

MDF BONDER ADHESIVE

Hazard Alert Code:
MODERATE

Chemwatch Material Safety Data Sheet

Revision No: 2.0

Chemwatch 21-9640

Issue Date: 23-Nov-2009

CD 2009/3

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

MDF Bonder Adhesive

SYNONYMS

Cyanoacrylate

PRODUCT USE

- Used according to manufacturer's directions. Instant glue for mitred joints.

SUPPLIER

Company: GSB Chemical Co. Pty Ltd

Address:

84 Camp Road

Broadmeadows

VIC, 3047






AUS

Telephone: +61 3 9457 1125

Fax: +61 3 9459 7978

Email: info@gsbchem.com.au

HAZARD RATINGS

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

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



Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

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

COMBUSTIBLE LIQUID, regulated under AS1940 for Bulk Storage purposes only.

POISONS SCHEDULE

S5

RISK

- Irritating to eyes respiratory system and skin.
- May cause SENSITISATION by inhalation and skin contact.
- Harmful to aquatic organisms.
- Cumulative effects may result following exposure*.
- Limited evidence of a carcinogenic effect*.

* (limited evidence).

SAFETY

- Do not breathe gas/ fumes/ vapour/ spray.
- Avoid contact with eyes.
- Wear suitable protective clothing.
- To clean the floor and all objects contaminated by this material use water and detergent.
- Keep away from food drink and animal feeding stuffs.
- In case of contact with eyes rinse with plenty of water and contact Doctor or Poisons Information Centre.
- If swallowed IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
ethyl cyanoacrylate	7085-85-0	85-90
methyl methacrylate homopolymer	9011-14-7	10-15
hydroquinone	123-31-9	0.1-0.5

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Section 4 - FIRST AID MEASURES

SWALLOWED

-
- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.
- For material bonded in the mouth seek medical/dental attention.
- If lips are accidentally stuck together apply lots of warm water and encourage maximum wetting and pressure from saliva inside the mouth.
- Peel or roll lips apart.
- Do NOT attempt to pull the lips with direct opposing action.
- It is almost impossible to swallow cyanoacrylates. The adhesive solidifies and adheres in the mouth. Saliva will lip the adhesion in one or two days.

EYE

- Eyelid Adhesion
- Wash thoroughly with water and apply moist pad; maintain in position.
- DO NOT force separation.
- Transport to hospital, or doctor without delay.
- Minor eye contamination should be treated by copious washing with water or 1% sodium carbonate solution.
- The eye will generally open without further action, typically in one to two days. there should be no residual damage.
- Adhesive introduced
- Removal of contact lenses after eye injury should only be undertaken by skilled personnel.

Adhesive in the Eye:

- Adhesive will attach itself to eye proteins and will disassociate from these over intermittent periods, usually within several hours.
- This will result in weeping until clearance of the protein complex.
- It is important to understand that disassociation will normally occur within a matter of hours even with gross contamination.

SKIN

■ Cyanoacrylate adhesives is a very fast setting and strong. they bond human tissues including skin in seconds. Experience shows that accidents involving cyanoacrylates are best handled by passive, non-surgical first aid. Skin Contact:

- Remove excessive adhesive.
- Soak in warm water - the adhesive should loosen from the skin in several hours. Dried adhesive does not present a health hazard.
- Contact with clothes, fabric, rags or tissues may generate heat, and strong irritating odours; skin burns may also ensue.

Skin Adhesion:

- IMMEDIATELY immerse affected areas in warm soapy water.
- DO NOT force bonded surfaces apart.
- Use a gentle rolling action to peel surfaces apart if possible. It may be necessary to use a blunt edge such as a spatula or spoon handle. Do NOT attempt to pull the surfaces apart with a direct opposing action.
- Remove any cured material with warm, soapy water.
- Seek medical attention without delay.
- A solvent such as acetone may be used (with care!) to separate bonded skin surfaces. NEVER use solvent near eyes, mouth, cuts, or abrasions.

INHALED

-
- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.
- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

■ It should never be necessary to use surgical means to separate tissues which become accidentally bonded. The action of physiological fluids or warm soapy water will cause this adhesive to eventually fail.
Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

-
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

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FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.

