



# MID (China) Composite Company Limited

NO.: ELA3521a3

## CompSet 521 Laminating Series

### DESCRIPTION:

**CompSet 521 Hand Lay-up Laminating System** is a low viscosity epoxy especially developed for production of articles where thin film cure is of particular importance. Particular emphasis has been placed on the general toughness and strength for an ambient cured epoxy resin system. As well as offering high mechanical properties its low viscosity facilitates wet out of difficult material.

### APPERANCE:

#### CompSet 521 Epoxy Resin

Viscosity at 20 °c (ISO 12058-1B)	1000 – 1400 mPa s
Density at 20 °c (ISO 1675)	1.1 – 1.21 g/cm <sup>3</sup>
Flash Point (ISO 2719)	> 120 °c

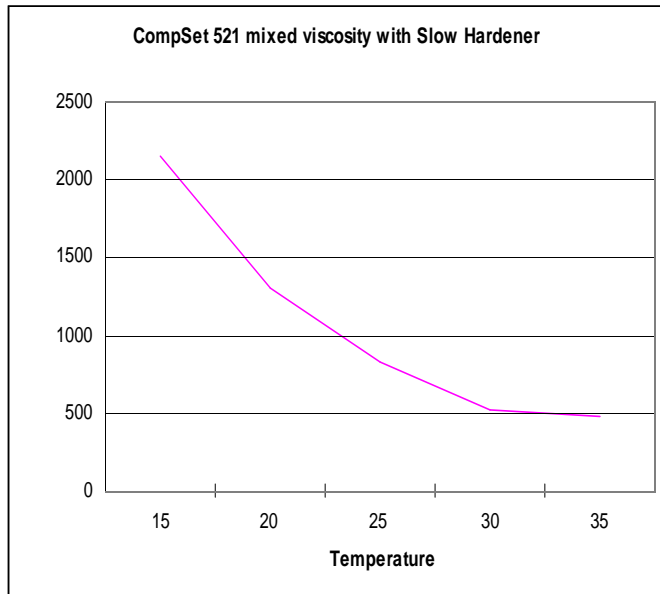
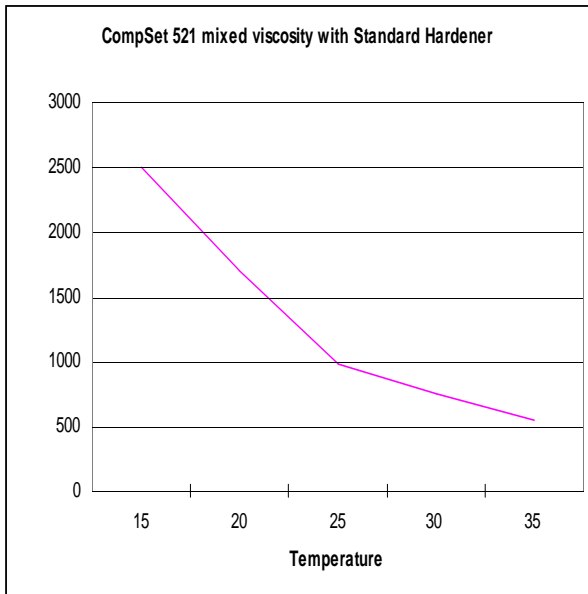
#### CompSet 521 Hardeners

60 - 160 mPa s
0.96 – 1.01 g/cm <sup>3</sup>
> 120 °c

### APPLICATION DATA: Mixing and Viscosity

Mixing Ratio by weight	100 Parts CompSet 521 Resin to 20 Parts Hardener
Mixing Ratio by Volume	5 Parts CompSet 521 Resin to 1 Part Hardener

The components should be mechanically mixed thoroughly at medium speed ensuring that no unnecessary air is entrained. Both sides and bottom of container should be scraped during mixing process.



