RW	**Raman & Weil Pvt. Ltd.**

Material Safety Data Sheet

1 Product Identification

Generic name: Glutaraldehyde Solution 2 % w/v
Intended Use of Product: Disinfection
Division: PHARMACEUTICALS
Synonym: Glutaral, Glutaric Dialdehyde
Chemical Family: Aldehydes

2 Composition / Information on Ingredients

Principle Hazardous Component(s) (chemical and common name(s)) (Cas. No)	%	OSHA CEILING mg/m3	ACGIH CEILING mg/m3	OSHA TWA mg/m3	ACGIH TWA mg/m3	NTP	IARC	OSHA regulated
Glutaraldehyde (111-30-8)	2	0.8	0.2	NE	NE	No	No	No
Water (7732-18-5)	>95	NE	NE	NE	NE	No	No	No

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3 Hazards Identification

Emergency overview
Appearance: Transparent, colorless liquid.
Immediate effects: Danger! Corrosive. Causes irreversible eye damage. Cause skin burns. Maybe fatal if swallowed. Prolonged or frequently repeated skin contact may cause allergic reaction in some individuals. Plastic container, if present, may cause static ignition hazard. Aspiration may cause lung damage. Causes asthmatic signs and symptoms in hyper-reactive individuals.

Potential health effects
Primary Routes of entry: Inhalation, ingestion, and skin and eye contact.
Signs and Symptoms of Overexposure:
Eyes: Liquid will cause 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 not obtained. Vapor will cause stinging sensations in the eye with excess tear production, blinking and possibly a slight excess of redness of the conjunctiva.
Skin: Brief contact will cause itching with mild to moderate local redness and possibly swelling. Prolong 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 skin. Skin Absorption: Prolonged or widespread contact may result in the absorption of potentially harmful amounts of material.

Ingestion: Moderately toxic. May cause moderate to marked irritation and possibly chemical burns of the mouth, throat, esophagus and stomach. There will be discomfort or pain in the chest and abdomen, nausea, vomiting, diarrhea, dizziness, faintness, drowsiness, thirst, weakness, circulator 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 nose, possibly bleeding from the nose, coughing, chest discomfort and tightness, difficulty with breathing and headache. Heating the solution may result in more sever irritant effects.
Chronic Exposure: Repeated skin contact may cause a cumulative dermatitis. 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.
Chemical Listed As Carcinogen Or Potential Carcinogen: No
See Toxicological Information (Section11)

Potential environmental effects
See Ecological Information (Section 12)

4 First Aid Measures

If accidental overexposure is suspected
Eye(s) 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.
Inhalation: Remove to fresh air. Give artificial respiration if not breathing. If breathing is difficult, oxygen may be given by qualified professional. Obtain medical attention.
Ingestion: DO NOT INDUCE VOMITING. Do not give anything to drink. Obtain medical attention immediately.

Note to physician
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 dimentary tract with hemorrhage and fluid loss. Also, perforation of the esophagus 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).
Medical Conditions generally Aggravated by Exposure: Skin contact may aggravate an existing dermatitis. Inhalation of material may aggravate asthma and inflammatory of fibrotic pulmonary disease.

5 Fire Fighting Measures

Flash Point: ND
Flammable Limits: ND
Auto-ignition point: ND
Fire Extinguishing Media: Non-flammable (aqueous solution). After water evaporates, remaining material will burn. Use alcohol-type or dl-purpose-type foam, applied by manufacturer's recommended techniques for large fires. Use carbon dioxide in sufficient concentrations can act as an asphyxiant.
Special Fire Fighting Procedures: Use self-contained breathing apparatus and protective clothing.
Unusual Fire and Explosion Hazards: None known.
Hazardous combustion products: Carbon monoxide, carbon dioxide.
DOT Class: 8

6 Accidental Release Measures

Steps to be Taken in Case Material is Released or Spilled: Very low concentrations (5 ppm or less of Glutaraldehyde) can be degraded in a biological waste water treatment system. Small spills can be flushed with large amounts of water. Large Spills: Material should be collected for disposal. It may also be possible to decontaminate spilled material by careful application of sodium hydroxide, ammonium or sodium bisulfate. Depending on conditions, considerable heat and fumes can be liberated by decontamination of reaction. Toxic to fish; avoid discharge to natural waters.
Waste Disposal Methods: Dispose of waste according to Federal, State and Local Regulations.

