local exhaust ventilation to meet TLV requirements.

If local exhaust ventilation or enclosure is not used, respirators should be worn.

Use supplied-air respiratory protection in confined or enclosed spaces.

Respiratory protection required in insufficiently ventilated working areas and during spraying where airborne concentration exceeds TLV.

**IMPROPER USE OF RESPIRATORS IS DANGEROUS.**

An air-fed mask, or for short periods of work, a combination of charcoal filter and particulate filter is recommended.

If vapor causes eye irritation or if an inhalation risk exists an air supplied breathing apparatus (meeting the requirements of AS1715 and AS1716) should be used.

Correct respirator fit is essential to obtain adequate protection.

If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect this product, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately.

Check to make sure the respirator to face seal is still good. If it is, replace the filter, cartridge, or canister.

If the seal is no longer good, you may need a new respirator.

If the possibility of overexposure exists, use an approved self-contained breathing apparatus(meeting the requirements of AS1715 and AS1716) with a full facepiece operated in continuous flow or other positive pressure mode.

Where the concentration of vapor or mist is unknown or expected to approach or exceed the Worksafe Exposure Standards limit, the following additional equipment is recommended :-

- (1) Short elevated exposures, e.g. spillage - goggles and correct respiratory equipment should be worn.

N.B.

if the vapor/mist concentration exceeds the exposure limit by more than 10 times, air supplied apparatus should be used.

- (2) For prolonged elevated exposures - Full face air supplied or self contained breathing apparatus should be worn.



**9. PHYSICAL and CHEMICAL PROPERTIES**

APPEARANCE		: Low viscosity, clear - colored liquid.	
ODOR		: Slight, mild odor.	
pH VALUE		: Not corrosive	
VAPOR PRESSURE	(@ 20°C)	: 15.0 mm Hg	(Water)
RELATIVE VAPOR DENSITY		: > 1	(Air = 1)
BOILING POINT	(°C)	: 100	(Water)
FREEZING POINT	(°C)	: 0 °	(Water)
SOLUBILITY IN WATER	(% weight)	: Completely miscible	
SPECIFIC GRAVITY	(@ 25°C)	: 1.000 - 1.200 g/cm <sup>3</sup>	(Water =1) (Depending on color & gloss)
FLASH POINT	(°C)	: Not Applicable	
EXPLOSIVE LIMITS	(% Volume)	: LEL : 0.6 %	(Di-Propylene Glycol Butoxy Ether)
		: UEL : 20.6 %	(Di-Propylene Glycol Butoxy Ether)
AUTOIGNITION TEMPERATURE	(°C)	: 240 °C (literature)	(Ethylene Glycol Mono-Butyl Ether)
VOC CONTENT		: 35 - 50 gm / Litre	(Depending on color & gloss)
EVAPORATION RATE		: > 1.0	(Butyl Acetate =1)
% VOLATILES	(by volume)	: 65.0 - 70.0 %	(Depending on color & gloss)
Partition coefficient (n-octanol/water)		: 1.13 log POW (estimated)	(Di-Propylene Glycol Butoxy Ether)



## 10. STABILITY and REACTIVITY

### REACTIVITY / COMPATIBILITY

- Hazardous Polymerisation : Will not occur.
- Hazardous Reactions : None known
- Stability (Thermal, Light, etc.) : Stable
- Conditions to Avoid : This product is **NOT** considered to be a significant fire risk because of its high water content.
- Incompatibility (materials to avoid for purpose of transport, handling & storage only)  
: Avoid contact with strong alkalis, mineral acids, halogens, strong oxidizers (liquid chlorine, concentrated oxygen, sodium hypochlorite, peroxides, chlorates, perchlorates, nitrates, & permanganates), Copper and natural rubber.
- Hazardous decomposition products : No hazardous decomposition products when stored and handled correctly.  
Carbon monoxide, carbon dioxide, oxides of silica, oxides of nitrogen, chlorinated compounds, fluorinated compounds, various hydrocarbons, fumes and smoke in the case of incomplete combustion.  
Thermal decomposition is dependent on time and temperature.

