

6-[Fluorescein-5(6)-carboxamido]hexanoic acid N-hydroxysuccinimide ester

sc-214357



The Power is Question

Material Safety Data Sheet

Hazard Alert Code
Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

6-[Fluorescein-5(6)-carboxamido]hexanoic acid N-hydroxysuccinimide ester

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

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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

C31-H26-N2-O10, "fluorescein-5(6)-carboxamidocaproic acid N-hydroxysuccinimide ester", "fluorescein-5(6)-carboxamidocaproic acid N-succinimidyl ester"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

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

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



CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

May form explosive peroxides.
Irritating to eyes, respiratory system and skin.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- Accidental ingestion of the material may be damaging to the health of the individual.

EYE

- This material can cause eye irritation and damage in some persons.
 - Isopropanol vapour may cause mild eye irritation at 400 ppm.
- Splashes may cause severe eye irritation, possible corneal burns and eye damage.

SKIN

- This material can cause inflammation of the skin on contact in some persons.
 - The material may accentuate any pre-existing dermatitis condition.
 - Skin contact is not thought to have harmful health effects (as classified under EC Directives); 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.

INHALED

- The material can cause respiratory irritation in some persons.
- The body's response to such irritation can cause further lung damage.
- Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
 - 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.
- If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.

CHRONIC HEALTH EFFECTS

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

There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

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. Prime symptom is breathlessness; lung shadows show on X-ray.

Exposure to small quantities may induce hypersensitivity reactions characterised by acute bronchospasm, hives (urticaria), deep dermal wheals (angioneurotic oedema), running nose (rhinitis) and blurred vision. Anaphylactic shock and skin rash (non-thrombocytopenic purpura) may occur. An individual may be predisposed to such anti-body mediated reaction if other chemical agents have caused prior sensitisation (cross-sensitivity).

Repeated exposure to tetrahydrofuran (THF) and related compounds has been associated with liver inflammation and fatty degeneration of the liver. Animal testing suggests that this group of compounds can cause liver damage, irritation of the skin and airway, metabolic imbalance, gynaecological disturbance, damage to the adrenal glands and may increase the rate of cancer.

Cyclic ethers can cause cancers, especially of the liver.

Chronic inhalation or skin exposure to n-hexane may cause damage to nerve ends in extremities, e.g. finger, toes with loss of sensation. Symptoms can progress for months even after removal of exposure, and recovery may take years and may not be complete.

Long term or repeated ingestion exposure of isopropanol may produce incoordination, lethargy and reduced weight gain.

Repeated inhalation exposure to isopropanol may produce narcosis, incoordination and liver degeneration.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
fluorescein-5-carboxamidocaproic acid N-hydroxysuccinimide	114616-31-8	>98
commercial product may contain		

ethyl acetate	141-78-6
n-hexane	110-54-3
isopropanol	67-63-0
tetrahydrofuran	109-99-9

Section 4 - FIRST AID MEASURES

SWALLOWED

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.

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.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin contact occurs

- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

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

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use water delivered as a fine spray to control fire and cool adjacent area.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustible solid which burns but propagates flame with difficulty; it is estimated that most organic dusts are combustible (circa 70%) - according to the circumstances under which the combustion process occurs, such materials may cause fires and / or dust explosions.
- 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 (420 micron or less) may burn rapidly and fiercely if ignited - particles exceeding this limit will generally not form flammable dust clouds.; once initiated, however, larger particles up to 1400 microns diameter will

contribute to the propagation of an explosion.

- In the same way as gases and vapours, dusts in the form of a cloud are only ignitable over a range of concentrations; in principle, the concepts of lower explosive limit (LEL) and upper explosive limit (UEL) are applicable to dust clouds but only the LEL is of practical use; - this is because of the inherent difficulty of achieving homogeneous dust clouds at high temperatures (for dusts the LEL is often called the "Minimum Explosible Concentration", MEC)
- A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people.

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

May emit poisonous fumes.

May emit corrosive fumes.

WARNING Long standing in contact with air and light may result in the formation of potentially explosive peroxides.

FIRE INCOMPATIBILITY

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

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact by using protective equipment.