7 Handling and Storage

Precautions to be Taken in Handling and Storage: Must not be used in the form of a spray or aerosol. Do not get in eyes, on skin or clothing. Avoid breathing vapors. 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 and use adequate ventilation.
Storage temperature: ND
Storage Pressure: ND

8 Exposure Controls/Personal Protections

Ventilation required: 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 vapors are strong enough to be irritating to the nose or eyes, the TLV is probably being exceeded and special ventilation is required.

Personal Protection Equipment
Respiratory protection: Use self-contained breathing apparatus in high vapor concentrations. If apparatus is not available, a MSHA/NIOSH approved air purifying respirator equipped with an organic vapor cartridge should be used.
Protective gloves: Polyethylene, Nitrile (NBR) or Butyl gloves must be worn.
Skin protection: Wear protective chemical apron and rubber boots.
Eye protection: Splash proof mono-goggles or safety glasses with side shields in conjunction with face shield.
Additional clothing and/or equipment: Eye bath and safety shower.

Exposure Guidelines
See Composition/Information on Ingredients (Section2)

9 Physical and Chemical Properties

Appearance and Physical State: Transparent, colorless liquid.
Odor (threshold): Sharp, fruity, medicinal.
Specific Gravity (H2O=1): 1.129 @ 20 °C
Vapor Pressure (mm Hg): 0.03 kPa active ingredient (0.20 mmHg active ingredient)
Vapor Density (air=1): 1.1
Percent Volatile by volume: ND
Evaporation Rate (butyl acetate=1): 1
Boiling Point: 100.5 °C (213 °F) as product.
Freezing point / melting point: -21 °C (-6 °F)
pH: ND
Solubility in Water: 100% @ 20 °C
Molecular Weight: 100.11 g/mol
Chemical Formula: OHCC3H6CHO

10 Stability and Reactivity

Stability: Stable
Conditions to Avoid: High temperatures above 100 °C and evaporation of water.
Materials to Avoid (Incompatibility): Strong alkalies and acids catalyze on aldol-type condensation exothermic, but not expected to be violent).
Hazardous Decomposition Products: ND
Hazardous Polymerization: Will not occur under 100 °C. However, if it does occur, it is not hazardous.

11 Toxicological Information (for Glutaraldehyde Solution 50 % w/v)

Results of component toxicity test performed: Acute Toxicity: (Peroral, Rat): LD50 female 154 (116-206) mg/kg. Major signs: sluggishness, lacrimation, diarrhea, piloerection, perinasal encrustation. Grass pathology: lungs, stomach, intestines discolored. (Peroral, Rat): LD50 male 246 (179-339) mg/kg. Major signs: sluggishness, lacrimation, diarrhea, piloerection, perinasal encrustation. Grass pathology: lungs, stomach, intestines discolored. (Percutaneous, Rabbit): LD50 24hrs occluded 2.54 (1.46-4.41) ml/kg. Major signs: necrosis at application site. Grass pathology: lungs, livers, spleen and kidneys discolored.
(Inhalation, Female Rat): Dynamic generation of vapor.
Exposure Time: 4 hrs 163 ppm
Kill Rate: 0/5
Major Signs: Blepharospasm, periocular wetness, audible respiration.
Grass Pathology: None.
(Inhalation, Female Rat): Static generation of substantially saturated vapor.
Exposure Time: 4hrs @ 20 °C
Kill Rate: 0/5
Major Signs: Blepharospasm
Grass Pathology: None.
(Inhalation, Male Rat): Dynamic generation of vapor
Exposure Time: 4h 16.3 ppm @ room temperature
Kill Rate: 0/5
Major Signs: Blepharospasm, periocular wetness, audible respiration
Gross Pathology: None.
(Inhalation, Male Rat): Static generation of substantially saturated vapor
Exposure Time: 4h @ 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 discolored.

IRRITATION:
(Skin: Rabbit): 4 hr covered 2/6 with necrosis
(Skin, Rabbit): 1 hr occluded minor to severe erythema and edema 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 traces corneal injury

SENSITIZATION:
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.

CHRONIC TOXICITY AND CARCINOGENICITY:
Subchronic 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 fetotoxic, 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. T he only possible oncogenicity-related finding was an increase in the incidence of large granular cell lymphocytic leukemia in female, but not male, rats. T he 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.
Human experience: Studies in humans have shown that glutaraldehyde is neither phototoxic nor a photosensitizer. Subchronic 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 fetotoxic, 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 leukemia 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 endoscope 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 FEVI for those with lower respiratory tract symptoms. There were no indications of asthma and no objective evidence for respiratory sensitization.
This product does not contain any compounds listed by NTP or IARC or regulated by OSHA as a carcinogen.