All components are registered in accordance with Australian Inventory of Chemical Substances(ACIS).

**11. TOXICOLOGICAL INFORMATION****TOXICITY**

Evidence from animal tests is available to indicate that repeated or prolonged exposure to solvents could result in liver, kidney and central nervous disorders as well as anaemia and leukopenia (lowered white cell count).

Solvents, such as those contained in this product, irritate the skin and mucous membranes and are narcotic if inhaled in high concentrations.

Harmful if swallowed, may cause gastric irritation and narcosis.

Do NOT induce vomiting if swallowed

Prolonged, repeated skin contact with low viscosity materials may de-fat the skin resulting in possible irritation and dermatitis.

Limits shown for guidance only. Follow applicable regulations (refer WORKSAFE Australia Exposure Standards).

No LD<sub>50</sub> data available for this specific product. Data for principal ingredients only.

**ETHYLENE GLYCOL MONO-BUTYL ETHER (CAS No. 111-76-2)**

Acute Oral	LD <sub>50</sub>	(rat)	:	1,480	mg/kg
Acute Oral	LD <sub>50</sub>	(guinea pig)	:	950 - 1,414	mg/kg
Acute Dermal	LD <sub>50</sub>	(rabbit)	:	100 - 610	mg/kg
Acute Dermal	LD <sub>50</sub>	(guinea pig)	:	1,200 - 2,000	mg/kg
Acute Inhalation	LC <sub>50</sub>	(rat)	:	450 - 490	ppm / 4hour
Primary irritant effect			:	on the skin	: Irritant to skin and mucous membranes.
			:	on the eye	: Irritating effect.
Sensitization			:	: No sensitizing effects known.	

**DI-PROPYLENE GLYCOL BUTOXY ETHER (CAS No. 29911-28-2)**

Acute Oral	LD <sub>50</sub>	(rat, female)	:	3,700	mg/kg
Acute Oral	LD <sub>50</sub>	(rat, male)	:	4,400	mg/kg
Acute Dermal	LD <sub>50</sub>	(rabbit, female)	:	5,330	mg/kg
Acute Dermal	LD <sub>50</sub>	(rabbit, male)	:	6,490	mg/kg
Acute Inhalation	LC <sub>50</sub>	(rat)	:	> 2.04	mg/L / 4hour
Skin			:	: Prolonged contact is unlikely to result in absorption of harmful amounts.	
Short term exposure			:	: Available data indicates that this product is not harmful. It should present no hazards in normal use. However product may be mildly irritating, but is unlikely to cause anything more than mild discomfort which should disappear once contact ceases.	
Skin Sensitisation			:	: Did not cause allergic skin reactions when tested in humans. Did not cause allergic skin reactions when tested in guinea pigs.	

Low toxicity if swallowed.

Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

**CHRONIC EFFECTS**

Repeated dose toxicity	:	: In animals, effects have been reported on the following organs: liver, respiratory tract, kidney effects have been observed in male rats. These effects are believed to be species specific and unlikely to occur in humans.			
Reproductive Toxicity	:	: In animal studies did not interfere with reproduction. Did not cause birth defects or any other foetal effects in laboratory animals.			
Mutagenicity	:	: In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.			
Carcinogenicity	:	: Carcinogen Status: ASCC : No significant ingredient is classified as carcinogenic by ASCC. NTP : No significant ingredient is classified as carcinogenic by NTP. IARC : No significant ingredient is classified as carcinogenic by IARC.			

