Glyoxal trimer dihydrate

sc-252862

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Glyoxal trimer dihydrate

STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA


SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800
EMERGENCY:
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS
(HC(O)C(O)H)3 · 2H2O, "(1, 4)dioxino[2, 3-b]-1, 4-dioxin-2, 3, 6, 7-tetrol, hexahydro-", "p-dioxino[2, 3-b]-p-dioxin-2, 3, 6, 7-tetrol, hexahydro-", "glyoxal trimeric dihydrate", "ethanedial, trimer, dihydrate", "triethanedial dihydrate", oxalaldehyde

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH 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

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

May cause SENSITISATION by skin contact.
Irritating to eyes, respiratory system and skin.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ The material has NOT been classified as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.
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EYE

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

SKIN

■ This material can cause inflammation of the skin oncontact in some persons.
■ The material may accentuate any pre-existing dermatitis condition.
■ Skin contact is not thought to have harmful health effects, however the material may still produce health damage following entry through wounds, lesions or abrasions.
■ 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.
■ Investigations of skin colouring agents containing glyoxal reveal it to be both a potent irritant and skin sensitiser which gives rise to contact allergies.

INHALED

■ The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

CHRONIC HEALTH EFFECTS

■ Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.
Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung.
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Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
glyoxal trimer dihydrate	4405-13-4	>98
being a polymer of		
glyoxal	107-22-2	

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 Center or a doctor.

EYE

■ If this product comes in contact with the eyes: · Wash out immediately with fresh running water. · Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

SKIN

■ If skin contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN

■ Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Negligible
Upper Explosive Limit (%):	Not available.
Specific Gravity (water=1):	Not available
Lower Explosive Limit (%):	Not available

EXTINGUISHING MEDIA
· Water spray or fog.
· Foam.

FIRE FIGHTING
· Alert Emergency Responders and tell them location and nature of hazard.
· Wear breathing apparatus plus protective gloves.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
· Combustible solid which burns but propagates flame with difficulty.
· Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
Combustion products include: carbon monoxide (CO), carbon dioxide (CO_2), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.
May emit corrosive fumes.

FIRE INCOMPATIBILITY
■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION
Glasses:
Chemical goggles.
Gloves:
Respirator:
Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
· Clean up all spills immediately.
· Avoid breathing dust and contact with skin and eyes.
MAJOR SPILLS
■ Moderate hazard.
· CAUTION: Advise personnel in area.
· Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
· Avoid all personal contact, including inhalation.
· Wear protective clothing when risk of exposure occurs.
Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
· Do NOT cut, drill, grind or weld such containers.
· In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS
· Polyethylene or polypropylene container.
· Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS
· Store in original containers.
· Keep containers securely sealed.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA mg/m³	STEL mg/m³	Notes

US - Oregon Permissible Exposure Limits (Z-3)	glyoxal trimer dihydrate (Inert or Nuisance Dust: Total dust)	10		(d)
US OSHA Permissible Exposure Levels (PELs) - Table Z3	glyoxal trimer dihydrate (Inert or Nuisance Dust: (d) Respirable fraction)	5		
US OSHA Permissible Exposure Levels (PELs) - Table Z3	glyoxal trimer dihydrate (Inert or Nuisance Dust: (d) Total dust)	15		
US - Hawaii Air Contaminant Limits	glyoxal trimer dihydrate (Particulates not other wise regulated - Total dust)	10		
US - Hawaii Air Contaminant Limits	glyoxal trimer dihydrate (Particulates not other wise regulated - Respirable fraction)	5		
US - Oregon Permissible Exposure Limits (Z-3)	glyoxal trimer dihydrate (Inert or Nuisance Dust: Respirable fraction)	5		(d)
US ACGIH Threshold Limit Values (TLV)	glyoxal trimer dihydrate (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10		See Appendix B current TLV/BEI Book
US - California Permissible Exposure Limits for Chemical Contaminants	glyoxal trimer dihydrate (Particulates not otherwise regulated Respirable fraction)	5		(n)
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	glyoxal trimer dihydrate (Particulates not otherwise regulated Respirable fraction)	5		
US - Michigan Exposure Limits for Air Contaminants	glyoxal trimer dihydrate (Particulates not otherwise regulated, Respirable dust)	5		
Canada - Prince Edward Island Occupational Exposure Limits	glyoxal trimer dihydrate (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10		See Appendix B current TLV/BEI Book
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	glyoxal trimer dihydrate (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction)	5		
Canada - British Columbia Occupational Exposure Limits	glyoxal (Glyoxal, Inhalable)	0.1 (V)		S
Canada - Alberta Occupational Exposure Limits	glyoxal (Glyoxal)	0.1		
US - California Permissible Exposure Limits for Chemical Contaminants	glyoxal (Glyoxal, 1,2-ethanedione)	0.1		(s), (u)
Canada - Ontario Occupational Exposure Limits	glyoxal (Glyoxal, inhalable, vapour and aerosol)	0.1		
US AIHA Workplace Environmental Exposure Levels (WEELs)	glyoxal (Glyoxal)	0.1		DSEN
Canada - Nova Scotia Occupational Exposure Limits	glyoxal (Glyoxal)	0.1		TLV Basis: upper respiratory tract irritation; larynx metaplasia
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	glyoxal (Glyoxal, (inhalable fraction++ and vapour))	0.1	0.3	SEN
US ACGIH Threshold Limit Values (TLV)	glyoxal (Glyoxal)	0.1		TLV Basis: upper respiratory tract irritation; larynx metaplasia
Canada - Prince Edward Island Occupational Exposure Limits	glyoxal (Glyoxal)	0.1		TLV Basis: upper respiratory tract irritation; larynx metaplasia