### APPLICATION DATA: Potlife 100 grams 20°c

Hardener 521 AH	15 mins
Hardener 521 BH	25 mins
Hardener 521 CH	40 mins

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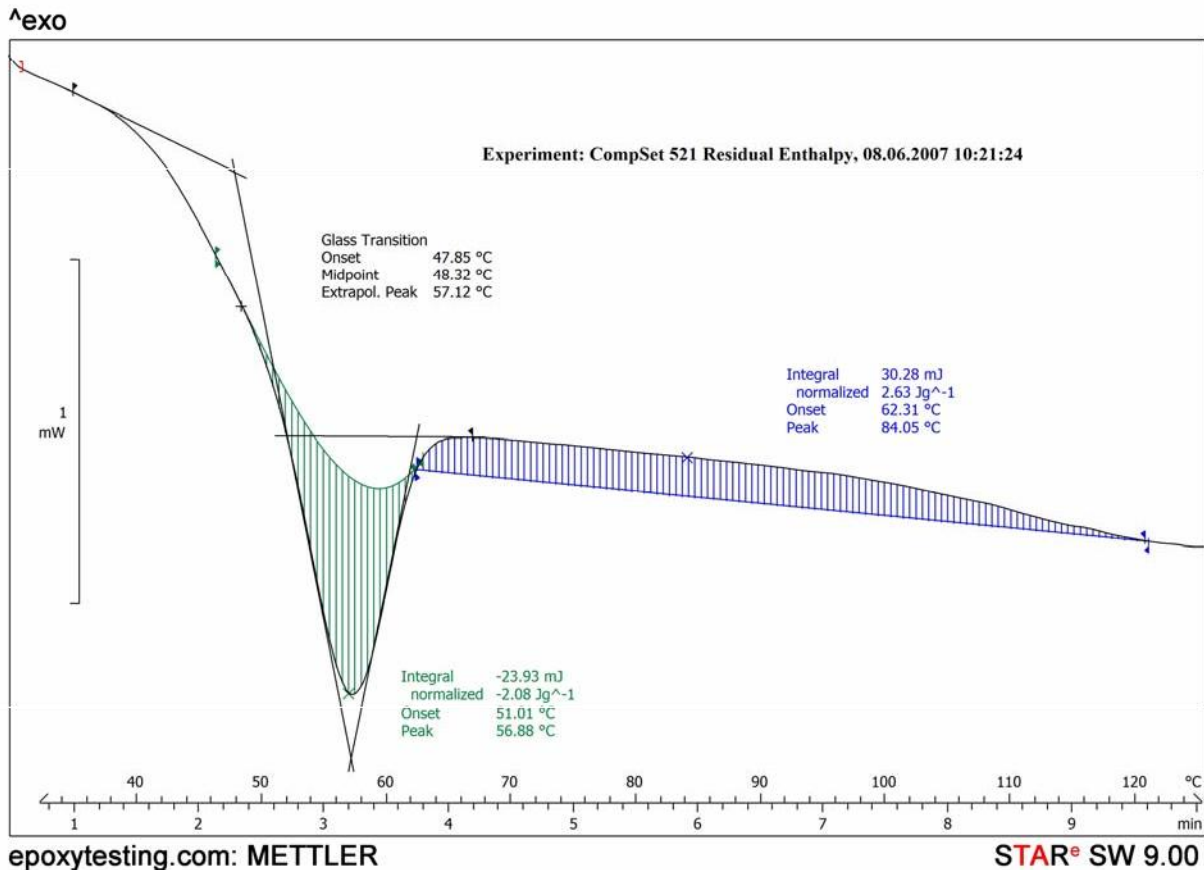


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## CURING DATA Thermodynamics Differential Scanning Calorimeter DSC

The DSC measures changes in specific heat or heat flow characteristics of a polymer. From this we can determine the **Glass Transition temperature Tg**, the "B-staging" or **Tg enthalpy** and the **ΔH enthalpy** which indicates how much heat is required to post-cure the finished composite to full physical properties. Most physical properties show changes around the Tg as the material changes from "glass like" to "liquid like".



### Room Temperature cure

CompSet 521 Hardener 521 AH

Reactivity dynamic jg <sup>-1</sup> (ISO11357-5)	324
Tg 24hr 40 <sup>o</sup> c (ISO 11357-3)	48
Tg Ultimate <sup>o</sup> c (ISO 11357-3)	65
Tg Enthalpy jg <sup>-1</sup> (ISO11357-5)	-2.08
ΔH Enthalpy jg <sup>-1</sup> (ISO11357-5)	2.63

### Post Cure (16 hrs60<sup>o</sup>c)

CompSet 521 Hardener	521 AH
Tg <sup>o</sup> c (ISO 11357-3)	59
Tg Enthalpy jg <sup>-1</sup> (ISO11357-5)	-1.30
ΔH Enthalpy jg <sup>-1</sup> (ISO11357-5)	1.81

The low **ΔH enthalpy** for CompSet 521 indicates that most properties are obtained from room temperature curing.