12 Ecological Information

Ecological Information:
BOD (% Oxygen Consumption)

Day 5	Day 10	Day 15	Day 20	Day 30
32%	68%		86%	

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
Further Information: ThOD (measured) 1.00
Chemical Fate Information: ND

13 Disposal Considerations

RCRA 40 CFR 261 Classification: Not listed. 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. Empty containers should be recycled or disposed of through an approved waste management facility.
Federal, State and local laws governing disposal of materials can differ. Ensure proper disposal compliance with proper authorities before disposal.

14 Transportation Information

US DOT Information: Proper shipping name: Corrosive Liquid, Acidic, Organic, n.o.s. (50% glutaraldehyde solution)
Hazard Class: 8
Packaging group: PG II
UN Number: UN3265
Limitations: ND
IATA: Proper shipping name: Corrosive Liquid, Acidic, Organic, n.o.s. (50% glutaraldehyde solution)
Hazard Class: 8
Packing group: PG II
UN Number: UN3265
Limitations: ND
Domestic shipments only:
IMO: Proper shipping name: Corrosive Liquid, Acidic, Organic, n.o.s. (50% glutaraldehyde solution)
Class: 8
UN Number: UN3265
Packing group: PG II
Marine Pollutant: Yes
Canadian TDG: ND
IMDG Page: ND
Limitations: ND

15 Regulatory Information

MSDS complies with OSHA's Hazard Communication Rule 29, CFR 1910.1200.
SARA: Yes
SARA Title III: Sections 311 and 312: Delayed Hazard: Yes. Fire Hazard: No. Immediate Health Hazard: Yes. Reactive Hazard: No. Sudden Release of Pressure Hazard: No.
RCRA: Not listed
TSCA: All components of this product are on the TSCA inventory or are exempt from TSCA inventory requirements.

CERCLA: None

16 Other Information

Label Information: ND
European Risk and Safety Phrases: ND
European symbols needed: ND
Canadian WHMIS Symbols: ND
HMIS® Rating: Health: 3; Fire: 0; Reactivity: 1
NFPA Rating: Health: 2; Fire: 0; Reactivity: 1
(0=least, 1=Slight, 2=Moderate, 3=High, 4=Extreme)

Abbreviations used in this document
NE= Not established
NA= Not applicable
NIF= No Information Found
ND= No Data

Material Safety Data Sheet

1 Product Identification

Generic name: Glutaraldehyde Solution 2.45% w/v
Intended Use of Product: Disinfection
Division: PHARMACEUTICALS
Synonym: Glutaral, Glutaric Dialdehyde
Chemical Family: Aldehydes

2 Composition / Information on Ingredients

Principle Hazardous Component(s) (chemical and common name(s)) (Cas. No)	%	OSHA CEILING mg/m3	ACGIH CEILING mg/m3	OSHA TWA mg/m3	ACGIH TWA mg/m3	NTP	IARC	OSHA regulated
Glutaraldehyde (111-30-8)	2.45	0.8	0.2	NE	NE	No	No	No
Water (7732-18-5)	>95	NE	NE	NE	NE	No	No	No

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3 Hazards Identification

Emergency overview
Appearance: Transparent, colorless liquid.
Immediate effects: Danger! Corrosive. Causes irreversible eye damage. Cause skin burns. Maybe fatal if swallowed. Prolonged or frequently repeated skin contact may cause allergic reaction in some individuals. Plastic container, if present, may cause static ignition hazard. Aspiration may cause lung damage. Causes asthmatic signs and symptoms in hyper-reactive individuals.

Potential health effects
Primary Routes of entry: Inhalation, ingestion, and skin and eye contact.
Signs and Symptoms of Overexposure:
Eyes: Liquid will cause 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 not obtained. Vapor will cause stinging sensations in the eye with excess tear production, blinking and possibly a slight excess of redness of the conjunctiva.
Skin: Brief contact will cause itching with mild to moderate local redness and possibly swelling. Prolong 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 skin. Skin Absorption: Prolonged or widespread contact may result in the absorption of potentially harmful amounts of material.
Ingestion: Moderately toxic. May cause moderate to marked irritation and possibly chemical burns of the mouth, throat, esophagus and stomach. There will be discomfort or pain in the chest and abdomen, nausea,

vomiting, diarrhea, dizziness, faintness, drowsiness, thirst, weakness, circulator 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 nose, possibly bleeding from the nose, coughing, chest discomfort and tightness, difficulty with breathing and headache. Heating the solution may result in more sever irritant effects.
Chronic Exposure: Repeated skin contact may cause a cumulative dermatitis. 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.
Chemical Listed As Carcinogen Or Potential Carcinogen: No
See Toxicological Information (Section11)

Potential environmental effects
See Ecological Information (Section 12)

4 First Aid Measures

If accidental overexposure is suspected
Eye(s) 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.
Inhalation: Remove to fresh air. Give artificial respiration if not breathing. If breathing is difficult, oxygen may be given by qualified professional. Obtain medical attention.
Ingestion: DO NOT INDUCE VOMITING. Do not give anything to drink. Obtain medical attention immediately.