ENDOELTABLE

PERSONAL PROTECTION




RESPIRATOR

Particulate
Consult your EHS staff for recommendations

EYE

· Safety glasses with side shields.
· Chemical goggles.

HANDS/FEET

■ NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
· frequency and duration of contact,
· chemical resistance of glove material,
· glove thickness and
· dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
· Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.
· polychloroprene
· nitrile rubber
· butyl rubber
· fluorocaoutchouc
· polyvinyl chloride
Gloves should be examined for wear and/ or degradation constantly.

OTHER

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

ENGINEERING CONTROLS

· Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
· Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.
Mixes with water.

State	Divided solid	Molecular Weight	246.17
Melting Range (°F)	Not available	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Miscible
Flash Point (°F)	Not available	pH (1% solution)	Not available
Decomposition Temp (°F)	Not available.	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	>1
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

APPEARANCE
White powder; mixes with water. Composed of 3 moles of glyoxal and 2 moles of water in a relatively stable configuration. Sometimes known (incorrectly) as glyoxal monohydrate; free glyoxal is probably unstable and is not commercially available.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY
· Presence of incompatible materials.
· Product is considered stable.

STORAGE INCOMPATIBILITY
■ Glyoxal
· is a powerful reducing and reactive solid of high vapor pressure
· mixtures with air may explode and contact with water produces violent polymerisation
· the pure substance, like formaldehyde, may polymerise exothermically and ignite in storage
· may polymerise at temperatures above boiling point
· reacts, possibly violently with strong acids, caustics, ammonia, amines, amides, aldehydes, chlorosulfonic acid, ethylene amine, hydroxyl-containing materials. Corrosive to metals: aluminium, copper, tin, steel, zinc.
Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

