

## MATERIAL SAFETY DATA SHEET

### SECTION 1 - IDENTIFICATION OF THE MATERIAL AND SUPPLIER

**Material Name:** Glutaraldehyde 25% solution.  
**Catalogue Number:** C001 and C002.  
**Other Names:** Glutaral; Glutaric Dialdehyde; 1,5-Pentanedial.  
**Recommended Use:** A fixative for electron microscopy.

**Supplier Name:** ProSciTech  
**Street Address:** 1/11 Carlton Street, Kirwan, Qld. 4817 Australia  
**Telephone Number:** (07) 4773 9444 - 8:30am – 5:00pm, Monday to Friday (excluding Public Holidays)  
**Emergency Contact:** (07) 4773 9444 - 8:30am – 5:00pm, Monday to Friday (excluding Public Holidays)

### SECTION 2 - HAZARDS IDENTIFICATION

**Hazard Classification:**  
 Hazardous according to the criteria for Classifying Hazardous Substances [NOHSC:1008].

**Hazardous and/or Dangerous Nature:**  
 HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS.

**Risk Phrases:**  
 R23/25 Toxic by inhalation and if swallowed.  
 R35 Causes severe burns.  
 R42/43 May cause sensitisation by inhalation and skin contact.  
 R50 Very toxic to aquatic organisms.  
 R68/20/21/22 Harmful: possible risk of irreversible effects through inhalation, in contact with skin and if swallowed.

**Safety Phrases:**  
 S1/2 Keep locked up and out of reach of children.  
 S7 Keep container tightly closed.  
 S16 Keep away from sources of ignition - No smoking.  
 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.  
 S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).  
 S61 Avoid release to the environment. Refer to special instructions/Material Safety Data Sheets.

*Refer to Section 15 for Poisons Schedule.*

### SECTION 3 - COMPOSITION / INFORMATION ON INGREDIENTS

**Pure Substance (Proportion 100%):**

**Chemical Identity:** Glutaraldehyde 25% solution.  
**Common Name(s):** Glutaral; Glutaric Dialdehyde; 1,5-Pentanedial.  
**CAS Number:** Mixture – see below.

**Mixture Substance:**

<b>Ingredients</b>	<b>Cas Number(s)</b>	<b>Proportion (%)</b>
Water	773218-5	<74.5
Glutaraldehyde	111-30-8	25
Methyl alcohol [Methanol]	67-56-1	0.5

### SECTION 4 - FIRST AID MEASURES

**Ingestion:** DO NOT INDUCE VOMITING. Do not give anything to drink. Obtain medical attention without delay.

**Inhalation:** Remove to fresh air. Give artificial respiration if not breathing. If breathing is difficult, oxygen may be given by qualified personnel. Obtain medical attention.

**Eye Contact:** Immediately flush eyes with water and continue washing for at least 15 minutes. DO NOT remove contact lenses, if worn. Obtain medical attention without delay, preferably from an ophthalmologist.

**Skin Contact:** Immediately remove contaminated clothing and shoes. Wash skin with soap and water. Obtain medical attention. Wash clothing before reuse. Discard contaminated leather articles such as shoes and belt.

**First Aid Facilities:** Eyebath/eyewash, Safety shower & general washroom facilities.

**Medical Attention & Special Treatment:**

The hazards of this material are due mainly to its severely irritant properties on skin and mucosal surfaces. Moderately toxic by swallowing. Moderately toxic by absorption across the skin. Due to the severely irritating or corrosive nature of the material, swallowing may lead to ulceration and inflammation of the upper alimentary tract with haemorrhage and fluid loss. Also, perforation of the oesophagus or stomach may occur, leading to mediastinitis or peritonitis and the resultant complications. Any material aspirated during vomiting may cause lung injury. Therefore, emesis should not be induced mechanically or pharmacologically. If it is considered necessary to evacuate the stomach contents, this should be done by means least likely to cause aspiration (e.g., gastric lavage after endotracheal intubation).

**Additional Information:**

Not available.

## SECTION 5 - FIRE FIGHTING MEASURES

**Suitable Extinguishing Media:**

Not-flammable (aqueous solution): After water evaporates, remaining material will burn.