MAJOR SPILLS

Moderate hazard.

- CAUTION Advise personnel in area.
- Alert Emergency Services and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

The substance accumulates peroxides which may become hazardous only if it evaporates or is distilled or otherwise treated to concentrate the peroxides. The substance may concentrate around the container opening for example.

Purchases of peroxidisable chemicals should be restricted to ensure that the chemical is used completely before it can become peroxidised.

- A responsible person should maintain an inventory of peroxidisable chemicals or annotate the general chemical inventory to indicate which chemicals are subject to peroxidation. An expiration date should be determined. The chemical should either be treated to remove peroxides or disposed of before this date.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.

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.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes
Canada - Ontario Occupational Exposure Limits	fluorescein- 5-carboxamidocaproic acid N-hydroxysuccinimide (Particles (Insoluble or Poorly Soluble) Not Otherwise)		10 (I)						
Canada - British Columbia Occupational Exposure Limits	fluorescein- 5-carboxamidocaproic acid N-hydroxysuccinimide (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))		10 (N)						
Canada - Ontario Occupational Exposure Limits	fluorescein- 5-carboxamidocaproic acid N-hydroxysuccinimide (Specified (PNOS) / Particules (insolubles ou peu solubles) non précisées par ailleurs)		3 (R)						
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	fluorescein- 5-carboxamidocaproic acid N-hydroxysuccinimide (Particulates not otherwise regulated Respirable fraction)		5						
US - California Permissible Exposure Limits for Chemical Contaminants	fluorescein- 5-carboxamidocaproic acid N-hydroxysuccinimide (Particulates not otherwise regulated Respirable fraction)		5						(n)
US - Oregon Permissible Exposure Limits (Z-1)	fluorescein- 5-carboxamidocaproic acid N-hydroxysuccinimide (Particulates not otherwise regulated (PNOR) (f) Total Dust)	-	10						Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.”

US - Michigan Exposure Limits for Air Contaminants	fluorescein- 5-carboxamidocaproic acid N-hydroxysuccinimide (Particulates not otherwise regulated, Respirable dust)		5		
US - Oregon Permissible Exposure Limits (Z-1)	fluorescein- 5-carboxamidocaproic acid N-hydroxysuccinimide (Particulates not otherwise regulated (PNOR) (f) Respirable Fraction)	-	5		Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.”
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	fluorescein- 5-carboxamidocaproic acid N-hydroxysuccinimide (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)		5		
Canada - Alberta Occupational Exposure Limits	ethyl acetate (Ethyl acetate)	400	1440		
Canada - British Columbia Occupational Exposure Limits	ethyl acetate (Ethyl acetate)	150			
US NIOSH Recommended Exposure Limits (RELs)	ethyl acetate ()	400	1400		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	ethyl acetate (Ethyl acetate)	400	1400		
US ACGIH Threshold Limit Values (TLV)	ethyl acetate (Ethyl acetate)	400			TLV® Basis URT & eye irr
US - Minnesota Permissible Exposure Limits (PELs)	ethyl acetate (Ethyl acetate)	400	1400		
US - Vermont Permissible Exposure Limits	ethyl acetate (Ethyl acetate)	400	1400		

Table Z-1-A Transitional Limits for Air Contaminants					
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	ethyl acetate (Ethyl acetate)	400	1400		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	ethyl acetate (Ethyl acetate)	400	1400		
US - California Permissible Exposure Limits for Chemical Contaminants	ethyl acetate (Ethyl acetate)	400	1,400		
US - Idaho - Limits for Air Contaminants	ethyl acetate (Ethyl acetate)	400	1400		
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	ethyl acetate (Ethyl acetate)	400	1440		
US - Hawaii Air Contaminant Limits	ethyl acetate (Ethyl acetate)	400	1,400		
US - Alaska Limits for Air Contaminants	ethyl acetate (Ethyl acetate)	400	1400		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	ethyl acetate (Ethyl acetate)	400		500	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	ethyl acetate (Ethyl acetate)	400	1,400	400	1,400
US - Washington Permissible exposure limits of air contaminants	ethyl acetate (Ethyl acetate)	400		500	

