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## SECTION 1 - PRODUCT IDENTIFICATION

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PRODUCT NAME: PART #70 Styrene Monomer

CHEMICAL NAME: Styrene

CHEMICAL FAMILY: Aromatic hydrocarbons

SYNONYMS: Cinnamene, Vinylbenzene, Ethenylbenzene

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## SECTION 2 – COMPOSITION/INFORMATION ON INGREDIENTS

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COMPONENT NAME	CASE #	EUROPEAN UNION INVENTORY NUMBER	CONCENTRATION BY WEIGHT/MOL %		
			AVG.	MIN.	MAX.
Styrene	100-42-5	EINECS 202-851-5		99.8	
P-Tertiary Butyl Catechol	98-29-3	EINECS 202-653-9			0.01

\*Concentration of gaseous products or materials is given in Mole %  
Compositions given are typical values not specifications.

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## SECTION 3 - HAZARD IDENTIFICATION

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**EMERGENCY OVERVIEW:** This material is HAZARDOUS by OSHA Communication definition.

**SIGNAL WORD:** DANGER

**HAZARDS:** Potential cancer hazard. CNS depressant. Moderate skin irritant. Aspiration hazard. Avoid heat, high temperatures and shocks.

**HEALTH:** 2  
**FLAMMABILITY:** 3  
**REACTIVITY:** 2

**PHYSICAL STATE:** Liquid

**COLOR:** Colorless

**ODOR:** Aromatic, sweet odor

**POTENTIAL HEALTH EFFECTS**

**ROUTES OF EXPOSURE:** Skin. Eye Inhalation.

**SIGNS AND SYMPTOMS OF ACUTE EXPOSURE:** See component summary

- Styrene: It may cause irritation to the respiratory tract and to other mucous membranes. Moderate eye irritant. Moderate skin irritant. Slight ingestion hazard.

**SKIN:** May cause moderate skin irritation. Not expected to be a sensitizer. Not a skin absorption hazard.

**INHALATION:** Vapors may cause irritation of the eyes, nose and throat as well as CNS depression (fatigue, dizziness, loss of concentration, with collapse, coma and death possible in cases of severe overexposure). High vapor concentrations may be irritation to the upper respiratory tract. May lead to potentially fatal cardiac sensitization.

**EYE:** Moderate eye irritant. Effects of eye irritation are reversible.

**INGESTION:** Ingestion may cause discomfort and irritation of the gastrointestinal tract and CNS depression (fatigue, dizziness, collapse, coma and death). Aspiration into the lung may cause fatal chemical pneumonitis. May lead to potentially fatal cardiac sensitization.

**CHRONIC HEALTH EFFECTS:** See component summary.

- Styrene: This material has been classified by IARC as a group 2B substance (possibly carcinogenic to humans). Repeated or prolonged exposure to styrene may cause nausea, loss of appetite, CNS depression and general weakness.

**CONDITIONS AGGRAVATED BY EXPOSURE:** Any pre-existing conditions affecting target organs:

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## SECTION 4 - FIRST AID MEASURES

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**GENERAL:** Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid. For specific information refer to the Emergency Overview in Section 3 of the MSDS.

**INHALATION:** If overcome by exposure, remove victim to fresh air immediately. Give oxygen or artificial respiration as needed. Obtain medical attention if breathing difficulty persists.

**EYE:** Thoroughly flush the eyes with large amounts of clean low-pressure water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation persists, seek medical attention.

**SKIN:** Promptly remove soiled clothing/wash thoroughly before reuse. Wash skin thoroughly with mild soap and water. Flush with lukewarm water for 15 minutes. If sticky, use waterless cleaner first. Seek medical attention if ill effect or irritation develops.

**INGESTION:** If large quantity swallowed, give lukewarm water (pint/½ liter) if victim completely conscious/alert. Do not induce vomiting. Risk of damage to lungs exceeds poisoning risk. Obtain emergency medical attention.

#### **NOTE TO PHYSICIAN**

Do not induce vomiting. Gastrointestinal decontamination in accidental petroleum distillate ingestions is not recommended, because of the severe aspiration hazard. Gastric lavage is indicated in those patients who require decontamination. Be sure that an endotracheal tube is in place prior to lavage; use cuffed tubes in patients over 7 years of age. All contaminated clothing should be removed, and contaminated skin areas washed with lipophilic soap, or green soap, and water. If ingested, cardiac and respiratory status must be continuously monitored. Be prepared to give oxygen and, if necessary, intubate. A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax.