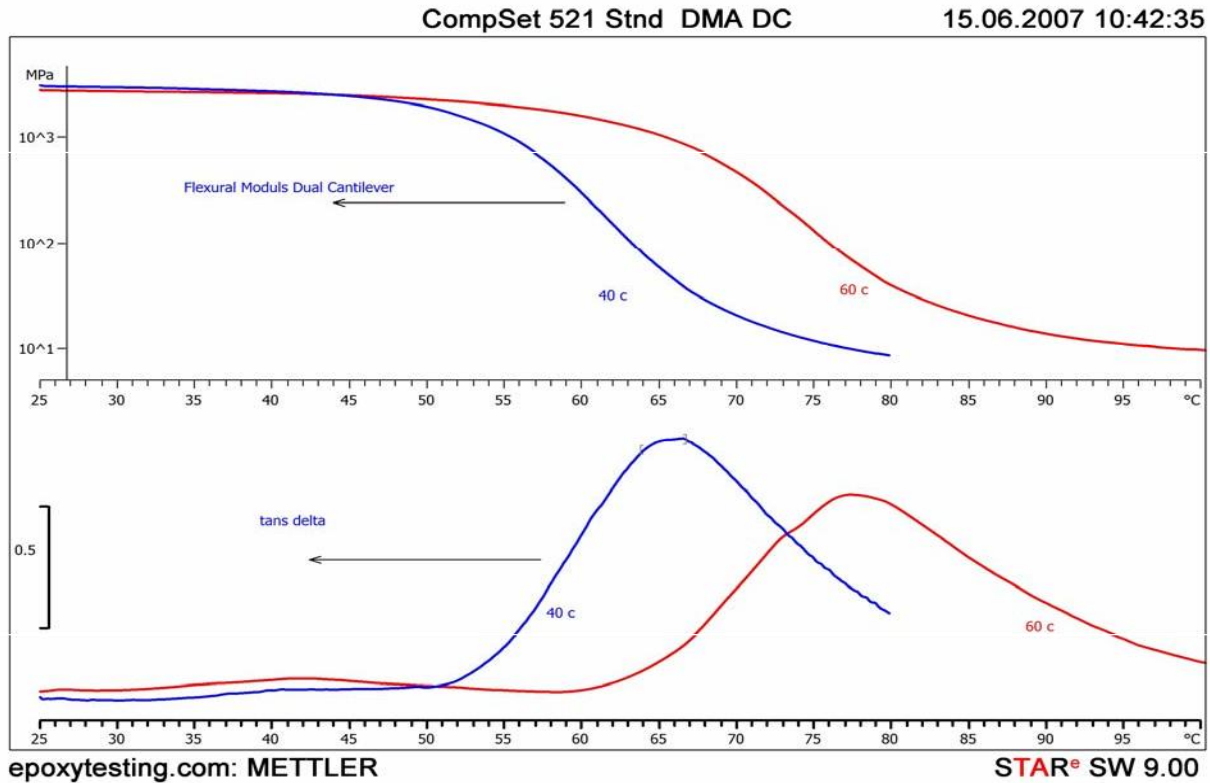
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## CURED DATA: Unreinforced

The **storage modulus E'** is a measure of the stiffness of a material. Here the modulus is flexural and is measured using the Dual Cantilever method in MPa. **T<sub>α</sub>** is the point where the material starts to undergo a change in phase and is synonymous to **T<sub>g</sub>**.

The **loss factor tan δ** is the ratio of loss modulus to storage modulus and is a measure of energy lost, and represents mechanical dampening. It is indicative of a material's ability to dissipate energy.