**DIETHYLENE GLYCOL MONO-BUTYL ETHER (CAS No. 112-34-5)**

Acute Oral	LD <sub>50</sub>	(rat)	:	5,660	mg/kg
Acute Dermal	LD <sub>50</sub>	(rabbit)	:	2,700	mg/kg
Irritation	(eye)	(rabbit)	:	Standard Draize	: 20 mg - severe
Carcinogenicity			:	: NTP Carcinogen Status: Known : No / Anticipated: No / IARC Category : None	





**11. TOXICOLOGICAL INFORMATION - continued**

**TOXICITY - continued**

**FUMED SILICA** (Amorphous - containing no asbestos and < 1% crystalline silica )

Acute Oral	LD <sub>50</sub>	(rat)	: > 10,000	mg/kg	
Acute Inhalation	LC <sub>50</sub>	(rat)	: 0.139	mg/L / 4 hours	(maximum concentration attainable in experiments)
Acute Dermal	LD <sub>50</sub>	(rabbit)	: > 5,000	mg/kg	- No deaths occurred.
Skin Irritation		(rabbit)	: Not irritating		
Eye Irritation		(rabbit)	: Not irritating		
Repeated dose toxicity		Oral	: No negative effects		
Repeated dose toxicity		Inhalative:	No irreversible changes and no indication of silicosis.		
Gentoxicity		(in vitro):	No evidence of mutagenic effects, literature		
Carcinogenicity			: 3 (Not classifiable for human) by IARC		
Toxicity to reproduction			: No negative effects		
Human experience			: Silicosis or other product specific illnesses of the respiratory tract were not observed in association with the product. Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation. No chronic (long term) effects are known for humans.		

**TITANIUM DIOXIDE**

Oral	LD <sub>50</sub>	(rat)	: > 10,000	mg/kg	
Dermal	LD <sub>50</sub>	(rabbit)	: > 10,000	mg/kg	
Inhalation	LC <sub>50</sub>	(rat)	: > 6.8	mg/L / 4 hours	- Low toxicity

**SPECIAL PROPERTIES / EFFECTS**

Effects of this product on human health and the environment depend on how much of the product is present and the length and frequency of exposure.

Effects also depend on the health of a person or the condition of the environment when exposure occurs.

Over-exposure, especially during spraying operations without the necessary precautions entails the risk of concentration-dependent irritating effects on eyes, nose, throat, and respiratory tract and can adversely affect the nervous system.

Effects range from headaches, dizziness, nausea, and numbness in fingers and toes to unconsciousness and death.

Delayed appearance of the complaints and development of hyper-sensitivity (difficult breathing, coughing, asthma) are possible.

Direct, prolonged contact with liquid product irritates the skin.

The liquid also irritates the eyes.

Human health effects associated with breathing or otherwise consuming smaller amounts of the product over long periods of time are not known.

This chemical has not been adequately evaluated to determine whether brain or other nerve damage could occur with repeated exposure.

However, many solvents and other petroleum-based chemicals have been shown to cause such damage.

Effects may include reduced memory and concentration, personality changes (withdrawal, irritability), fatigue, sleep disturbances, reduced coordination, and/or effects on nerves supplying internal organs (autonomic nerves) and/or nerves to the arms and legs (weakness, "pins and needles").

**12. ECOLOGICAL INFORMATION****ECOLOGICAL INFORMATION**

The product is a liquid at room temperature. Do not allow to escape into waters, waste water or soil.

This product may enter the environment from industrial discharges, municipal waste treatment plant discharges, or spills.

It is a liquid at room temperature.

No environmental impact data available for this specific product. However for some of the components :

**ETHYLENE GLYCOL MONO-BUTYL ETHER (CAS No. 111-76-2)****ECOTOXICITY**

Mobility : Miscible with water

Persistence/degradability : Biodegradable, has negligible potential to bioaccumulate.

**DI-PROPYLENE GLYCOL BUTOXY ETHER (CAS No. 29911-28-2)**

This product is biodegradable. It will not accumulate in the soil or water or cause long term problems.

Bioconcentration potential is low due to low Pow and potential for soil mobility is very high (Koc between 0 and 50)

Persistence / Degradability : 91% after 28 days (OECD 301E), 96% after 28 days (OECD 302B)

Acute Toxicity Fish LC<sub>50</sub> guppy (Poecilia reticulata) : 841 mg/L

Daphnia LC<sub>50</sub> water flea Daphnia magna : >1,000 mg/l

Other Information : Material is practically non-toxic to aquatic organisms on an acute Basis (LC<sub>50</sub>/EC<sub>50</sub>/EL<sub>50</sub>/LL<sub>50</sub>>100 mg/l in the most sensitive species tested).