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## **SECTION 5 - FIRE FIGHTING MEASURES**

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**FLAMMABILITY:** OSHA/NFPA Class IC flammable liquid.

**CLASSIFICATION FLASH POINT/METHOD:** ~32°C (90°F) (Closed Cup)

**AUTO-IGNITION TEMPERATURE:** 490°C (914°F)

**FLAMMABLE LIMITS:** Lower – 1.1 vol% Upper – 6.1 vol%

**HAZARDOUS COMBUSTION PRODUCTS:** Thermal decomposition may produce carbon monoxide and other toxic vapors.

**SPECIAL CONDITIONS TO AVOID:** Releases flammable vapors below normal ambient temperatures. May polymerize explosively when involved in a fire.

**EXTINGUISHING MEDIA:** Suitable – SMALL FIRE: Use dry chemical CO<sub>2</sub>, water spray or regular foam. LARGE FIRES: Water spray, water fog and/or foam.  
Unsuitable – Do not use solid water stream.

**FIRE FIGHTING INSTRUCTIONS:** Protective Equipment/Clothing – Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighter's protective clothing will only provide limited protection.

**Instructions** – Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Always stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles, if this is impossible, withdraw from area and let fire burn.

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## SECTION 6 - ACCIDENTAL RELEASE MEASURES

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**RELEASE RESPONSE:** Flammable liquid. Release will cause immediate fire/explosion. Eliminate all sources of ignition. All equipment used when handling this product must be grounded. Do not touch or walk through spilled materials. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material.

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## SECTION 7 - HANDLING AND STORAGE

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**HANDLING:** May autopolymerize if uninhibited, heated or involved in a fire. Autopolymerization will be accompanied by evolution of heat, which may cause release of styrene vapors forming flammable mixtures with air. Do not handle near heat, sparks or flame. Avoid contact with incompatible agents. Use only with adequate ventilation/personal protection. Avoid contact with eyes, skin and clothing. Do not enter storage area unless adequately ventilated. Metal containers involved in the transfer of this material should be grounded and bonded. Containers that have held styrene monomer must be thoroughly cleaned, drained and dried to prevent fire hazard from residue.

**STORAGE:** Monitor inhibitor to maintain appropriate concentration. Keep containers tightly closed when not in use and store in a well-ventilated area. Isolate incompatible materials such as oxidizers. Containers should be clearly labeled. Metal containers used to store this material should be grounded.

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## SECTION 8 - EXPOSURE CONTROLS AND PERSONAL PROTECTION

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**ENGINEERING CONTROLS:** Use process enclosures, local exhaust ventilation or other engineering controls to keep airborne levels below recommended exposure limits.

**PERSONAL PROTECTION**

**INHALATION:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 or ANSI Z88.2 requirements must be followed whenever workplace conditions warrant respirator use.

**SKIN:** Wear chemical resistant gloves such as: Viton(TM). When skin contact is possible, protective clothing including gloves, apron, sleeves, boots, head and face protection should be worn.

**EYE:** Eye protection such as chemical splash goggles and/or face shield must be worn when possibility exists for eye contact due to splashing or spraying liquid, airborne particles or vapor.

**ADDITIONAL REMARKS:**

Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using the toilet facilities. Promptly remove soiled clothing/wash thoroughly before reuse.

**OCCUPATIONAL EXPOSURE LIMITS:**

COMPONENT NAME:	SOURCE/DATE	VALUE/UNITS	TYPE	NOTATION	CARCINOGENIC LISTING*
Styrene	US(ACGIH)/2004	20 ppm	8 HRS/TWA	BEI	2
	US(ACGIH)/2004	40 ppm	15 MIN/STEL	BEI	
	US(OSHA)/2004	100 ppm	8 HRS/TWA	NO	
	US(ACGIH)/2004	200 ppm	CEILING	NO	
P-Tertiary Butyl Catechol	US(ACGIH)	N/L			N/L
	US(OSHA)	N/L			

\*1 = OSHA 2=IARC 3=NTP 4=OTHERS,N/L = NOT LISTED See Section 11 for more information

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**SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES**

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Appearance: Liquid. Colorless

Odor: Aromatic, sweet odor

Odor Threshold: Not Data Available

pH: Not applicable.