US - Michigan Exposure Limits for Air Contaminants	ethyl acetate (Ethyl acetate)	400	1400		
Canada - Prince Edward Island Occupational Exposure Limits	ethyl acetate (Ethyl acetate)	400			TLV® Basis URT & eye irr
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	ethyl acetate (Ethyl acetate)	400	1400		
Canada - Nova Scotia Occupational Exposure Limits	ethyl acetate (Ethyl acetate)	400			TLV Basis upper respiratory tract & eye irritation
US - Oregon Permissible Exposure Limits (Z-1)	ethyl acetate (Ethyl acetate)	400	1,400		
Canada - Northwest Territories Occupational Exposure Limits (English)	ethyl acetate (Ethyl acetate)	400	1441	500	1801
Canada - British Columbia Occupational Exposure Limits	n-hexane (n-Hexane)	20			Skin
US - Minnesota Permissible Exposure Limits (PELs)	n-hexane (n-Hexane)	50	180		
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	n-hexane (N-HEXANE)	0.6			
US OSHA Permissible Exposure Levels (PELs) - Table Z1	n-hexane (n-Hexane)	500	1800		
US ACGIH Threshold Limit Values (TLV)	n-hexane (n-Hexane)	50			TLV® Basis CNS impair; peripheral neuropathy; eye irr ; BEI

Canada - Alberta Occupational Exposure Limits	n-hexane (n-Hexane)	50	176		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	n-hexane (n-Hexane)	50	180		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	n-hexane (n-Hexane.)	500	1800		
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	n-hexane (n-Hexane)	50	180		
US - California Permissible Exposure Limits for Chemical Contaminants	n-hexane (n-Hexane)	50	180		
US - Idaho - Limits for Air Contaminants	n-hexane (n-Hexane)	500	1800		
US - Hawaii Air Contaminant Limits	n-hexane (n-Hexane)	50	180		
US - Alaska Limits for Air Contaminants	n-hexane (n-Hexane)	50	180		
US - Michigan Exposure Limits for Air Contaminants	n-hexane (n-Hexane)	50	180		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	n-hexane (Hexane (n-hexane))	100	360	125	450
US - Washington Permissible exposure limits of air contaminants	n-hexane (Hexane - n-hexane)	50		75	
Canada - Saskatchewan Occupational Health and	n-hexane (Hexane (n-Hexane))	50		62.5	Skin

Safety
Regulations -
Contamination
Limits

Canada - Prince Edward Island Occupational Exposure Limits	n-hexane (n-Hexane)	50					TLV® Basis CNS impair; peripheral neuropathy; eye irr ; BEI
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	n-hexane (n-Hexane)	500	1800				
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	n-hexane (n-Hexane)	50	176				
US - Oregon Permissible Exposure Limits (Z-1)	n-hexane (Hexane (n-hexane))	500	1,800				
Canada - Northwest Territories Occupational Exposure Limits (English)	n-hexane (Hexane (n-Hexane))	100	352	125	440		
Canada - Nova Scotia Occupational Exposure Limits	n-hexane (n-Hexane)	50					TLV Basis central nervous system impairment; peripheral neuropathy; eye irritation
US NIOSH Recommended Exposure Limits (RELs)	n-hexane ()	100	350			510 1800	[15-minute]
US NIOSH Recommended Exposure Limits (RELs)	n-hexane ()	50	180				
Canada - Alberta Occupational Exposure Limits	isopropanol (2-Propanol (Isopropyl alcohol, isopropanol))	200	492	400	984		
Canada - British Columbia Occupational Exposure Limits	isopropanol (Isopropanol (Isopropyl alcohol) Revised 2003)	200		400			

US - Minnesota Permissible Exposure Limits (PELs)	isopropanol (Isopropyl alcohol)	400	980	500	1225	
US NIOSH Recommended Exposure Limits (RELs)	isopropanol ()	400	980	500	1225	
US ACGIH Threshold Limit Values (TLV)	isopropanol (2-Propanol)	200		400		TLV® Basis Eye & URT irr; CNS impair ; BEI
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225	
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980			
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225	
US - Idaho - Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980			
US - California Permissible Exposure Limits for Chemical Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225	
US - Alaska Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225	
US - Michigan Exposure Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225	
US - Oregon Permissible Exposure Limits (Z-1)	isopropanol (Isopropyl alcohol)	400	980			
US - Hawaii Air Contaminant Limits	isopropanol (Isopropyl alcohol)	400	980	500	1,225	

Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	isopropanol (Isopropyl alcohol - Skin)	400	980	500	1,225	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	isopropanol (Isopropyl alcohol)	200		400		
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	isopropanol (Isopropyl alcohol)	400	985	500	1230	
US OSHA Permissible Exposure Levels (PELs) - Table Z1	isopropanol (Isopropyl alcohol)	400	980			
Canada - Prince Edward Island Occupational Exposure Limits	isopropanol (2-Propanol)	200		400		TLV® Basis Eye & URT irr; CNS impair ; BEI
Canada - Northwest Territories Occupational Exposure Limits (English)	isopropanol (Isopropyl alcohol - Skin)	400	983	500	1228	
Canada - Nova Scotia Occupational Exposure Limits	isopropanol (2-Propanol)	200		400		TLV Basis eye & upper respiratory tract irritation; central nervous system impairment
Canada - Alberta Occupational Exposure Limits	tetrahydrofuran (Tetrahydrofuran)	50	147	100	295	
Canada - British Columbia Occupational Exposure Limits	tetrahydrofuran (Tetrahydrofuran Revised 2005)	50		100		Skin

US NIOSH Recommended Exposure Limits (RELs)	tetrahydrofuran ()	200	590	250	735	
US OSHA Permissible Exposure Levels (PELs) - Table Z1	tetrahydrofuran (Tetrahydrofuran)	200	590			
US ACGIH Threshold Limit Values (TLV)	tetrahydrofuran (Tetrahydrofuran)	50		100		TLV® Basis URT irr; CNS impair; kidney dam
US - Minnesota Permissible Exposure Limits (PELs)	tetrahydrofuran (Tetrahydrofuran)	200	590	250	735	
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	tetrahydrofuran (Tetrahydrofuran)	200	590			
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	tetrahydrofuran (Tetrahydrofuran)	200	590	250	735	
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	tetrahydrofuran (Tetrahydrofuran)	200	590	250	735	
US - California Permissible Exposure Limits for Chemical Contaminants	tetrahydrofuran (Tetrahydrofuran)	200	590	250	735	
US - Idaho - Limits for Air Contaminants	tetrahydrofuran (Tetrahydrofuran)	200	590			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	tetrahydrofuran (Tetrahydrofuran)	100	300			
US - Hawaii Air Contaminant Limits	tetrahydrofuran (Tetrahydrofuran)	200	590	250	735	
US - Alaska Limits for Air Contaminants	tetrahydrofuran (Tetrahydrofuran)	200	590	250	735	

Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	tetrahydrofuran (Tetrahydrofuran)	50	100			Skin
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	tetrahydrofuran (Tetrahydrofuran)	200	590	250	700	
US - Washington Permissible exposure limits of air contaminants	tetrahydrofuran (Tetrahydrofuran)	200		250		
US - Michigan Exposure Limits for Air Contaminants	tetrahydrofuran (Tetrahydrofuran)	200	590	250	735	
Canada - Prince Edward Island Occupational Exposure Limits	tetrahydrofuran (Tetrahydrofuran)	50		100		TLV® Basis URT irr; CNS impair; kidney dam
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	tetrahydrofuran (Tetrahydrofuran)	200	590			
Canada - Nova Scotia Occupational Exposure Limits	tetrahydrofuran (Tetrahydrofuran)	50		100		TLV Basis upper respiratory tract irritation; central nervous system impairment; kidney damage
US - Oregon Permissible Exposure Limits (Z-1)	tetrahydrofuran (Tetrahydrofuran)	200	590			
Canada - Northwest Territories Occupational Exposure Limits (English)	tetrahydrofuran (Tetrahydrofuran)	200	590	250	735	

PERSONAL PROTECTION



RESPIRATOR

- Type AX-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

HANDS/FEET

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include

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

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
- fluorocautchouc

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.