FIRE/EXPLOSION HAZARD

- Combustible.
- Slight fire hazard when exposed to heat or flame.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).
- May emit acrid smoke.
- Mists containing combustible materials may be explosive.

Combustion products include: carbon dioxide (CO₂), aldehydes, nitrogen oxides (NO_x), other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

May emit corrosive fumes.

FIRE INCOMPATIBILITY

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

HAZCHEM

None

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

- Remove all ignition sources.
- 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

- Moderate hazard.
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- 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

- DO NOT allow clothing wet with material to stay in contact with skin
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.

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- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- Avoid smoking, naked lights or ignition sources.
- 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.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

SUITABLE CONTAINER

-
- Metal can or drum
- Packaging as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

STORAGE INCOMPATIBILITY

- For cyanoacrylates:
 - Avoid contact with acids, bases, amines.
 - Avoid contact with clothes, fabric, rags (especially cotton and wool) rubber or paper; contact may cause polymerisation.
 - Cyanoacrylate adhesives undergo anionic polymerization in the presence of a weak base, such as water, and are stabilized through the addition of a weak acid. The stabiliser is usually in the form of a weak acidic gas such as SO₂, NO, or BF₃. An essential function of the stabiliser is to prevent polymerisation in the container, which is usually made of polyethylene. If too little stabiliser is added, the product will be prone to premature polymerization and if too much is added it will be less active and function less effectively as an adhesive.
 - When the adhesive contacts a slightly alkaline surface, trace amounts of adsorbed water or hydroxide ions (OH⁻) that are present on the substrate's surface neutralise the acidic stabilizer in the adhesive, resulting in rapid polymerisation.
 - Unmodified cyanoacrylate adhesives do not polymerise readily on acidic surfaces such as wood or dichromated metals.
 - Cyanoacrylate adhesives (or super-glues) do not wet or adhere well to polyolefins. The surface tension of the adhesive is much higher than that of the substrate. However, polyolefins can be primed for adhesion with cyanoacrylates by certain chemical compounds normally considered to be activators for cyanoacrylate polymerisation.
 - Free radical stabilisers such as hydroquinone are added to improve storage stability
 - Segregate from alcohol, water.
 - Avoid reaction with oxidising agents

STORAGE REQUIREMENTS

-
- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

*X: Must not be stored together**O: May be stored together with specific preventions**+: May be stored together*

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes
Australia Exposure Standards	hydroquinone (Hydroquinone)		2						
The following materials had no OELs on our records									
	• ethyl cyanoacrylate:		CAS:7085-85-0						

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- methyl methacrylate homopolymer: CAS:9011-14-7

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
hydroquinone	50	

MATERIAL DATA**MDF BONDER ADHESIVE:**

■ The recommended TLV-TWA for hydroquinone takes into account the toxicology of hydroquinone and experience of industrial exposures to benzenediols. Exposure at or below the limit is thought to minimise the risk to workers of eye injury, dermatitis and central nervous system effects. A short-term duration exposure value has not been recommended, because no quantitative data as to the levels of hydroquinone which produce eye irritation or more serious corneal changes has been identified.

ETHYL CYANOACRYLATE:

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

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

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

Odour Threshold: 1-3 ppm

METHYL METHACRYLATE HOMOPOLYMER:

■ 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.

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HYDROQUINONE:

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PERSONAL PROTECTION**EYE**

-
- Safety glasses with side shields.

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- Chemical goggles.
- 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

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

NOTE:

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

Suitability and durability of glove type is dependent on usage. Factors such as:

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

are important in the selection of gloves.

- Polyethylene gloves

OTHER

-
- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

RESPIRATOR

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

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	A-AUS 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

- Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations.

Provide adequate ventilation in warehouse or closed storage area. 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

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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

Clear liquid with a sharp irritating odour; not miscible with water.

PHYSICAL PROPERTIES

Liquid.

Does not mix with water.

Sinks in water.