GLYOXAL TRIMER DIHYDRATE

TOXICITY AND IRRITATION
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
■ The main routes of occupational exposure to glyoxal during use as a disinfectant are via inhalation of aerosol and dermal absorption. The general population is exposed mainly through ingestion of glyoxal-containing food, but could be exposed through polluted air in urban regions and through traces of glyoxal in drinking-water.
Glyoxal is endogenously produced during normal cellular metabolism by a multitude of enzyme-independent pathways. Glyoxal is also a product of the metabolism and microsomal oxidation of other compounds, such as glycolaldehyde, ethylene glycol, and beta-hydroxy-substituted N-nitrosamines. The concentration of glyoxal in human blood plasma has been reported to be 0.1-1 µmol/litre, with higher levels reported for patients with diabetes or renal failure. In biological materials, less than 10% of the glyoxal present is in unbound forms in aqueous solution (free glyoxal and hydrates), as most of the reactive carbonyl groups are reversibly bound to cysteinyl, lysyl, and arginyl residues of proteins.
Glyoxal, which attacks amino groups of proteins, nucleotides, and lipids, is considered an important intermediate in the formation of advanced glycation end-products (AGEs). AGE modification alters protein function and inactivates enzymes, resulting in disturbance of cellular metabolism, impaired proteolysis, and inhibition of cell proliferation and protein synthesis. The deleterious effects of the highly reactive glyoxal are counteracted by a ubiquitous glutathione (GSH)-dependent glyoxalase system, which converts glyoxal to the less reactive glycolate.
The acute toxicity of glyoxal in experimental animals is low to moderate, depending on the actual concentration of glyoxal in the tested product. In rats, for 40% glyoxal, the LC50 for a single 4-h inhalation of aerosol is 2440 mg/m3, the oral LD50 value ranges from 3000 to 9000 mg/kg body weight (with higher sensitivity in females), and dermal LD50 values are >2000 mg/kg body weight. After inhalation exposure, local irritations of the eyes and respiratory organs as well as hyperaemia and foamy secretion in the lungs predominate. After oral exposure to glyoxal, macroscopic observations include irritations of the gastrointestinal tract and congestion in the gastrointestinal tract, lung, kidney, and adrenal glands. In the prominent target organs, pancreas and kidney, the toxic action of glyoxal leads to severe degenerative changes resembling those induced during diabetes.
Studies into short-term (29-day) inhalation exposure of rats to glyoxal showed a no-observed-effect level (NOEL) of 0.6 mg/m3 (nominal concentration was 0.4 mg/m3) for local effects in the larynx and a NOEL of >8.9 mg/m3 (nominal concentration was 10 mg/m3) for systemic effects (examination of body weight, haematological and biochemical parameters, urine analysis, macroscopic and histological examination). A 28-day study in which glyoxal was administered to rats in drinking-water resulted in a no-observed-adverse-effect level (NOAEL) of 100 mg glyoxal/kg body weight per day. The 90-day feeding of glyoxal to rats resulted in a NOAEL of 125 mg/kg body weight per day (dosage corresponding to 100% glyoxal). Effects stated at higher dosages in these two latter studies were reduced water and food intake (first study only) and retardation of body weight gain (both studies). In a study examining more sensitive end-points (serum clinical biochemistry), the lowest tested dosage of 107 mg/kg body weight per day (99% glyoxal) corresponded to the lowest-observed-adverse-effect level (LOAEL) for a 90-day exposure of rats via drinking-water. A 90-day feeding study in dogs failed to reveal any substance-related changes at the top dose of 115 mg/kg body weight per day (dose corresponding to 100% glyoxal).
In animal studies, 30% and 40% aqueous glyoxal caused slight to definite skin irritations, depending on the application time. Glyoxal is irritating to mucous membranes and acts as a skin sensitizing agent in humans and experimental animals.
Foetotoxic effects occurred only with doses of glyoxal that induced maternal toxicity. In developmental toxicity studies with rats, a NOEL for embryotoxicity was >300 mg glyoxal dihydrate/kg body weight per day (corresponding to >185 mg glyoxal/kg body weight per day), whereas a lowest-observed-effect level (LOEL) (decreased body weight gain) for maternal toxicity was 200 mg glyoxal dihydrate/kg body weight per day (corresponding to 123 mg glyoxal/kg body weight per day). Developmental toxicity range-finding studies in rabbits yielded a NOEL of 200 mg glyoxal dihydrate/kg body weight per day (corresponding to 123 mg glyoxal/ kg body weight per day) for both maternal toxicity and embryotoxicity.
Glyoxal is directly genotoxic in vitro in bacterial and mammalian cells, inducing, for example, DNA adducts, mutations, chromosomal aberrations, DNA repair, sister chromatid exchanges, and DNA single strand breaks. In vivo, a genotoxic activity of glyoxal was established at the site of application in the pyloric mucosa of rats by demonstration of unscheduled DNA synthesis and DNA single strand breaks. After oral application, DNA strand breaks were further observed in rat liver. There are no carcinogenesis bioassays with inhalation exposure to glyoxal. Glyoxal showed tumour-promoting activity in a two-stage glandular stomach carcinogenesis model in male Wistar rats, whereas it was