Large Fires: Use alcohol-type or all-purpose-type foam.

Small Fires: Use carbon dioxide or dry chemical media.

**Hazards from Combustion Products:**

Burning can produce the following products: Carbon monoxide and/or carbon dioxide. Carbon monoxide is highly toxic if inhaled; carbon dioxide in sufficient concentrations can act as an asphyxiant.

**Precautions for Fire Fighters:**

Use self-contained breathing apparatus and protective clothing.

**Hazchem Code:** 4ZE

## SECTION 6 - ACCIDENTAL RELEASE MEASURES

**Emergency Procedures:**

Wear suitable protective equipment. Refer to Section 8.

**Containment & Clean up:**

Very low concentrations (5ppm or less of glutaraldehyde) can be degraded in a biological wastewater treatment system. Thus, small spills can be flushed with large quantities of water. Large quantities or 'slugs' can be harmful to the treatment system. Thus, large spills should be collected for disposal. It may also be possible to decontaminate spilled material by careful application of sodium hydroxide, ammonium or sodium bisulphite. Depending on conditions, considerable heat and fumes can be liberated by the decontamination reaction.

## SECTION 7 - HANDLING & STORAGE

**Precautions for Safe Handling:**

Do not get in eyes, on skin, on clothing. Avoid breathing vapor. Do not swallow. Do not handle or empty in presence of flammable vapor. Wear goggles, protective clothing and gloves. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse. Keep container closed when not in use. Use with adequate ventilation.

**Precautions for Safe Storage:**

Store in a refrigerator (preferable). Keep away from heat and incompatible materials. Use only in a well ventilated area. Store with lid tightly sealed when not in use.

## SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

**National Exposure Standards:** Glutaraldehyde Cas No. 111-30-8: (Conc<50%>=10%)  
TWA 0.1ppm  
TWA 0.41mg/m<sup>3</sup> (Peak limitation)

Methyl alcohol [Methanol] Cas No. 67-56-1:  
(below cutoff) No exposure standard allocated.

**Biological Limit Values:** No biological limit allocated.

**Engineering Controls:**

General (mechanical) room ventilation is expected to be satisfactory if this material is kept in covered equipment or if the solution is highly diluted. However, if vapours are strong enough to be irritating to the nose (or eyes), the TLV is probably being exceeded and special ventilation may be required.

**Personal Protective Equipment:**

**RESPIRATORY PROTECTION:** Use self-contained breathing apparatus in high vapor concentrations. If self-contained breathing apparatus is not available, a MSHA/NIOSH approved air purifying respirator equipped with

an organic vapor cartridge should be used.

**VENTILATION:** General (mechanical) room ventilation is expected to be satisfactory if this material is kept in covered equipment or if the solution is highly diluted. However, if vapours are strong enough to be irritating to the nose (or eyes), the T L V is probably being exceeded and special ventilation may be required.

**EYE PROTECTION:** Splash proof mono-goggles or safety glasses with side shields in conjunction with a face shield.

**PROTECTIVE GLOVES:** Polyethylene, Nitrile (NBR) or Butyl is recommended.

**OTHER PROTECTIVE EQUIPMENT:** Chemical apron and rubber boots. The laboratory/area of use and storage needs a safety shower, eye bath and general washroom facilities.

## SECTION 9 - PHYSICAL & CHEMICAL PROPERTIES

<b>Appearance:</b>	Transparent, colourless liquid.
<b>Odour:</b>	Sharp, Fruity, Medicinal odour.
<b>pH:</b>	Not available.
<b>Vapour pressure (mm of Hg at °C):</b>	0.03kPa Active Ingredient, 0.20mmHg at 20°C.
<b>Vapour density:</b>	(air=1): 1.1
<b>Boiling point/range (°C):</b>	(760mmHg) ~100.5°C as product.
<b>Freezing/melting point (°C):</b>	~ -21°C.
<b>Solubility:</b>	In water 100% at 20°C.
<b>Specific gravity or density:</b>	(h <sub>2</sub> o=1): 1.129 at 20°C
<b>Flash Point:</b>	Closed cup: Tag closed cup ASTMD56: None Closed cup: Tag closed cup ASTMD 1310: None
<b>Flammable (explosive) limits:</b>	Not available.
<b>Ignition temperature:</b>	Not available.
<b>Additional Information:</b>	
<b>Molecular weight:</b>	100.11g/mol
<b>Evaporation rate:</b>	(Butyl Acetate=1): 1.0