Note to physician
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 dimentary tract with hemorrhage and fluid loss. Also, perforation of the esophagus 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). Medical Conditions generally Aggravated by Exposure: Skin contact may aggravate an existing dermatitis. Inhalation of material may aggravate asthma and inflammatory of fibrotic pulmonary disease.

5 Fire Fighting Measures

Flash Point: ND
Flammable Limits: ND
Auto-ignition point: ND
Fire Extinguishing Media: Non-flammable (aqueous solution). After water evaporates, remaining material will burn. Use alcohol-type or dl-purpose-type foam, applied by manufacturer's recommended techniques for large fires. Use carbon dioxide in sufficient concentrations can act as an asphyxiant.
Special Fire Fighting Procedures: Use self-contained breathing apparatus and protective clothing.
Unusual Fire and Explosion Hazards: None known.
Hazardous combustion products: Carbon monoxide, carbon dioxide.
DOT Class: 8

6 Accidental Release Measures

Steps to be Taken in Case Material is Released or Spilled: Very low concentrations (5 ppm or less of Glutaraldehyde) can be degraded in a biological waste water treatment system. Small spills can be flushed with large amounts of water. Large Spills: Material should be collected for disposal. It may also be possible to decontaminate spilled material by careful application of sodium hydroxide, ammonium or sodium bisulfate. Depending on conditions, considerable heat and fumes can be liberated by decontamination of reaction. Toxic to fish; avoid discharge to natural waters.
Waste Disposal Methods: Dispose of waste according to Federal, State and Local Regulations.

7 Handling and Storage

Precautions to be Taken in Handling and Storage: Must not be used in the form of a spray or aerosol. Do not get in eyes, on skin or clothing. Avoid breathing vapors. 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 and use adequate ventilation.
Storage temperature: ND
Storage Pressure: ND

8 Exposure Controls/Personal Protections

Ventilation required: 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 vapors are strong enough to be irritating to the nose or eyes, the TLV is probably being exceeded and special ventilation is required.

Personal Protection Equipment
Respiratory protection: Use self-contained breathing apparatus in high vapor concentrations. If apparatus is not available, a MSHA/NIOSH approved air purifying respirator equipped with an organic vapor cartridge should be used.
Protective gloves: Polyethylene, Nitrile (NBR) or Butyl gloves must be worn.
Skin protection: Wear protective chemical apron and rubber boots.
Eye protection: Splash proof mono-goggles or safety glasses with side shields in conjunction with face shield.
Additional clothing and/or equipment: Eye bath and safety shower.

Exposure Guidelines
See Composition/Information on Ingredients (Section2)

9 Physical and Chemical Properties

Appearance and Physical State: Transparent, colorless liquid.
Odor (threshold): Sharp, fruity, medicinal.
Specific Gravity (H2O=1): 1.129 @ 20 °C
Vapor Pressure (mm Hg): 0.03 kPa active ingredient (0.20 mmHg active ingredient)
Vapor Density (air=1): 1.1
Percent Volatile by volume: ND
Evaporation Rate (butyl acetate=1): 1
Boiling Point: 100.5 °C (213 °F) as product.
Freezing point / melting point: -21 °C (-6 °F)
pH: ND
Solubility in Water: 100% @ 20 °C
Molecular Weight: 100.11 g/mol
Chemical Formula: OHCC3H6CHO

10 Stability and Reactivity

Stability: Stable
Conditions to Avoid: High temperatures above 100 °C and evaporation of water.
Materials to Avoid (Incompatibility): Strong alkalies and acids catalyze on aldol-type condensation exothermic, but not expected to be violent).
Hazardous Decomposition Products: ND
Hazardous Polymerization: Will not occur under 100 °C. However, if it does occur, it is not hazardous.