Molecular Weight: Not Available	Boiling Range (°C): >100	Melting Range (°C): Not Available
Specific Gravity (water=1): 1.1	Solubility in water (g/L): Immiscible	pH (as supplied): Not Available
pH (1% solution): Not Available	Vapour Pressure (kPa): Negligible	Volatile Component (%vol): Not Available
Evaporation Rate: Not Available	Relative Vapour Density (air=1): Not Available	Flash Point (°C): >81
Lower Explosive Limit (%): Not Applicable	Upper Explosive Limit (%): Not Applicable	Autoignition Temp (°C): Not Applicable
Decomposition Temp (°C): Not Available	State: Liquid	Viscosity: Not Available

Material	Value
log Kow	0.50-0.61

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

-
- Presence of incompatible materials.
- Product is considered stable.
- 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

■ Although ingestion is not thought to produce harmful effects (as classified under EC Directives), the material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.

Uncured cyanoacrylates are difficult to swallow as saliva cures the surface of the adhesive with negligible bonding. The cured material is considered to be non-hazardous.

EYE

■ This material can cause eye irritation and damage in some persons.

Exposure to cyanoacrylate vapours can cause discomfort and tears, nasal discharge, and blurred vision. The eyelids may be glued shut. Double vision and corneal scratching may occur.

SKIN

■ This material can cause inflammation of the skin oncontact in some persons.

The material may accentuate any pre-existing dermatitis condition.

Small n-alkyl cyanoacrylates cause burns and irritation on skin contact. Exposure to their vapours can cause irritation, but usually only in dry conditions.

Open cuts, abraded or irritated skin should not be exposed to this material.

Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

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■ The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

In low humidity, cyanoacrylate vapours are irritating to the respiratory system and eyes. High concentrations may cause inflammation of the lungs and other complications. They are much less dangerous in high humidity.

CHRONIC HEALTH EFFECTS

■ Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.

Inhaling this product is more likely to cause a sensitisation reaction in some persons compared to the general population.

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

Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

Dermatitis may result from prolonged exposures. On repeated and prolonged exposure by skin contact or inhalation, a small proportion of individuals develop allergic sensitivities.

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

Chronic exposure to cyanides and certain nitriles may result in interference to iodine uptake by thyroid gland and its consequent enlargement. This occurs following metabolic conversion of the cyanide moiety to thiocyanate. Thyroid insufficiency may also occur as a result of metabolic conversion of cyanides to the corresponding thiocyanate. Exposure to small amounts of cyanide compounds over long periods are reported to cause loss of appetite, headache, weakness, nausea, dizziness, abdominal pain, changes in taste and smell, muscle cramps, weight loss, flushing of the face, persistent runny nose and irritation of the upper respiratory tract and eyes. These symptoms are not specific to cyanide exposure and therefore the existence of a chronic cyanide toxicity remains speculative. Repeated minor contact with cyanides produce a characteristic rash with itching, papules (small, superficial raised spots on the skin) and possible sensitisation. Concerns have been expressed that low-level, long term exposures may result in damage to the nerves of the eye.

TOXICITY AND IRRITATION

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

TOXICITY

IRRITATION

Oral (Rat) LD50: >5000 mg/kg

Dermal (None) LD50: >2000 mg/kg

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

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergic 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-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.

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.

For methyl cyanoacrylate (MCA) and ethyl cyanoacrylate (ECA)

From the data available, the key toxicological features of MCA and ECA seem to be as a result of local activity at the site of contact. Human data indicate that liquid MCA and ECA are not skin irritants as a result of single exposure. However, there are indications from human studies that repeated exposure can result in skin irritant effects. Eye irritancy has been observed in humans exposed to liquid cyanoacrylate adhesives.

No conclusions can be drawn with respect to the skin sensitisation potential of MCA; the only study available did not provide any meaningful information. For ECA, there are a number of reports, but in only two individuals are the data consistent with a skin sensitisation response. It should be borne in mind that there are likely to be considerable difficulties in performing tests on a substance that polymerises rapidly on the skin; although speculative, it seems plausible that the removal of hardened adhesive could contribute to some of the skin reactions observed.

The main health effects that have been observed to date in relation to occupational exposure to MCA and ECA are eye and respiratory tract irritation. A number of studies, both case reports and workplace surveys, have been reported in which occurrences of asthma have also been linked to exposure to ECA and/or MCA. The available information does not allow conclusions to be drawn regarding whether asthma was induced by an allergenic or an irritation mechanism. In many of the bronchial challenge tests, it seems that the challenge concentrations involved were directly irritant.