## SECTION 10 - STABILITY AND REACTIVITY

<b>Chemical stability:</b>	Stable under normal conditions of use.
<b>Conditions to avoid:</b>	Avoid evaporation of water. Avoid incompatible materials. Avoid temperatures above 100°C, although polymerization may occur, it is not hazardous.
<b>Incompatible Materials:</b>	Strong alkalis and acids catalyse an aldol-type condensation (exothermic, but not expected to be violent).
<b>Hazardous Decomposition Products:</b>	
	Burning can produce the following products: Carbon monoxide and/or carbon dioxide. Carbon monoxide is highly toxic if inhaled; carbon dioxide in sufficient concentrations can act as an asphyxiant.
<b>Hazardous Reactions:</b>	Will not occur.

## SECTION 11 - TOXICOLOGICAL INFORMATION

### Exposure and Health Effects:

May cause skin sensitization in a small portion of individuals and present as an allergic contact dermatitis. This usually results from contact with the liquid, but occasionally there may be a reaction to glutaraldehyde vapor. Will cause signs and symptoms of an asthmatic attack in hyper-reactive individuals.

### Ingestion:

Moderately toxic. May cause moderate to marked irritation and possibly chemical burns of the mouth, throat, oesophagus, and stomach. There will be discomfort or pain in the chest and abdomen, nausea, vomiting, diarrhea, dizziness, faintness, drowsiness, thirst, weakness, circulatory shock, collapse and coma. Aspiration into the lungs may occur during ingestion or vomiting, resulting in lung injury.

### Inhalation:

Vapor is irritating to the respiratory tract, causing stinging sensations in the nose and throat, discharge from the nose, possibly bleeding from the nose, coughing, chest discomfort and tightness, difficulty with breathing, and headache. Heating the solution may result in more severe irritant effects. Inhalation of material may aggravate asthma and inflammatory of fibrotic pulmonary disease.

### Eye Contact:

Liquid will cause a severe and persistent conjunctivitis, seen as excess redness and marked swelling of the conjunctiva and profuse discharge. Severe corneal injury may develop, which could permanently impair vision if prompt first-aid and medical treatment are not obtained. Vapor will cause stinging sensations in the eye with excess tear production, blinking, and possibly a slight excess redness of the conjunctiva.

### Skin Contact:

Brief contact will cause itching with mild to moderate local redness and possibly swelling. Prolonged contact

may result in pain, severe redness and swelling, with ulceration, tissue destruction, and possibly bleeding into the inflamed area. Contact with solutions of glutaraldehyde may cause harmless yellow or brownish coloration of the skin. Prolonged or widespread contact may result in the absorption of potentially harmful amounts of material. Repeated skin contact may cause a cumulative dermatitis.

**Human/Animal data:**

PERORAL: rat LD50 female 154 (116-206) mg/kg

Major signs: sluggishness, lacrimation, diarrhea, piloerection, perinasal encrustation.

Gross pathology: lungs, stomach, intestines discoloured.

PERORAL: rat LD50 male 246 (179-339) mg/kg

Major signs: sluggishness, lacrimation, diarrhea, piloerection, perinasal encrustation.

Gross pathology: lungs, stomach, intestines discoloured.

PERCUTANEOUS: rabbit LD50 24 hr occluded 2.54 (1.46-.41)ml/kg

Major signs: necrosis at application site.

Gross pathology: lungs, liver, spleen, kidneys discoloured.

INHALATION: dynamic generation of vapor Exposure Time 4h

163 ppm rat female

Room temperature, Kill Rate: 0/5

Major Signs: blepharospasm, periocular wetness, audible respiration.

Gross pathology: None.

INHALATION: static generation of substantially saturated vapour.

Exposure Time 4h rat female, 20°C, Kill Rate: 0/5

Major Signs: blepharospasm.