11 Toxicological Information (for Glutaraldehyde Solution 50 % w/v)

Results of component toxicity test performed: Acute Toxicity: (Peroral, Rat): LD50 female 154 (116-206) mg/kg. Major signs: sluggishness, lacrimation, diarrhea, piloerection, perinasal encrustation. Grass pathology: lungs, stomach, intestines discolored. (Peroral, Rat): LD50 male 246 (179-339) mg/kg. Major signs: sluggishness, lacrimation, diarrhea, piloerection, perinasal encrustation. Grass pathology: lungs, stomach, intestines discolored. (Percutaneous, Rabbit): LD50 24hrs occluded 2.54 (1.46-4.41) ml/kg. Major signs: necrosis at application site. Grass pathology: lungs, livers, spleen and kidneys discolored.

(Inhalation, Female Rat): Dynamic generation of vapor.
Exposure Time: 4 hrs 163 ppm
Kill Rate: 0/5
Major Signs: Blepharospasm, periocular wetness, audible respiration.
Grass Pathology: None.
(Inhalation, Female Rat): Static generation of substantially saturated vapor.
Exposure Time: 4hrs @ 20 °C
Kill Rate: 0/5
Major Signs: Blepharospasm
Grass Pathology: None.
(Inhalation, Male Rat): Dynamic generation of vapor
Exposure Time: 4h 16.3 ppm @ room temperature
Kill Rate: 0/5
Major Signs: Blepharospasm, periocular wetness, audible respiration
Gross Pathology: None.
(Inhalation, Male Rat): Static generation of substantially saturated vapor
Exposure Time: 4h @ 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 discolored.
IRRITATION:
(Skin: Rabbit): 4 hr covered 2/6 with necrosis
(Skin, Rabbit): 1 hr occluded minor to severe erythema and edema 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 traces corneal injury

SENSITIZATION:

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.

CHRONIC TOXICITY AND CARCINOGENICITY:

Subchronic 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 fetotoxic, 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. T he only possible oncogenicity-related finding was an increase in the incidence of large granular cell lymphocytic leukemia in female, but not male, rats. T he 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.

Human experience: Studies in humans have shown that glutaraldehyde is neither phototoxic nor a photosensitizer. Subchronic 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 fetotoxic, 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 leukemia 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 endoscope 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 FEVI for those with lower respiratory tract symptoms. There were no indications of asthma and no objective evidence for respiratory sensitization.
This product does not contain any compounds listed by NTP or IARC or regulated by OSHA as a carcinogen.

12 Ecological Information

Ecological Information:
BOD (% Oxygen Consumption)

Day 5	Day 10	Day 15	Day 20	Day 30
32%	68%		86%	

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
Further Information: ThOD (measured) 1.00
Chemical Fate Information: ND

13 Disposal Considerations

RCRA 40 CFR 261 Classification: Not listed. 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. Empty containers should be recycled or disposed of through an approved waste management facility.
Federal, State and local laws governing disposal of materials can differ. Ensure proper disposal compliance with proper authorities before disposal.

14 Transportation Information

US DOT Information: Proper shipping name: Corrosive Liquid, Acidic, Organic, n.o.s. (50% glutaraldehyde solution)
Hazard Class: 8

Packaging group: PG II
UN Number: UN3265
Limitations: ND
IATA: Proper shipping name: Corrosive Liquid, Acidic, Organic, n.o.s. (50% glutaraldehyde solution)
Hazard Class: 8
Packing group: PG II
UN Number: UN3265
Limitations: ND
Domestic shipments only:
IMO: Proper shipping name: Corrosive Liquid, Acidic, Organic, n.o.s. (50% glutaraldehyde solution)
Class: 8
UN Number: UN3265
Packing group: PG II
Marine Pollutant: Yes
Canadian TDG: ND
IMDG Page: ND
Limitations: ND

15 Regulatory Information

MSDS complies with OSHA's Hazard Communication Rule 29, CFR 1910.1200.
SARA: Yes
SARA Title III: Sections 311 and 312: Delayed Hazard: Yes. Fire Hazard: No. Immediate Health Hazard: Yes. Reactive Hazard: No. Sudden Release of Pressure Hazard: No.
RCRA: Not listed
TSCA: All components of this product are on the TSCA inventory or are exempt from TSCA inventory requirements.
CERCLA: None

16 Other Information

Label Information: ND
European Risk and Safety Phrases: ND
European symbols needed: ND
Canadian WHMIS Symbols: ND
HMIS® Rating: Health: 3; Fire: 0; Reactivity: 1
NFPA Rating: Health: 2; Fire: 0; Reactivity: 1
(0=least, 1=Slight, 2=Moderate, 3=High, 4=Extreme)

Abbreviations used in this document
NE= Not established
NA= Not applicable
NIF= No Information Found
ND= No Data