In a human experimental study using MCA vapour, no sensory irritant effects were reported at 1 ppm (4.5 mg/m³) (a human no-observed-adverse-effect level [NOAEL]); throat and nose "irritation" were subjectively reported from 2 to 20 ppm (9.1 to 91 mg/m³) or more. Eye irritation and "burning" were reported from 4 to 15 ppm (18 to 68 mg/m³) or more. At concentrations above 20 ppm (91 mg/m³), lacrimation and rhinorrhoea were reported (except in one individual for whom rhinorrhoea was reported at around 7 ppm [32 mg/m³]), and these were more pronounced at 50-60 ppm (227-272 mg/m³) (a level at which burning pain in the eyes was also reported). In the absence of similar quantitative data for ECA, it would seem reasonable to assume that a similar dose-

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response relationship exists for ECA as for MCA, given their close structural similarities, similar physicochemical properties, and, for most end-points, similar toxicological profiles.

Genotoxicity: There is no evidence of mutagenic response in several test assays.

ETHYL CYANOACRYLATE:

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

TOXICITY

Oral (rat) LD50: 5000 mg/kg

Oral (rat) LD50: 0.18 ml/kg *

Dermal (rabbit) LD50: 2000 mg/kg

Dermal (Rabbit) LD50: 0.22 ml/kg *

IRRITATION

Nil Reported

[Manufacturer]

■ 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-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.

For methyl cyanoacrylate (MCA) and ethyl cyanoacrylate (ECA)

From the data available, the key toxicological features of MCA and ECA seem to be as a result of local activity at the site of contact. Human data indicate that liquid MCA and ECA are not skin irritants as a result of single exposure. However, there are indications from human studies that repeated exposure can result in skin irritant effects. Eye irritancy has been observed in humans exposed to liquid cyanoacrylate adhesives.

No conclusions can be drawn with respect to the skin sensitisation potential of MCA; the only study available did not provide any meaningful information. For ECA, there are a number of reports, but in only two individuals are the data consistent with a skin sensitisation response. It should be borne in mind that there are likely to be considerable difficulties in performing tests on a substance that polymerises rapidly on the skin; although speculative, it seems plausible that the removal of hardened adhesive could contribute to some of the skin reactions observed.

The main health effects that have been observed to date in relation to occupational exposure to MCA and ECA are eye and respiratory tract irritation. A number of studies, both case reports and workplace surveys, have been reported in which occurrences of asthma have also been linked to exposure to ECA and/or MCA. The available information does not allow conclusions to be drawn regarding whether asthma was induced by an allergenic or an irritation mechanism. In many of the bronchial challenge tests, it seems that the challenge concentrations involved were directly irritant.

In a human experimental study using MCA vapour, no sensory irritant effects were reported at 1 ppm (4.5 mg/m³) (a human no-observed-adverse-effect level [NOAEL]); throat and nose "irritation" were subjectively reported from 2 to 20 ppm (9.1 to 91 mg/m³) or more. Eye irritation and "burning" were reported from 4 to 15 ppm (18 to 68 mg/m³) or more. At concentrations above 20 ppm (91 mg/m³), lacrimation and rhinorrhoea were reported (except in one individual for whom rhinorrhoea was reported at around 7 ppm [32 mg/m³]), and these were more pronounced at 50-60 ppm (227-272 mg/m³) (a level at which burning pain in the eyes was also reported). In the absence of similar quantitative data for ECA, it would seem reasonable to assume that a similar dose-response relationship exists for ECA as for MCA, given their close structural similarities, similar physicochemical properties, and, for most end-points, similar toxicological profiles.

Genotoxicity: There is no evidence of mutagenic response in several test assays.

*

[AIHAAP]

METHYL METHACRYLATE HOMOPOLYMER:

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

■ 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.

No significant acute toxicological data identified in literature search.

The substance is classified by IARC as Group 3:

NOT classifiable as to its carcinogenicity to humans.

Evidence of carcinogenicity may be inadequate or limited in animal testing.

HYDROQUINONE:

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

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Oral (human) LDLo: 29 mg/kg

Skin (human): 2% - Mild

Oral (human) TDLo: 170 mg/kg

Skin (human): 5% - SEVERE

Oral (rat) LD50: 320 mg/kg

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

The material may cause severe 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. Repeated exposures may produce severe ulceration.