Henry's Law Constant (H) : 3.78E-7 atm\*m<sup>3</sup>/mole; 25 °C Estimated

Partition coefficient, n-octanol/water (log Pow) : 1.13 Estimated

Partition coefficient, soil organic carbon/water (Koc) : 10 - 21 Estimated

**ECOTOXICITY**

Material is not classified as dangerous to aquatic organisms (LC<sub>50</sub>/EC<sub>50</sub>/IC<sub>50</sub> greater than 100 mg/L in most sensitive species).

Acute Toxicity Fish LC<sub>50</sub> guppy (Poecilia reticulata) : 841 mg/L / 96 hour

Daphnia LC<sub>50</sub> water flea Daphnia magna : >1,000 mg/l

**DIETHYLENE GLYCOL MONO-BUTYL ETHER (CAS No. 112-34-5)**

Mobility : Miscible with water

Persistence/degradability : Biodegradable

Acute Toxicity Fish LC<sub>50</sub> : > 100 mg/L / 96 hour

This material is not expected to be toxic to aquatic life.

**ENVIRONMENTAL FATE:**

When released into the soil, this material is not expected to evaporate significantly.

When released into the soil, this material may leach into groundwater.

When released into the soil, this material may biodegrade to a moderate extent.

When released into water, this material is not expected to evaporate significantly.

When released into water, this material may biodegrade to a moderate extent.

This material has a log octanol-water partition coefficient of less than 3.0.

This material is not expected to significantly bioaccumulate.

When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals.

When released into the air, this material is expected to have a half-life of less than 1 day.



## 12. ECOLOGICAL INFORMATION - continued

### FUMED SILICA (Amorphous - containing no asbestos and < 1% crystalline silica )

#### ACUTE TOXICITY

LC <sub>50</sub>	: > 10,000 mg / L / 96 hours	(Brachydanio rerio)
EC <sub>50</sub>	: > 10,000 mg / L / 24 hours	(Daphnia magna)

Bioaccumulation	: According to experience not expected.
Mobility	: Not expected to migrate.
Persistence & Degradability	: The methods for determining biodegradability are not applicable to inorganic substances.
Solubility	: Insoluble in water.
Products of Biodegradation	: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

No expected damaging effects to aquatic organisms.

Effects in sewage treatment plants (bacteria toxicity : respiration-/reproduction inhibition):

According to current knowledge adverse effects on water purification plants are not expected.

Can be removed mechanically from waste water.

### ECOTOXICITY

Do not allow to escape into waters, waste water or soil.

This chemical is a liquid with a slightly alcoholic odor.

It may enter the environment from industrial or municipal waste treatment plant discharges or spills.

### ACUTE (SHORT-TERM) ECOLOGICAL EFFECTS

Acute toxic effects may include the death of animals, birds, or fish, and death or low growth rate in plants.

Acute effects are seen two to four days after animals or plants come in contact with a toxic chemical substance.

This product is expected to have slight acute toxicity to aquatic life.

No data are available on the short-term effects of this product on plants, birds, or land animals.

### CHRONIC (LONG-TERM) ECOLOGICAL EFFECTS

Chronic toxic effects may include shortened lifespan, reproductive problems, lower fertility, and changes in appearance or behaviour.

Chronic effects can be seen long after first exposure(s) to a toxic chemical.

This product is expected to have a slight chronic toxicity to aquatic life.

No data are available on the long-term effects of this product on plants, birds, or land animals.

### ABIOTIC EFFECTS

No information on abiotic effects of this product.

### BIOACCUMULATION IN AQUATIC ORGANISMS

Some substances increase in concentration, or bio-accumulate, in living organisms as they breathe contaminated air, drink contaminated water, or eat contaminated food.

These chemicals can become concentrated in the tissues and internal organs of animals and humans.

The concentration of this product found in fish tissues is expected to be slightly higher than the average concentration than the water from which the fish was taken.