## Dynamic Mechanical Analysis (cured 16 hrs)

CompSet 521 Hardener ELA3521a1A	<b>40<sup>0</sup>c</b>	<b>60<sup>0</sup>c</b>
<b>T<sub>α</sub></b> <sup>0</sup> c (ASTM D5418-01)	48	64
<b>tan δ</b> <sup>0</sup> c (ASTM D5418-01)	67	78

## Static Mechanical Analysis 20<sup>0</sup>c: (cured 14 days 20 °c)

### Tensile Test (ISO 527)

Strength	47 N/mm <sup>2</sup>
Modulus	2100 N/mm <sup>2</sup>
Ultimate Elongation	4.0%

### Flexural Test (ISO 178)

Strength	93 N/mm <sup>2</sup>
Modulus	3000 N/mm <sup>2</sup>
Ultimate Elongation	2.0%

## PRECAUTIONS:

High atmospheric humidity or drops in temperature around dew point may result in condensation on the uncured film causing changes in the film surface as a result of hydration. This effect may cause loss of intercoat adhesion. In these conditions good adhesion may be obtained by re-roughening the surface.

Date of Printing: 2010-12      supersedes all previous issues

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## MATERIAL SAFETY DATA SHEET

### Section 1 – Identification of Chemical Product & Company

**Product Name:** CompSet 521 Resin

**Product Use:** In conjunction with epoxy hardeners for Civil Engineering.

**Description:** Modified Epoxy Resin

**Manufacturer's Code:** F202

### Section 2 – Hazards Identification

This product is classified as: Hazardous according to criteria of Worksafe Australia

**U.N. Number:** None

**Hazchem Code:** Not applicable

**Poisons Schedule:** 5

**Dangerous Goods Class:** None

**Risk:** Irritant



<b>RISK PHRASES:</b>	R20/22	Harmful by inhalation, and if swallowed.
	R36/38	Irritating to eyes and skin
	R43	May cause sensitisation by skin contact

<b>SAFETY PHRASES:</b>	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	Do not breathe vapour
	S37/39	Wear suitable protective gloves and eye/face protection.

### Section 3 – Composition / Information on Ingredients

#### HAZARDOUS INGREDIENTS

Chemical Entity	C.A.S. No.	Haz	R-phrases	Concentration
Epoxy resin	025085-99-8	Xi	R36/38-R43	>60%

### Section 4 – First Aid Measures

**Inhalation:** If effects occur, remove to fresh air. Seek Medical attention.

**Skin Contact:** Wash skin thoroughly with soap and flowing water for 15 minutes. **DO NOT** use solvents to remove product from skin. It is recommended to remove contaminated clothing immediately. Wash clothing thoroughly before re-use. Discard contaminated footwear.

**Eye Contact:** Hold eyes open and wash thoroughly with flowing water for 15 minutes. Seek prompt medical attention by a doctor.

**Swallowed:** Do **NOT** induce vomiting. Give glass of water. Call a doctor and/or transport to a hospital promptly.

#### ADVICE TO DOCTOR

No specific antidote. Supportive care. Treatment based on the judgement of the doctor in response to the reactions of the patient. Skin contact may cause dermatitis; treat as any contact dermatitis.

### Section 5 – Fire Fighting Measures

#### FLAMMABILITY

Non-Flammable liquid. Will support combustion.

**Flash Point:** 154 Deg C PMCC

**Flammability Limits:** N/A

**Hazchem Code:** Not



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## **FIRE/EXPLOSION HAZARD**

Extinguish with foam, water, dry chemical or carbon dioxide. Drums may rupture when exposed to fire conditions. Wear positive pressure self-contained breathing apparatus. Decomposition products include phenolics, carbon monoxide and water.

## **Section 6 – Accidental Release Measures**

### **SPILLS AND DISPOSAL**

Soak up in an absorbent material, such as sand, sawdust or absorbent clay. Place in secure container for disposal. Burn in an adequate incinerator or bury in an approved landfill in accordance with State and/or Local government regulations.

## **Section 7 – Handling & Storage**

### **HANDLING**

Refer to Section 8 of this MSDS for details of personal protection measures.

### **STORAGE**

Store in cool place away from heat and ignition sources. Keep partially used product containers closed. Store away from foodstuffs, clothing and keep out of reach of children. Store away from amines.

## **Section 8 – Exposure Controls / Personal Protection**

**EXPOSURE LIMITS:** Not established for product or individual components.

**VENTILATION:** Provide general and / or local exhaust Ventilation, depending on type of operations, to control airborne exposures.

### **PERSONAL PROTECTIVE EQUIPMENT**

**Respiratory:** Not required for normal operations. For emergency conditions, use an approved positive pressure self-contained breathing apparatus.