Hydroquinone is rapidly and extensively absorbed from the gut and lungs of animals. Absorption via the skin is slow but may be accelerated with vehicles such as alcohols. Hydroquinone distributes rapidly and widely among tissues. It is metabolized to 1,4-benzoquinone and other oxidised products, and is detoxified by conjugation to monoglucuronide, monosulfate, and mercapturic derivatives. The excretion of hydroquinone and its metabolites is rapid, and occurs primarily via the urine.

Hydroquinone exhibits moderate acute oral toxicity for animals. Limited data suggest that powdered hydroquinone causes transient eye irritation and corneal opacity in dogs and guinea-pigs; in rabbits powdered hydroquinone induced slight irritation of the eye. Hydroquinone may be a skin sensitiser in animals. The ability to induce sensitization has been found to vary from "weak" to "strong" depending on the test procedure and vehicle used.

Repeated oral dosing caused tremors and reduced activity (≥ 64 mg/kg), reduced body weight gain (≥ 200 mg/kg), convulsions (≥ 400 mg/kg), and nephropathy in F-344 rats (≥ 100 mg/kg). No adverse effects on the kidneys were reported in Sprague-Dawley rats treated for the same length of time with the same dose levels. Effects in mice include tremors and convulsions (400 mg/kg), increased liver weight (≥ 25 mg/kg), and irritation of the forestomach (≥ 200 mg/kg). A functional observational battery and neuropathological examinations of rats failed to give any evidence of persistent or structural neurotoxicity after repeated dosing for 90 days. A NOEL for all effects was 20 mg/kg per day.

Fourteen days of repeated dermal dosing caused reduced body weights of male rats at the 3840 mg/kg dose level (6% relative to the controls), but the body weights of female rats at this dose level and of mice at 4800 mg/kg were comparable to controls. There were no clinical signs of toxicity in either species. Prolonged dermal dosing over 13 weeks with 2.0, 3.5, or 5.0% hydroquinone in an oil-in-water emulsion cream resulted in minimal to minor dermal irritation, but no overt toxicity. No adverse effects or compound-related effects occurred in organ weight, clinical pathology, or histopathology. A NOEL was not determined because of the dermal irritation in all treated groups, but the NOAEL was the highest dose level of 5% hydroquinone (74 mg/kg in males and 110 mg/kg in females) based on the lack of systemic effects.

Reproductive effects: A two-generation reproduction study was conducted in rats. The NOAEL for reproductive effects through two generations was 150 mg/kg per day (the highest dose tested).

Genetic toxicity: Numerous genotoxicity studies of hydroquinone have been conducted. Hydroquinone is not mutagenic in the Salmonella/microsome test. Other data indicate that hydroquinone induces structural chromosome aberrations and c-mitotic effects in vivo in mouse bone-marrow cells following ip injection. In vitro studies with various cell lines showed that hydroquinone was capable of inducing gene mutations, structural chromosome aberrations, sister-chromatid exchange, and DNA damage. Hydroquinone produces adducts with DNA in vitro, but recent in vivo studies were unable to produce DNA adducts. While several experiments with hydroquinone have shown mutagenic effects; the relevance of these results to human risk is uncertain. The majority of positive mutagenicity studies use routes of exposure (parenteral or in vitro) which are not relevant to human exposures. A dominant lethal assay in rats was negative.

Carcinogenicity: Sprague-Dawley rats treated for two-years with hydroquinone in the diet showed "atrophy of the liver cord cells, lymphoid tissue of the spleen, adipose tissue, and striated muscle together with superficial ulceration and hemorrhage of the stomach mucosa" but no carcinogenesis. Two-year studies performed by the NTP reported that hydroquinone exposure was associated with some evidence of carcinogenicity in F-344 rats and B6C3F1 mice. In the NTP study, renal tubular cell adenomas occurred in male rats and mononuclear cell leukemia in female rats, and hepatocellular neoplasms, mainly adenomas, in female mice. The NTP concluded that these data indicated "some evidence of carcinogenic activity" in male and female rats and in female mice. In another study using F-344 rats and B6C3F1 mice, renal tubular cell adenomas were also noted in male rats; hepatocellular adenomas and renal cell hyperplasia were noted in male mice; and hyperplasia of the forestomach was noted in both male and female mice fed 0.8% hydroquinone diets for two years. The evidence provided by cancer bioassay studies is considered limited A.U.S.E.P.A. review of the NTP bioassay found the bioassay results provide limited evidence of carcinogenicity in animals.