ENGINEERING CONTROLS

■ Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are

Process controls which involve changing the way a job activity or process is done to reduce the risk.

Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.

Does not mix with water.

State	Divided solid	Molecular Weight	586.55
Melting Range (°F)	Not available	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	Not available	pH (1% solution)	Not applicable
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 Vapour Density (air=1)	Not Applicable
Volatile Component (%vol)	Negligible	Evaporation Rate	Not Applicable

Material	Value
N-HEXANE	
log Kow (Sangster 1997)	3.9
ISOPROPANOL	
log Kow (Sangster 1997)	0.05
TETRAHYDROFURAN	
log Kow (Prager 1995)	0.46
log Kow (Sangster 1997)	0.46

APPEARANCE

Solid; does not mix well with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

STORAGE INCOMPATIBILITY

■ For tetrahydrofuran (THF)

- Avoid contact with oxygen, air, light and heat
- Contact with lithium aluminium hydride or with sodium or potassium hydroxide can be hazardous when peroxides are present. THF may polymerise in the presence of cationic initiators such as Lewis acids or strong proton acids.
- Segregate from lithium aluminium hydride, sodium or potassium hydroxide, cationic initiators such as Lewis acids or strong proton acids.
- In the absence of inhibitors tetrahydrofuran is subject to auto-oxidation with the formation of 2-tetrahydrofuryl hydroperoxide . When heated this tends to decompose smoothly but if allowed to accumulate over a considerable period it transforms to other peroxidic species, such as unstable and explosive polyalkylidene peroxide, which violently decompose.
- The unhindered oxygen atom found on cyclic ethers such as the epoxides, oxetanes, furans, dioxanes and pyrans, carries two unshared pairs of electrons - a structure which favors the formation of coordination complexes and the solvation of cations.
- Cyclic ethers are used as important solvents, as chemical intermediate and as monomers for ring-opening polymerization.
- They are unstable at room temperature due to possibility of peroxide formation; stabiliser is sometimes needed for storage and transportation.

NOTE Ethers lacking non-methyl hydrogen atoms adjacent to the ether link are thought to be relatively safe.

- Avoid reaction with oxidising agents

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

Section 11 - TOXICOLOGICAL INFORMATION

fluorescein-5-carboxamidocaproic acid N-hydroxysuccinimide

TOXICITY AND IRRITATION

■ 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.

Topical, oral, and intravenous use of fluorescein usually causes nausea, diarrhoea, hives, acute hypotension, hyper allergic reaction, heart attack and even sudden death. As such, health care staff should use prophylactic antihistamines and always prepare for possible emergency resuscitation to reduce risk and prevent death from emergencies. Adverse reaction is 25 times more common in those with prior adverse reaction and this may be elicited with a pin prick test. Reaction to lip stick containing eosin (which is derived from fluorescein) has caused skin inflammation. Reports have also suggested that eosin may cause photosensitivity.

No significant acute toxicological data identified in literature search.

CARCINOGEN

ethyl acetate	US - Rhode Island Hazardous Substance List	IARC	
n-Hexane	US EPA Carcinogens Listing	Carcinogenicity	
n-Hexane	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	
Diesel fuel, as total hydrocarbons	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A3
n-hexane	US - Rhode Island Hazardous Substance List	IARC	
n-hexane	US - Maine Chemicals of High Concern List	Carcinogen	
n-hexane	US - Maine Chemicals of High Concern List	Carcinogen	A3
n-hexane	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	Inadequate information to assess carcinogenic potential
n-hexane	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	TLV® Basis Dermatitis
Isopropyl alcohol	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	3
Isopropyl alcohol manufacture using strong acids	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	1
2-Propanol	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4
isopropanol	US - Rhode Island Hazardous Substance List	IARC	
ISOPROPYL ALCOHOL (STRONG-ACID PROCESS)	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	IARC
isopropanol	US - Maine Chemicals of High Concern List	Carcinogen	A4
isopropanol	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	TLV® Basis Eye & URT irr; CNS impair ; BEI
isopropanol	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	TLV Basis eye & upper respiratory tract irritation; central nervous system impairment
Tetrahydrofuran	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A3
tetrahydrofuran	US - Rhode Island Hazardous Substance List	IARC	
tetrahydrofuran	US - Maine Chemicals of High Concern List	Carcinogen	A3