**Hands:** Wear body-covering clothing. Protect hands with impervious gloves when handling or using this product. Wear boots.

**Eyes:** Wear chemical goggles. Eye wash facilities should be located in the immediate work area. Selection and the use of personal protective equipment should be in accordance with the recommendations in one or more of the relevant Australian Standards, including:

AS 1336:	Recommended practices for eye protection in the industrial environment.
AS/NZS 1337:	Eye protectors for industrial application.
AS/NZS 1715:	Selection, use and maintenance of respiratory protective devices.
AS 2161:	Industrial safety gloves and mittens (excluding electrical and medical gloves).
AS/NZS 2210:	Occupational protective footwear.
AS 2919:	Industrial clothing.

**BIOLOGICAL LIMIT:** No biological limit allocated

## **Section 9 – Physical & Chemical Properties**

**Appearance:** Clear Liquid

**Odour:** Not available

**pH:** Not Determined

**Vapour Pressure:** Not Determined

**Vapour Density:** Not Determined

**Percent Volatile:** < 1%

**Specific Gravity:** 1.12

**Flammability Limits:** N/A

**Boiling Point:** Not Determined

**Flash Point:** > 120 Deg C PMCC

**Auto Ignition:** Not Determined



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## Section 10 – Stability & Reactivity

### **STABILITY / INSTABILITY**

Stable under recommended storage conditions. Refer to Section 7 of this MSDS.

**Conditions to Avoid:** Avoid temperatures above 300°C (572°F) Potentially violent decomposition can occur above 350°C (662°F) Generation of gas during decomposition can cause pressure in closed systems. Pressure build-up can be rapid.

**Incompatible Materials:** Avoid contact with oxidizing materials. Avoid contact with: Acids, Bases. Avoid unintended contact with amines.

### **HAZARDOUS POLYMERISATION**

Will not occur by itself. Masses of more than one pound (0.5 kg) of product plus an aliphatic amine will cause irreversible polymerization with considerable heat build-up.

### **THERMAL DECOMPOSITION**

Decomposition products depend upon temperature, air supply and the presence of other materials. Gases are released during decomposition. Uncontrolled exothermic reaction of epoxy resins release phenolics, carbon monoxide, and water.

## Section 11 – Toxicological Information

### **Short Term Hazards (Acute Exposure):**

**Inhaled:** Not expected to be an inhalation hazard by this route, due to the low vapour pressures of the components at ambient temperatures.

**Skin Contact:** A single prolonged exposure is not likely to result in the material being absorbed through the skin in harmful amounts.

**Eye Contact:** May cause slight transient (temporary) eye irritation. Corneal injury is unlikely.

**Swallowed:** Acute oral toxicity has not been determined. Acute oral toxicity (rat) for components of this product are each in excess of 2000 mg/kg.

### **Long Term Hazards (Chronic Exposure):**

**Inhaled:** Prolonged exposure to high concentrations of vapour may affect the central nervous system.

**Skin Contact:** Product may be a skin sensitiser in some individuals.

**Eye Contact:** Corneal injury.

**Systematic and other effects:** Diglycidyl ether of Bisphenol A (Base epoxy resin) that is representative of the current manufacturing process is not believed to be a cancer hazard to humans. Did not cause birth defects or other adverse effects on the foetus when pregnant rabbits were exposed by skin contact, the most likely route of exposure. Results of mutagenicity tests in animals have been negative. Has been shown to be negative in some "in vitro" (test tube) mutagenicity tests and positive in others.

## Section 12 – Ecological Information

**Movement & Partitioning:** Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5). Potential for mobility in soil is low (Koc between 500 and 2000).

### **Persistence and Degradability**

Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

**Ecotoxicity:** Material is toxic to aquatic organisms (LC50/EC50/IC50 between 1 and 10 mg/L in most sensitive species).

## Section 13 – Disposal Considerations

**Disposal:** Place in secure container for disposal. Burn in an adequate incinerator or bury in an approved landfill in accordance with State and/or Local government regulations.



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## Section 14 – Transport Information

This product is not classified as a dangerous good in the Australian Dangerous Goods Code by reference to a specific substance name or a generic substance name or group.