Mechanisms: Covalent binding and oxidative stress are mechanisms postulated to be associated with hydroquinone-induced toxicity. Oxidised hydroquinone metabolites may covalently bind cellular macromolecules or alkylate low molecular weight nucleophiles (e.g., glutathione (GSH)) resulting in enzyme inhibition, alterations in nucleic acids and oxidative stress; however, redox cycling is not likely to contribute significantly to oxidative stress. The reaction of hydroquinone metabolites with GSH results in the formation of conjugates which can be further processed to cysteine conjugates which are postulated to cause kidney toxicity

Cell proliferation associated nephrotoxicity in a sensitive strain and species of animal (male F344 rat) has been postulated to be involved in the production of renal tumors in rats.

Interaction with Phenols:

A number of studies reporting interactive effects between hydroquinone and other phenolic compounds. Coadministration of hydroquinone and phenol (75 mg/kg), when given by intraperitoneal injection twice per day, produced a synergistic decrease in

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bone marrow cellularity in B6C3F1 mice that was similar to that induced by benzene. This compound treatment was significantly more myelotoxic than that observed when either hydroquinone or phenol was administered separately. Associated in vitro studies suggested that this interactive effect was due to a phenol-induced stimulation of the myeloperoxidase-mediated conversion of hydroquinone to 1,4-benzoquinone in the bone marrow.

Subsequent studies have indicated that interactions between hydroquinone and other phenolic compounds can result in a variety of cytotoxic, immunotoxic and genotoxic effects.

The substance is classified by IARC as Group 3:

NOT classifiable as to its carcinogenicity to humans.

Evidence of carcinogenicity may be inadequate or limited in animal testing.

CARCINOGEN

Polymethyl methacrylate	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group 3
Hydroquinone	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group 3

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

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METHYL METHACRYLATE HOMOPOLYMER:

ETHYL CYANOACRYLATE:

■ DO NOT discharge into sewer or waterways.

MDF BONDER ADHESIVE:

ETHYL CYANOACRYLATE:

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

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

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

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

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

MDF BONDER ADHESIVE:

■ Harmful to aquatic organisms.

ETHYL CYANOACRYLATE:

METHYL METHACRYLATE HOMOPOLYMER:

■ Hazardous Air Pollutant:	Yes
■ Fish LC50 (96hr.) (mg/l):	159- 277
■ Daphnia magna EC50 (48hr.) (mg/l):	37- 120
■ BOD5:	0.14
■ Half- life Soil - High (hours):	672
■ Half- life Soil - Low (hours):	168
■ Half- life Air - High (hours):	9.7
■ Half- life Air - Low (hours):	1.1
■ Half- life Surface water - High (hours):	672
■ Half- life Surface water - Low (hours):	168
■ Half- life Ground water - High (hours):	1344
■ Half- life Ground water - Low (hours):	336
■ Aqueous biodegradation - Aerobic - High (hours):	672
■ Aqueous biodegradation - Aerobic - Low (hours):	168
■ Aqueous biodegradation - Anaerobic - High (hours):	2688
■ Aqueous biodegradation - Anaerobic - Low (hours):	672
■ Photooxidation half- life air - High (hours):	9.7
■ Photooxidation half- life air - Low (hours):	1.1
■ First order hydrolysis half- life (hours):	4 YRS
■ Base rate constant [MOH]- HR]- 1:	200M- 1 hr-

HYDROQUINONE:

■ Very 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.

■ Hydroquinone is a naturally occurring substance found in several foods (e.g., wheat products, fruits) and beverages (e.g., brewed coffee, some teas, beer, red wine). Hydroquinone is formed as a byproduct of metabolism in several bacteria and marine species. It is estimated that approximately 5 x 10⁴ kg of hydroquinone is generated per year during cigarette smoking.