tetrahydrofuran	US - Maine Chemicals of High Concern List	Carcinogen	
tetrahydrofuran	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	TLV® Basis URT irr; CNS impair; kidney dam
tetrahydrofuran	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	TLV Basis upper respiratory tract irritation; central nervous system impairment; kidney damage
SKIN			
n-hexane	US ACGIH Threshold Limit Values (TLV) - Skin	Skin Designation	Yes
n-hexane	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	TLV® Basis CNS impair; peripheral neuropathy; eye irr ; BEI
n-hexane	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	TLV® Basis Dermatitis
n-hexane	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	Yes
n-hexane	Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
n-hexane	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	Yes
n-hexane	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	Yes
n-hexane	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S
n-hexane	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1
tetrahydrofuran	US ACGIH Threshold Limit Values (TLV) - Skin	Skin Designation	Yes
tetrahydrofuran	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	TLV® Basis URT irr; CNS impair; kidney dam
tetrahydrofuran	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	Yes
tetrahydrofuran	Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
tetrahydrofuran	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	Yes
tetrahydrofuran	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	Yes
tetrahydrofuran	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

Section 12 - ECOLOGICAL INFORMATION

No data

Ecotoxicity

Ingredient	Persistence:	Persistence: Air	Bioaccumulation	Mobility
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	Water/Soil			
ethyl acetate	LOW	HIGH	LOW	HIGH
n-hexane	LOW	No Data Available	MED	MED
isopropanol	LOW	MED	LOW	HIGH
tetrahydrofuran	LOW	No Data Available	LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

B. Component Waste Numbers

When ethyl acetate is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U112 (waste code I).

When tetrahydrofuran is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U213 (waste code I).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

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. In most instances the supplier of the material should be consulted.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

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

Section 15 - REGULATORY INFORMATION

fluorescein-5-carboxamidocaproic acid N-hydroxysuccinimide (CAS: 114616-31-8) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Guidelines","Canada - Alberta Ambient Air Quality Objectives","Canada - British Columbia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada National Pollutant Release Inventory (NPRI)","US - California Permissible Exposure Limits for Chemical Contaminants","US - Michigan Exposure Limits for Air Contaminants","US - Oregon Permissible Exposure Limits (Z-1)","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US Clean Air Act (CAA) National Ambient Air Quality Standards (NAAQS)"

Regulations for ingredients

ethyl acetate (CAS: 141-78-6) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada National Pollutant Release Inventory (NPRI)","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","IMO MARPOL 73/78"

(Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) - High Production Volume List", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD List of High Production Volume (HPV) Chemicals", "US - Alaska Limits for Air Contaminants", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - Connecticut - Regulations Concerning the Designation of Controlled Drugs - Volatile substances", "US - Connecticut Hazardous Air Pollutants", "US - Delaware Pollutant Discharge Requirements - Reportable Quantities", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances (English)", "US - North Dakota Air Pollutants - Guideline Concentrations", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Discarded Chemical Products List - ""U"" Chemical Products", "US - Washington Permissible exposure limits of air contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US Cosmetic Ingredient Review (CIR) Cosmetic ingredients found safe as used", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "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 Everything Added to Food in the United States (EAFUS)", "US FDA Maximum Recommended Therapeutic Dose (MRTD) Database", "US FMA Air Freshener Fragrance Ingredient Survey Results", "US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards", "US -Texas Air Monitoring Comparison Values for Evaluating Carbonyls", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory", "US TSCA Section 4 - Chemicals Subject to Testing Consent Orders", "US TSCA Section 4/12 (b) - Sunset Date/Status", "WHO Food Additives Series - Flavouring agents considered for specifications only"