**U.N. Number:** None

**Dangerous Goods Class:** None

## Section 15 – Regulatory Information

**AICS:** All of the significant ingredients in this formulation are compliant with NICNAS regulations.

## Section 16 – Other Information

### **ACRONYMS**

**AICS:** Australian Inventory of Chemical Substances

**CAS Number:** Chemical Abstracts Service Registry Number

**Hazchem Code:** Emergency action code that provides information to emergency services

**UN Number:** United Nations Number

**Date of issue:** 2010-12

### **IMPORTANT NOTE:**

**Data quoted is typical for the product, but does not constitute a specification, and is based on the most accurate information available to MID American at the time of writing. All information contained herein is given in good faith, but is subject to change without notice.**

This MSDS has been prepared in alignment with the NOHSC document *National Code of Practice for the Preparation of Material Safety Data Sheets 2<sup>nd</sup> Edition* [NOHSC: 2011(2003)]

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## MATERIAL SAFETY DATA SHEET

### Section 1 – Identification of Chemical Product & Company

**Product Name:** CompSet Hardener  
**Product Use:** Curing agent for Epoxy Resins  
**Description:** Formulated polyamine  
**Manufacturer's Code:** F324

### Section 2 – Hazards Identification

This product is classified as: Hazardous according to criteria of Worksafe Australia

**U.N. Number:** 1760  
**Hazchem Code:** 2X  
**Poisons Schedule:** 5

**Dangerous Goods Class:** 8  
**Subsidiary Risk:** None



**RISK PHRASES:**  
R21/22 Harmful by contact with skin and if swallowed.  
R34 Causes burns  
R43 May cause sensitisation by skin contact

**SAFETY PHRASES:**  
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.  
S36/37/39 Wear suitable protective clothing, gloves and eye face protection.  
S38 In case of insufficient ventilation, wear suitable respiratory equipment.  
S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)

### Section 3 – Composition / Information on Ingredients

#### HAZARDOUS INGREDIENTS

Chemical Entity	C.A.S. No.	Haz	R-phrases	Concentration
Aliphatic amine	000112-24-3	C	R21/22-R34-R43	30% - 60%
Isophorone Diamine	002855-13-2	C	R21/22-R34-R43	30% - 60%
Aliphatic Diamine	015520-10-2	C	R20/22-R34	< 10%
Polyoxyalkyeneamine	009046-10-0	C	R34	30% - 60%
Non hazardous ingredients or those below cut off limits			to 100%	

### Section 4 – First Aid Measures

**Inhaled:** If effects occur, remove to fresh air. Seek Medical attention.

**Skin Contact:** Wash skin thoroughly with soap and flowing water for 15 minutes. **DO NOT** use solvents to remove product from skin. It is recommended to remove contaminated clothing immediately. Wash clothing thoroughly before re-use. Discard contaminated footwear. Obtain medical attention promptly.

**Eye Contact:** Hold eyes open and wash thoroughly with flowing water for 15 minutes. Seek prompt medical attention by a doctor

**Swallowed:** Do **NOT** induce vomiting. Give glass of water. Call a doctor and/or transport to a hospital promptly





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## ADVICE TO DOCTOR

Main ingredient of this formulation is corrosive to tissue. If product in eyes, check for corneal injury.

The decision of whether to induce vomiting should be made by the attending physician. If burn present, suggest treatment as a thermal burn after decontamination. Human effects not established for this product. No specific antidote. Treatment based on the sound judgement of the physician and the individual reactions of the patient.

## Section 5 – Fire Fighting Measures

### FLAMMABILITY

Non-Flammable liquid. Will support combustion.

**Flash Point:** 112 Deg C PMCC

**Hazchem Code:** 2X

**Flammability Limits:** Not. Determined

### FIRE/EXPLOSION HAZARD

Extinguish with foam, water, dry chemical or carbon dioxide. Drums may rupture when exposed to fire conditions. Ammonia is a product of decomposition. Wear positive pressure self-contained breathing apparatus. The amine type component of this product will decompose at temperatures above 260 Deg C and generate ammonia.

## Section 6 – Accidental Release Measures

### SPILLS AND DISPOSAL

Soak up in an absorbent material, such as sand, sawdust or absorbent clay. Place in secure container for disposal. Burn in an adequate incinerator or bury in an approved landfill in accordance with State and/or Local government regulations.

## Section 7 – Handling & Storage

### HANDLING

Refer to Section 8 of this MSDS for details of personal protection measures.