Hydroquinone is considered to be readily biodegradable and photodegradable.

The aquatic toxicity of hydroquinone to fresh water fish, Daphnia, and algae was between 0.050-0.335 mg/l; the predicted chronic values for these fresh water taxa were calculated to be < 0.100.

The 84 hr LC50 for the salt water shrimp, *C. septemspinosa*, was selected as the only salt water species for analysis. Based on these data and on the predicted aquatic toxicity values, the USEPA identified concern concentrations or predicted no effect concentrations (PNECs) at 1.0 ug/l for fresh water species and 8.0 ug/l for salt water species. Alternatively, a PNEC can be derived using the assessment factors recommended in the SIDS Manual. As only acute effect data for fish and daphnids are available, an assessment factor of 100-1000 would be appropriate. Due to the large available database, a factor of 100 would be acceptable. Applied to the lowest experimental value of 0.044 mg/l (fathead minnow), a PNEC of 0.44 ug/l can be derived.

Physicochemical parameters:

Water solubility: 73 g/l (25 C)

log Kow: 0.50-0.61

Vapour pressure: 2.34 x 10⁻³ Pa (25 C)

BOD5: 1.0 g O₂/g

COD5: 1.83 gO₂/g

BOD5/COD5: 0.55

Degradation: Hydroquinone degrades by both biotic and abiotic mechanisms. Biodegradation is affected by pH, temperature, aerobic/anaerobic conditions, and acclimation of the microorganisms involved. Under aerobic conditions 74% of the radioactivity from the incubation of activated sludge and 14C- hydroquinone was recovered as carbon dioxide in 5-10 days. Small amounts of 1,4-benzoquinone, 2-hydroxy-1,4-benzoquinone, and beta-ketoadipic acid are formed as metabolites of hydroquinone. A maximum concentration of 0.11% (1.05 mg/L) 1,4-benzoquinone was detected at 2 hr during incubation of 950 mg/L hydroquinone by yeast cultures. At later time points 1,4-benzoquinone levels were lower and benzoquinone was not detected in the effluent from the

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activated sludge unit. In another study 82% of hydroquinone was converted to CO₂ in a 28-day Sturm test ; 97% of the dissolved organic carbon was removed in 28 days. Thus hydroquinone is primarily converted to CO₂ or mineralised during aerobic degradation.

Under anaerobic conditions, hydroquinone is metabolized through phenol, instead of 1,4-benzoquinone, prior to mineralisation.

As the organisms which biodegrade hydroquinone are widely distributed in the environment in sludges, soils, sediments, and composts, hydroquinone is expected to readily biodegrade in soils and water.

Photolysis: Due to its intrinsic properties, hydroquinone is relatively rapidly photodegraded; phototransformations may occur from direct excitation or from induced or photocatalytic reactions.

Bioaccumulation: With measured partition coefficients log Pow = 0.50-0.61, hydroquinone is not considered to undergo bioaccumulation. Bioaccumulation factors of 40 have been determined for algae and fish .

Distribution between environmental compartments and occurrence in the environment: The environmental transport of hydroquinone can be partially predicted based on its physicochemical properties. With a melting point of 169 C, a vapor pressure of 2.34 x 10⁻³ Pa at 25 C and a relative vapor density of 3.81 (air=1), it is not expected to transport into the atmosphere. A calculation of fugacity using Mackay's model I indicates that hydroquinone will be distributed to the water compartment (99.6%) when released into the environment.

Air: Hydroquinone is essentially non-volatile in its solid form. Its solubility in water (which increases with temperature), low vapor pressure, and high relative vapor density, and low Henry's law constant (3.84x10⁻¹¹ atm-m³/mole) indicate that hydroquinone will not evaporate from water into the atmosphere. The half-life of hydroquinone in the air is 14 hr (U.S.E.P.A., 1990).

In its dry solid form, hydroquinone is stable and darkens only slowly if exposed to the air. In the presence of moisture and ambient levels of oxygen, hydroquinone can undergo oxidation to 1,4-benzoquinone which is more likely to volatilise because of its higher vapor pressure. As this potential reaction is well recognised, manufacturing plants do not let hydroquinone powders stand in open environments prior to bagging or drumming operations. For the same reason, hydroquinone-containing products such as photographic developers contain stabilizers such as sodium sulfite to prevent or retard oxidation.