n-hexane (CAS: 110-54-3) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Objectives", "Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada National Pollutant Release Inventory (NPRI)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances", "US - Alaska Limits for Air Contaminants", "US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Louisiana Minimum Emission Rates Toxic Air Pollutants", "US - Louisiana Toxic Air Pollutant Ambient Air Standards", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances (English)", "US - North Dakota Air Pollutants - Guideline Concentrations", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Permissible exposure limits of air contaminants", "US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values", "US - Wisconsin Control of Hazardous Pollutants - Emission Thresholds, Standards and Control Requirements (Hazardous Air Contaminants)", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Carcinogens Listing", "US EPA Master Testing List - Index I Chemicals Listed", "US EPA Master Testing List - Index II Chemicals Removed", "US EPCRA Section 313 Chemical List", "US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US -Texas Air Monitoring Comparison Values for Evaluating Carbonyls"

isopropanol (CAS: 67-63-0) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Objectives", "Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Industrial Hazardous Substances", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada CEPA Environmental Registry Substance Lists - List of substances on the DSL that meet the human health criteria for categorization (English)", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada National Pollutant Release Inventory (NPRI)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 18: List of products to which the Code does not apply", "IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances", "IMO Provisional Categorization of Liquid Substances - List 2: Pollutant only mixtures containing at least 99% by weight of components already assessed by IMO", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD List of High Production Volume (HPV) Chemicals", "US - Alaska Limits for Air Contaminants", "US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for Which Emissions Must Be Quantified", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California OEHHA/ARB - Acute Reference Exposure

Levels and Target Organs (RELs),"US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs),"US - California Permissible Exposure Limits for Chemical Contaminants","US - California Toxic Air Contaminant List Category II","US - Connecticut - Regulations Concerning the Designation of Controlled Drugs - Volatile substances","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances (English)","US - North Dakota Air Pollutants - Guideline Concentrations","US - Oregon Permissible Exposure Limits (Z-1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","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 EPA Master Testing List - Index II Chemicals Removed","US EPCRA Section 313 Chemical List","US FDA Everything Added to Food in the United States (EAFUS)","US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives","US FMA Air Freshener Fragrance Ingredient Survey Results","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act","US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide","US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory","US TSCA Section 4/12 (b) - Sunset Date/Status","US TSCA Section 8 (d) - Health and Safety Data Reporting"

tetrahydrofuran (CAS: 109-99-9) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada CEPA Environmental Registry Substance Lists - List of substances on the DSL that meet the human health criteria for categorization (English)","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada National Pollutant Release Inventory (NPRI)","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","IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk","OECD List of High Production Volume (HPV) Chemicals","US - Alaska Limits for Air Contaminants","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California Permissible Exposure Limits for Chemical Contaminants","US - Connecticut Hazardous Air Pollutants","US - Delaware Pollutant Discharge Requirements - Reportable Quantities","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Massachusetts Oil & Hazardous Material List","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances (English)","US - North Dakota Air Pollutants - Guideline Concentrations","US - Oregon Permissible Exposure Limits (Z-1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Discarded Chemical Products List - ""U"" Chemical Products","US - Washington Permissible exposure limits of air contaminants","US - Wisconsin Control of Hazardous Pollutants - Emission Thresholds, Standards and Control Requirements (Hazardous Air Contaminants)","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)","US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides","US DOE Temporary Emergency Exposure Limits (TEELs)","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 FDA List of ""Indirect"" Additives Used in Food Contact Substances","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory","US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements","US TSCA Section 4 - Chemicals Subject to Testing Consent Orders","US TSCA Section 4/12 (b) - Sunset Date/Status","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

- Inhalation and/or ingestion may produce health damage*.
- Cumulative effects may result following exposure*.
- Limited evidence of a carcinogenic effect*.

* (limited evidence).

- 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.

■ For detailed advice on Personal Protective Equipment, refer to the following U.S. Regulations and Standards:

OSHA Standards - 29 CFR:

1910.132 - Personal Protective Equipment - General requirements

1910.133 - Eye and face protection

1910.134 - Respiratory Protection

1910.136 - Occupational foot protection

1910.138 - Hand Protection

Eye and face protection - ANSI Z87.1

Foot protection - ANSI Z41

Respirators must be NIOSH approved.

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