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Date of Issue : 17/04/12

**MATERIAL SAFETY DATA SHEET**

Page 20 of 24

**UW2173 AQUAFLOX 2K WATERBORNE COATING - PART "A"** Ref msds 00267A

**13. DISPOSAL CONSIDERATIONS**

Recycle product where possible.

Recycle containers where possible, or dispose of in an authorised landfill.

Contact your state Environmental Program for specific recommendations.

Refer to State Land Waste Management Authority. Advise of chemical nature.

Consult an expert on disposal of any recovered material and ensure conformity to local disposal regulations.

This product is NOT suitable for disposal by either landfill or via municipal sewers, drains, and natural streams or rivers.

Do NOT reuse empty containers without commercial cleaning or reconditioning.

Do NOT pressurise, cut, heat, or weld containers.

Empty product containers may contain product residue.



#### 14. TRANSPORT INFORMATION

Not classified as Dangerous Goods for the purpose of transport according to the Australian Dangerous Goods (ADG) Code. Refer to relevant regulations for storage and transport requirements.

CORRECT SHIPPING NAME	: None Allocated	OTHER NAMES	: Not Applicable
UN NUMBER	: None Allocated	CAS NUMBER	: None Allocated
AICS STATUS	: All components listed		
DANGEROUS GOODS CLASS	: None Allocated	IMO HAZARD CLASS	: None Allocated
PACKAGING GROUP	: None Allocated	AS 1940 CLASS	: None Allocated
SUBSIDIARY RISK	: Not Applicable	HAZCHEM CODE	: None Allocated
POISONS SCHEDULE	: None Allocated	EPG	: None Allocated
STORAGE TEMPERATURE (°C)	: Ambient	TRANSPORT TEMPERATURE (°C)	: Ambient
LOADING / UNLOADING TEMPERATURE (°C)	: Ambient		
STORAGE / TRANSPORTATION PRESSURE (kPa)	: Atmospheric		
ELECTROSTATIC ACCUMULATION HAZARD ?	: Use proper grounding procedure.		
USUAL SHIPPING CONTAINERS	: Closed / open head drums, pails.		
MATERIALS AND COATINGS SUITABLE	: Polyethylene / Polypropylene / Lined Steel / Stainless Steel		

Refer to Australian Code for the Transport of Dangerous Goods By Road and Rail (7<sup>th</sup> Edition) for transport regulations and state Dangerous Goods regulations for storage requirements.

**15. REGULATORY INFORMATION****Classified as hazardous according to criteria of Safe Work Australia**

Not a Dangerous Good according to the criteria of Australian Dangerous Goods (ADG) Code.

**CLASSIFICATION AND LABELLING ACCORDING TO NOHSC CODES****CLASSIFICATION / SYMBOL** : Not applicable**CLASSIFICATION / SYMBOL** : HARMFUL / Xn - IRRITANT / Xi**GOVERNING DIRECTIVE** : National Code of practice for the Labelling of Hazardous Substances.**HAZARDS IDENTIFICATION**

R20/21/22	Harmful in contact with skin, by inhalation and if swallowed
R36/38	Irritating to eyes and skin
R37	Irritating to respiratory system
R43	May cause sensitization by skin contact
R66	Repeated exposure may cause skin dryness or cracking

**SAFETY ADVICE**

S02	Keep out of the reach of children
S09	Keep container in a well ventilated place
S20/21	Do not eat, drink or smoke when using
S23	Do not breathe gas/fumes/vapour/spray
S24/25	Avoid contact with skin and eyes
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S28	Wash off immediately with soap and plenty of water
S36/37	Wear suitable protective clothing and gloves
S51	Use only in well ventilated areas.

**16. OTHER INFORMATION****LD<sub>50</sub>** (Lethal Dose, 50 %)

LD<sub>50</sub> is the amount of a material, given all at once, which causes the death of 50 % (one half) of a group of test animals.

The LD<sub>50</sub> is one way to measure the short-term poisoning potential (acute toxicity) of a material.