Water: Due to its physical chemical properties, hydroquinone can be expected to partition to the water compartment. As its melting point is 169 C, vapor pressure is low, Henry's law constant is relatively low, and its solubility in water increases with temperature, hydroquinone is not likely to be volatilised to the air compartment from water. In waste water, hydroquinone would be expected to be readily biodegradable. If hydroquinone were present in an open body of water, it would be expected to both biodegrade and photodegrade. Hydroquinone half-life in surface water is 20 hr. While 1,4-benzoquinone would be expected to be one of the degradation products of hydroquinone, its ready degradation would not be expected to impact the toxicity of a hydroquinone release.

Soil: Hydroquinone released to the soil would be expected to mineralize as organisms which can degrade hydroquinone are commonly found in soils and compost. Half-life in soil is 2-14 days and depends on photo-oxidation and bacterial degradation. Hydroquinone present in soil could be expected to partition to water in the soil and be mobile. Half-life values in ground water are 4-14 days (aerobic conditions) and up to a month (anaerobic conditions). However, hydroquinone and its immediate degradation product, 1,4-benzoquinone may also be absorbed to the soil. Since hydroquinone and 1,4-benzoquinone are electron donor and electron acceptor molecules respectively, they could form charge transfer complexes with soil particles. Hydroquinone and its biodegradation products may contribute to the formation of humic acids which are polymerisation products of polyphenols commonly formed during the biodegradation of plants. Much of the naturally occurring hydroquinone in plants may be reincorporated into soils in this manner.

Effects on the Environment

Aquatic effects

Fish LC50 (96 h): Pimephales promelas 0.044 mg/l

Daphnia magna LC50 (48 h): 0.096 mg/l (interpolated results from several researchers)

Salt water shrimp (Crangon septemspinosa) LC50 (84 h):0.833 mg/l

Algal EC50 (3 d): S. capricornutum 0.355 mg/l

Based on these numbers hydroquinone has a high acute toxicity for aquatic organisms.

■ The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

Koc: 9-50

ThOD: 1.89

BCF: 40-65

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
MDF Bonder Adhesive ethyl cyanoacrylate methyl methacrylate homopolymer	LOW	No data	LOW	HIGH
hydroquinone	LOW	No data	LOW	MED

Section 13 - DISPOSAL CONSIDERATIONS

- - Containers may still present a chemical hazard/ danger when empty.
 - Return to supplier for reuse/ recycling if possible.
- Otherwise:
- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store

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- the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.
- Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
- A Hierarchy of Controls seems to be common - the user should investigate:
- Reduction,
 - Reuse
 - Recycling
 - Disposal (if all else fails)
- This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
- DO NOT allow wash water from cleaning or process equipment to enter drains.
 - It may be necessary to collect all wash water for treatment before disposal.
 - In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
 - Where in doubt contact the responsible authority.
 - Recycle wherever possible or consult manufacturer for recycling options.
 - Consult State Land Waste Authority for disposal.
 - Bury or incinerate residue at an approved site.
 - Recycle containers if possible, or dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION



Labels Required: COMBUSTIBLE LIQUID, regulated under AS1940 for Bulk Storage purposes only.
HAZCHEM: None (ADG7)
NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: ADG7, UN, IATA, IMDG

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE

S5

REGULATIONS

Regulations for ingredients

ethyl cyanoacrylate (CAS: 7085-85-0) is found on the following regulatory lists;

"Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "OECD Representative List of High Production Volume (HPV) Chemicals"

methyl methacrylate homopolymer (CAS: 9011-14-7) is found on the following regulatory lists;

"Australia Inventory of Chemical Substances (AICS)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs"

hydroquinone (CAS: 123-31-9) is found on the following regulatory lists;

"Australia Exposure Standards", "Australia Hazardous Substances", "Australia Inventory of Chemical Substances (AICS)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "OECD Representative List of High Production Volume (HPV) Chemicals"

No data for MDF Bonder Adhesive (CW: 21-9640)

Section 16 - OTHER INFORMATION

■ 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.

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

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MDF BONDER ADHESIVE

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