Gross Pathology: None

INHALATION: dynamic generation of vapor Exposure Time 4h

16.3 ppm rat male

Room temperature, Kill Rate: 0/5

Major Signs: blepharospasm, periocular wetness, audible respiration.

Gross Pathology: None.

INHALATION: static generation of substantially saturated vapour

Exposure Time 4h rat male

20°C, Kill Rate: 0/5

Major Signs: blepharospasm.

Gross Pathology: None

INHALATION: Aerosol Exposure Time 4h, LC50 0.48 (0.41-0.59) ml/l

Major Signs: heavy or irregular breathing, nasal discharge, gasping, nasal encrustation.

Gross Pathology: lungs discoloured.

**IRRITATION:**

SKIN: rabbit 4 hr covered 2/6 with necrosis.

SKIN: rabbit 1 hr occluded minor to severe erythema and oedema. with necrosis, scabbing, desquamation, and alopecia.

SKIN: rabbit 3 min occluded minor erythema.

EYE: rabbit 0.005 ml severe corneal injury, iritis, swelling and necrosis of eyelid.

EYE: rabbit 0.5ml 5% solution in water severe corneal injury, iritis, swelling and necrosis of eyelid.

EYE: rabbit 0.5ml 1% solution in water trace corneal injury.

**SENSITISATION (ANIMAL AND HUMAN STUDIES):**

Guinea Pig Maximization Test: intradermal injection of a 0.1% glutaraldehyde solution and topical administration of a 5% solution. Evidence of delayed contact hypersensitivity in 68% of test animals upon challenge.

**Carcinogenic Category:  
Other Carcinogenic  
Information:**

Not classified as a Carcinogen by the IARC.

Sub chronic drinking water studies in rats, mice and dogs using glutaraldehyde concentrations up to 1000 ppm showed no evidence for any target organ toxicity.

In vitro studies for genotoxicity using a variety of assays have given results varying from no activity, through equivocal, to weakly positive; however, in all vivo studies for genotoxicity have been uniformly negative. Several developmental toxicity studies have demonstrated that a maternally nontoxic doses, glutaraldehyde does not produce foetotoxic, embryotoxic or teratogenic effects. In chronic (2-year) continuous drinking water combined chronic toxicity-oncogenicity study using Fischer 344 rats, there was no evidence for non-oncogenic target organ toxicity. The only possible oncogenicity-related finding was an increase in the incidence of large granular cell lymphocytic leukaemia in female, but not male, rats. The pattern of the response suggests that it does not represent direct chemical carcinogenic activity but, rather, a modifying influence on the expression of this spontaneous and commonly occurring neoplasm in the Fischer 344 rat.

## SECTION 12 – ECOLOGICAL INFORMATION

<b>Ecotoxicity:</b>	Toxic to fish; avoid discharge to natural waters. ECOTOXICITY TO MICRO-ORGANISMS: Bacterial/NA LC50 16 h 50 mg/l ECOTOXICITY TO AQUATIC INVERTEBRATES: Daphnia LC50 48 h 11.5 mg/l CONFIDENCE LIMITS: 9.4 - 14.2 mg/l ECOTOXICITY TO FISH: Blue gill LC50 96 h 22 mg/l
<b>Persistence and degradability:</b>	BOD (% OXYGEN CONSUMPTION): DAY 5: 32% DAY 10: 68% DAY 15: 86% DAY 20: 86% DAY 30: -
<b>Mobility:</b>	Not available.
<b>Additional Information:</b>	THOD (measured) 1.00

## SECTION 13 - DISPOSAL CONSIDERATIONS

### Disposal Methods:

Atomize into a very hot incinerator fire or mix with a suitable flammable solvent, and incinerate where permitted under appropriate Federal, State and local regulations. High water content may dampen flame. Dispose in accordance with all applicable Federal, State, Provincial, and local environmental regulations. Empty containers should be recycled or disposed of through an approved waste management facility.

### Special Precautions/Additional Informational:

Disposal methods identified are for the product as sold. For proper disposal of used material, an assessment must be completed to determine the proper and permissible waste management options permissible under applicable rules, regulations and/or laws governing your location.