Boiling Point/Boiling Range: approx 146 deg C (294.8 deg F) @ 760 mm Hg

Freezing Point/Melting Point: approx -31 deg C (-23.8 deg F)  
Flash Point: approx 32 deg C (89.6 deg F) (TCC)  
Auto-ignition: approx 490 deg C (914 deg F)  
Flammability: OSHA/NFPA Class IC flammable liquid.  
Lower Flammable Limit: approx 1.1 vol%  
Upper Flammable Limit: approx 6.1 vol %  
Explosive Properties: Not Applicable. No Data Available  
Relative Density: approx 0.90 @ 25 deg C (77 deg F) (water = 1)  
Relative Vapor Density: approx 3.6 @ 15 – 20 deg C (59 – 68 deg F) (Air = 1.0)  
Viscosity: No Data Available  
Solubility (Water): Negligible (Less Than .1 Percent)  
Partition Coefficient (Kow): approx 3.02  
Additional Physical and Chemical Properties: Additional properties may be listed in Sections 3 and 5.

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## SECTION 10 - STABILITY AND REACTIVITY

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**CHEMICAL STABILITY:** This product is stable with an appropriate level of TBC inhibitor (minimum 10 ppm), but reactive (unstable) without. Contact a company sales representative for information regarding adequate inhibitor levels and methods of making inhibitor level determinations.

**CONDITIONS TO AVOID:** May autopolymerize if uninhibited, heated or involved in a fire. Autopolymerization will be accompanied by evolution of heat, which may cause release of styrene vapors forming flammable mixtures with air. Depleted inhibitor levels. Extended contact with air or oxygen. Contaminants. High temperatures and severe oxidizing conditions. Avoid static discharge or other sources of ignition.

**SUBSTANCES TO AVOID:** Peroxides. Strong oxidizing agents. Pure oxygen. Contaminants and catalysts for vinyl polymers. Sulfuric acid. Alkali metal-graphite compounds. Aluminum chloride. Strong acids. Strong alkalies. Copper. Copper alloys. Rubber.

**DECOMPOSITION PRODUCTS:** On decomposition, emits acrid fumes.

**HAZARDOUS POLYMERIZATION:** May occur.

**REACTIONS WITH AIR AND WATER:** May react with oxygen to form peroxides.

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## SECTION 11 - TOXICOLOGICAL INFORMATION

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### PRODUCT SUMMARY

Styrene is of moderate acute toxicity in animals. Inhalation exposure may cause dizziness and CNS depression, while ingestion may be fatal if aspiration into the lung occurs. It may increase the sensitivity of the heart to endogenous catecholamines

leading to potentially fatal cardiac sensitization. It is moderately irritating to skin and eye. Repeat inhalation studies demonstrate that mouse nose and lung are highly sensitive to styrene vapor, while responses in the rat are much less pronounced. Specialist investigations provide evidence of mild, permanent hearing loss in rats after repeated exposure to very high concentrations of vapor. Minor impairment of color discrimination has been identified in some studies of workers occupationally exposed to styrene. The available animal and human data demonstrate it is not selectively toxic toward the fetus, nor does it impact reproduction. Results from genotoxicity tests are generally negative with no consistent or conclusive evidence of genetic damage in exposed worker populations. Chronic inhalation resulted in hyperplasia and fibrosis and an increased incidence of late onset lung tumors in mice, which are believed to have arisen through a non-genotoxic mechanism. Tumor incidence in rats was unaffected after chronic inhalation exposure.

**COMPONENT SUMMARY:**

Styrene

LC50 (inhl)	Mouse	9,500 GM/M3	4 Hours
	Rat	12 GM/M3	4 hours
LD50 (Oral)	Rat	2,650 GM/KG	
	Mouse	316 MG/KG	

**IRRITATION:** Skin Moderate skin irritant. No significant signs or symptoms indicative of any health hazard are expected to occur as a result of skin absorption exposure. Not expected to be a sensitizer. Repeated or prolonged contact with skin may cause dermatitis.