The LD<sub>50</sub> can be found for any route of entry or administration but dermal (applied to the skin) and oral (given by mouth) administration methods are the most common.

**LC<sub>50</sub>** (Lethal Concentration, 50 %)

LC values usually refer to the concentration of a chemical in air but in environmental studies it can also mean the concentration of a chemical in water.

For inhalation experiments, the concentration of the chemical in air that kills 50 % of the test animals in a given time (usually four hours) is the LC<sub>50</sub> value.

**EC<sub>50</sub>** (half maximal effective concentration)

refers to the concentration of a drug, antibody or toxicant which induces a response halfway between the baseline and maximum after some specified exposure time. It is commonly used as a measure of drug's potency.

**IC<sub>50</sub>** (half maximal inhibitory concentration)

is a measure of the effectiveness of a compound in inhibiting biological or biochemical function.

This quantitative measure indicates how much of a particular drug or other substance (inhibitor) is needed to inhibit a given biological process (or component of a process, i.e. an enzyme, cell, cell receptor or micro-organism) by half.

**TL<sub>M</sub>** (Median Tolerance Limit)

the concentration of toxicant or substance at which 50% of the test organisms survive over the test period.

**log Pow / log P(o/w)**

in chemistry and the pharmaceutical sciences, a partition- (P) or distribution coefficient (D) is the ratio of concentrations of a compound in the two phases of a mixture of two immiscible solvents at equilibrium. Hence these coefficients are a measure of differential solubility of the compound between these two solvents. The phrase "Partition Coefficient" is now considered obsolete by IUPAC, and the appropriate alternative ("partition constant", "partition ratio" or "distribution ratio") should be used as appropriate. Normally one of the solvents chosen is water while the second is hydrophobic such as octanol. Hence both the partition and distribution coefficient are measures of how hydrophilic ("water loving") or hydrophobic ("water fearing") a chemical substance is. A partition coefficient can also be used when one or both solvents is a solid though.

**THEORETICAL OXYGEN DEMAND (ThOD)**

is the calculated amount of oxygen required to oxidize a compound to its final oxidation products.

or

the amount of oxygen that theoretically can be consumed if the test substance is completely oxidized by micro-organisms.

Calculated from the test substance's chemical structure; units mg O<sub>2</sub> per mg of test substance.

**CHEMICAL OXYGEN DEMAND (COD)** test is commonly used to indirectly measure the amount of organic compounds in water. Most applications of COD determine the amount of organic pollutants found in surface water (e.g. lakes and rivers), making COD a useful measure of water quality.

It is expressed in milligrams per litre (mg/L), which indicates the mass of oxygen consumed per litre of solution.

Older references may express the units as parts per million (ppm).

**BIOCHEMICAL OXYGEN DEMAND (BOD)** is a chemical procedure for determining the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period.

It is not a precise quantitative test, although it is widely used as an indication of the organic quality of water.

It is most commonly expressed in milligrams of oxygen consumed per litre of sample during 5 days of incubation at 20 °C and is often used as a robust surrogate of the degree of organic pollution of water.

BOD can be used as a gauge of the effectiveness of wastewater treatment plants.

**HAZCHEM CODE EMERGENCY** action code of numbers and letters that provide information to emergency services, especially firefighters

**IARC** : International Agency for Research on Cancer

**NTP** : National Toxicology Program (USA)

**SUSDP** : Standard for the Uniform Scheduling of Drugs & Poisons

**UN NUMBER** : United Nations Number



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Date of Issue : 17/04/12

**MATERIAL SAFETY DATA SHEET**

Page 24 of 24

**UW2173 AQUAFLOX 2K WATERBORNE COATING - PART "A"** Ref msds 00267A

**16. OTHER INFORMATION - continued**

**DATE OF PREPARATION / LAST REVISION** : 17/04/12

**PRINCIPAL REFERENCES**

Supplier's Material Safety Data Sheets

In "Registry of Toxic Effects of Chemical Substances 1995" (Ed. D. Sweet),  
(US Dept. of Health & Human Services: Cincinnati 1995)

**END OF MSDS**