inactive in a short-term liver foci assay. In an assay for tumour-initiating activity of glyoxal in skin and in cell transformation assays, glyoxal yielded negative test results.
Taking the 29-day inhalation study in rats exposed to glyoxal, which showed a NOEL of 0.6 mg/m3 for local effects in the larynx, and using uncertainty factors of 10 for interspecies differences and 10 for interindividual differences, a tolerable concentration of 6 µg/m3 for local effects in the larynx for short-term exposure was estimated.
In a sample risk assessment for the general population, an exposure scenario has been compiled as a hypothesized worst case. Using the daily intake of, maximally, 10 mg glyoxal via food, an estimated intake of 0.16 mg glyoxal/kg body weight per day can be calculated. This is similar to the tolerable intake of about 0.2 mg/kg body weight per day for lifetime oral exposure to glyoxal.
In a second sample risk assessment, for a nurse or hospital cleaner or consumer using disinfectant, a typical brand of disinfectant (7.5 g in 100 g = 7.5% glyoxal) is used at a dilution of 1% for disinfection and cleaning of surfaces (i.e., 0.075% glyoxal). Using a rounded-up 0.1% glyoxal solution and a calculation derived from a model gives an uptake of about 4 µg/kg body weight per day, assuming a body weight of 64 kg. This is much (50 times) less than the tolerable intake of about 0.2 mg/kg body weight per day for lifetime oral exposure. However, using a worst-case exposure to 4% glyoxal and the same assumptions as above would give an uptake of about 0.15 mg/kg body weight, which is approximately the same as the tolerable intake of about 0.2 mg/kg body weight per day for lifetime oral exposure.
In the final sample risk assessment, a farmer using a spray application of biocidal products containing glyoxal to disinfect a stable was used as an example. The model calculation using the given assumptions predicts a short-term exposure concentration of 24 µg glyoxal/m3 for a 6-min exposure and 32 µg glyoxal/m3 for a 15-min exposure. This can be compared with the estimated tolerable concentration of 6 µg/m3 for local effects in the larynx for a short-term exposure. There is a perceived risk of local laryngeal effects and irritation to the skin from this spray application of glyoxal.
■ Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type.
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GLYOXAL TRIMER DIHYDRATE:
■ 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.
No significant acute toxicological data identified in literature search.

TOXICITY	IRRITATION
GLYOXAL:	
Oral (rabbit) LD50: 1100 mg/kg	Skin (rabbit): 545 mg(open)-Mild
	Eye (rabbit): 1.87 mg - SEVERE

■ The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause 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.

Section 12 - ECOLOGICAL INFORMATION

No data

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
glyoxal trimer dihydrate	LOW		LOW	HIGH
glyoxal	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions
All waste must be handled in accordance with local, state and federal regulations.
¦ Puncture containers to prevent re-use and bury at an authorized landfill.
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. 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 equipment to enter drains. Collect all wash water for treatment before disposal.
· Recycle wherever possible.
· Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 - REGULATORY INFORMATION

glyoxal trimer dihydrate (CAS: 4405-13-4) is found on the following regulatory lists;
"US - Hawaii Air Contaminant Limits","US - Oregon Permissible Exposure Limits (Z-3)","US OSHA Permissible Exposure Levels (PELs) - Table Z3"
Regulations for ingredients
glyoxal (CAS: 107-22-2) is found on the following regulatory lists;
"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","OECD Representative List of High Production Volume (HPV) Chemicals","US - California Permissible Exposure Limits for Chemical Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US AIHA Workplace Environmental Exposure Levels (WEELs)","US Cosmetic Ingredient Review (CIR) Cosmetic ingredients found safe, with qualifications","US DOE Temporary Emergency Exposure Limits (TEELs)","US DOT Coast Guard Bulk Hazardous Materials - List of Flammable and Combustible Bulk Liquid Cargoes","US EPA High Production Volume Program Chemical List","US EPA Master Testing List - Index I Chemicals Listed","US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives","US Toxic Substances Control Act (TSCA) - Inventory","US TSCA Section 8 (a) - Preliminary Assessment Information Rules (PAIR) - Reporting List","US TSCA Section 8 (d) - Health and Safety Data Reporting"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE
■ Cumulative effects may result following exposure*.
■ Possible respiratory sensitiser*.
* (limited evidence).

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

■ 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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