## SECTION 14 - TRANSPORT INFORMATION

<b>UN Number:</b>	Not regulated.
<b>UN Proper Shipping Name:</b>	Not regulated.
<b>Class and Subsidiary risk:</b>	Not regulated.
<b>Packing Group:</b>	Not regulated.
<b>Special Precautions for User:</b>	Not available.
<b>Hazchem Code:</b>	4ZE

## SECTION 15 - REGULATORY INFORMATION

**Poison Schedule Number:** None Allocated.

## SECTION 16 - OTHER INFORMATION

**Date of preparation of MSDS:** April 11

### Comments:

### SIGNIFICANT DATA WITH POSSIBLE RELEVANCE TO HUMANS:

Studies in humans have shown that glutaraldehyde is neither phototoxic nor a photosensitizer. Sub chronic drinking water studies in rats, mice and dogs using concentrations up to 1000 ppm showed no evidence for any

target organ toxicity. In vitro studies for genotoxicity using a variety of assays have given results varying from no activity through equivocal, to weakly positive; however, all in vivo studies for genotoxicity have been uniformly negative. Several developmental toxicity studies have demonstrated that at maternally nontoxic doses, glutaraldehyde does not produce foetotoxic, embryotoxic or teratogenic effects. In a two-generation reproduction study involving continuous exposure of CD rats to glutaraldehyde up to 1000 ppm, in drinking water there were effects on parental body weight and food consumption at 1000 ppm (due to an aversion to the taste), but no adverse effects on reproductive performance. In a chronic 2-year) continuous drinking water combined chronic toxicity-oncogenicity study using Fischer 344 rats; there was no evidence for nononcogenic target organ toxicity. The only possible oncogenicity-related finding was an increase in the incidence of large granular cell lymphocytic leukaemia in female, but not male, rats. The pattern of the response suggests that it does not represent direct chemical carcinogenic activity but, rather, a modifying influence on the expression of this spontaneous and commonly occurring neoplasm in the Fischer 344 rat. Repeated applications of aqueous solutions of glutaraldehyde to the rat skin for 20 doses over a 28-day period at 50, 100, or 150 mg/kg/day produced mild local inflammatory effects, but no evidence for target organ or tissue systemic toxicity. An extensive clinical survey has been conducted on nursing staff in 59 endoscopy units (340 currently employed workers and 18 former employees); investigational procedures included detailed questionnaire, sensitization to common allergens, and blood for IgE measurements, lung function tests, peak flow diaries, and measurement of workplace glutaraldehyde vapor concentrations. About two-thirds of current employees had ocular, nasal, or lower respiratory tract symptoms, but these were more prevalent for non-work conditions. The only effect correlated with glutaraldehyde exposure was nasal irritation. There was a slight, but no statistically or biologically significant, decrease in FEV1 for those with lower respiratory tract symptoms. There were no indications of asthma and no objective evidence for respiratory sensitisation.

**List of Publications referenced when creating this MSDS;**

- Hazardous Substances Information System Consolidated Lists: Safe Work Australia.
- APPROVED CRITERIA FOR CLASSIFYING HAZARDOUS SUBSTANCES [NOHSC:1008(2004)] 3rd Edition: National Occupational Health and Safety Commission.
- Dangerous Goods - Initial Emergency Response Guide (SAA/SNZ HB76:1997).
- IATA Dangerous Goods Regulations.
- Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003(1995)].
- Australia Standard for the Uniform Scheduling of Drugs and Poisons [SUSPD] (Australian Government Department of Health and Ageing).

*This Material Safety Data Sheet (MSDS) has been prepared in compliance with the National code of Practice for the Preparation of Material Safety Data Sheets 2<sup>nd</sup> Edition [NOHSC:2011(2003)]. It is the user's responsibility to determine the suitability of this information for adoption of necessary safety precautions. The information published in this MSDS has been compiled from the publications listed in Section 16: to the best of our ability and knowledge these publications are considered accurate. We reserve the right to revise Material Safety Data Sheets as new information becomes available. Copies may be made for non-profit use.*

**... End of MSDS ...**