### STORAGE

Store in cool place away from heat and ignition sources. Keep partially used product containers closed. Store away from foodstuffs, clothing and keep out of reach of children.

## Section 8 – Exposure Controls / Personal Protection

**EXPOSURE LIMITS:** Not established for product or individual components.

**VENTILATION:** Provide general and / or local exhaust ventilation, depending on type of operations, to control airborne exposures.

### PERSONAL PROTECTIVE EQUIPMENT

**Respiratory:** Not required for normal operations. For emergency conditions, use an approved positive pressure self-contained breathing apparatus.

**Hands:** Wear body-covering clothing. Protect hands with impervious gloves when handling or using this product. Wear boots.

**Eyes:** Wear chemical goggles. Eye wash facilities should be located in the immediate work area.

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



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AS 1336:	Recommended practices for eye protection in the industrial environment.
AS/NZS 1337:	Eye protectors for industrial application.
AS/NZS 1715:	Selection, use and maintenance of respiratory protective devices.
AS 2161:	Industrial safety gloves and mittens (excluding electrical and medical gloves).
AS/NZS 2210:	Occupational protective footwear.
AS 2919:	Industrial clothing.

**BIOLOGICAL LIMIT:** No biological limit allocated

## Section 9 – Physical & Chemical Properties

<b>Appearance:</b> Amber liquid	<b>Percent Volatile:</b> < 1%
<b>Odour:</b> Slightly ammoniacal	<b>Specific Gravity:</b> 0.97 - 1.00
<b>pH:</b> Not Determined	<b>Flammability Limits:</b> Not Determined
<b>Vapour Pressure:</b> Not Determined	<b>Boiling Point:</b> Not Determined
<b>Vapour Density:</b> Not Determined	<b>Flash Point:</b> 112 Deg C PMCC
<b>Auto Ignition:</b> Not Determined	

## Section 10 – Stability & Reactivity

**Chemical Stability:** This product is unlikely to react or decompose under normal storage conditions.  
**Hazardous decomposition products:** The amine type component of this product will decompose at temperatures above 260 Deg C and generate ammonia.

## Section 11 – Toxicological Information

### Short Term Hazards (Acute Exposure):

**Inhaled:** Not expected to be an inhalation hazard by this route, due to the low vapour pressures of the components at ambient temperatures.  
**Skin Contact:** May cause severe irritation and possibly burns.  
**Eye Contact:** Based on data available for the components of this product, eye contact may result in severe eye irritation and corneal injury, which may be permanent.  
**Swallowed:** Single dose oral toxicity has not been determined for this formulation. Single dose oral toxicity is expected to be low, based on information available for each item.

### Long Term Hazards (Chronic Exposure):

**Inhaled:** Prolonged exposure to high concentrations of vapour may affect the central nervous system.  
**Skin Contact:** Product will cause severe irritation and burns. Product may be a skin sensitizer in some individuals.  
**Eye Contact:** Corneal injury.  
**Swallowed:** Product may cause severe irritation and burns to the digestive tract.

## Section 12 – Ecological Information

LC50 (24h) Daphnae: 42 mg/L.  
LD50 (48h) Leuciscus idus: 185 mg/L.  
NOEC (21day) Daphnia magna: 3 mg/L  
EC10 (16hr) Pseudomonas putida: 1120 mg/L  
Persistence/Biodegradability: 42% (DOC, OECD 303A)  
8.0% (DOC, Die away test -9/69/EEC)

## Section 13 – Disposal Considerations

**Disposal:** Place in secure container for disposal. Burn in an adequate incinerator or bury in an approved landfill in accordance with State and/or Local government regulations.

## Section 14 – Transport Information

**Substance Name:** CORROSIVE LIQUID n.o.s



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**U.N. Number:** 1760  
**Dangerous Goods Class:** 8  
**Hazchem Code:** 2X  
**Packing Group:** III EPG8

## Section 15 – Regulatory Information

**AICS:** All of the significant ingredients in this formulation are compliant with NICNAS regulations.

## Section 16 – Other Information

### **ACRONYMS**

**AICS:** Australian Inventory of Chemical Substances  
**CAS Number:** Chemical Abstracts Service Registry Number  
**Hazchem Code:** Emergency action code that provides information to emergency services  
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