Eye Moderate eye irritant. Effects of eye irritation are reversible.

Target Organ Effects

Cardiac sensitization. Nervous system. Nasal cavity. Lung. Eye. Skin.

**Repeated Dose Toxicity**

Results from repeat-dose toxicity studies demonstrate that the mouse is highly sensitive to styrene-induced toxicity, with hyperplasia and fibrosis in lung tissue and atrophy and degeneration of nasal olfactory epithelium after chronic exposure. Mild nasal changes were also observed in the rat. Mechanistic studies demonstrate greater formation of locally toxic products in mouse nose and lung, and provide a metabolic basis for these species differences in susceptibility (negligible metabolism likely in human respiratory tract). Specialist investigations provide evidence of mild, concentrations of styrene (2.6 mg/l; 600 ppm), but no consistent evidence of neurological or behavioral changes. Minor impairment of color discrimination has been reported in workers occupationally exposed to styrene. However the magnitude of the change is small suggesting it is of negligible toxicological or clinical significance.

**Reproductive Effects**

Results from reproductive toxicity studies in rats exposed via drinking water or inhalation have shown that styrene is not selectively toxic to the testis or ovary, nor does it adversely affect fertility or litter parameters. Histopathological examination of reproductive tissue from rats and mice revealed no adverse changes following sub-chronic or chronic inhalation exposure. Studies in male workers exposed to styrene provide no evidence of a link between internal body burden and reproductive function.

### **Development Effects**

Results from animal studies demonstrate that styrene is not a teratogen, nor is it fetotoxic at sub-maternally-toxic treatment levels. No selective effects on nervous system development have been reported. Some indication of developmental delay was observed in pups from dams exposed to 500 ppm styrene (equivalent to 300 mg/kg bwt), however these findings were attributed to decrease pup body weight rather than a selective effect of styrene on the unborn child.

### **Genetic Toxicity**

The genotoxic potential of styrene has been investigated extensively. While results from in vitro tests were mostly negative, occasional positive findings have been reported presumably reflecting conversion of styrene to styrene oxide. In vivo studies in rats, mice and hamsters generally show no increase in chromosomal aberrations or micronuclei after single or repeated inhalation, oral or intraperitoneal exposure, however simultaneous assessment of sister chromatid exchanges resulted in a weakly positive result in some of these same studies. Investigations of genetic damage in exposed worker populations provide no consistent or conclusive evidence for the genotoxicity of styrene in humans.

### **Carcinogenicity**

The carcinogenic potential of styrene has been investigated in several rodent bioassays, including two recent inhalation regulatory guideline studies using rats and mice. Results for the rat provide no evidence of carcinogenicity, whereas data from the mouse indicate an increase in late-onset tumors in the lung (no other organ affected). These tumors occurred in the presence of hyperplasia and inflammatory changes which were not observed in rats. Mechanistic studies demonstrate that mouse lung converts styrene to a locally-toxic metabolite, capable of causing chronic inflammation and hyperplasia. Pulmonary metabolism is negligible in rat lung and virtually all mechanism was responsible for the species-specific, tissue-specific tumors found in the mouse. Listed by IARC as possibly carcinogenic to humans (Group 2B), based on limited evidence of carcinogenicity in humans and experimental animals.

P-Tertiary Butyl Catechol 98-29-3

Acute Toxicity – Lethal Doses

LD50 (Oral) Rat 2, 820 mg/kg

Irritation

Skin Severe skin irritant.

Eye Severe eye irritant.

Target Organ Effects

Skin. Eye. Respiratory system.

Repeated Dose Toxicity

No Known chronic health effects.

Carcinogenicity

Not listed by IARC, NTP, or OSHA

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## **SECTION 12 - ECOLOGICAL INFORMATION**

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### **Product Information**

Ecotoxicity

Toxic to fish, invertebrates and microorganisms, however, substantial aquatic exposure is not expected based on the volatile nature of this material. See component summary.

Environmental Fate and Pathways  
See component summary.

**TOXICITY TO FISH:/AMPHIBIANS**

<u>Test Type</u>	<u>Species</u>	<u>Value/Units</u>
LC50/96 Hours	Fathead minnow	32 mg/l

**TOXICITY TO AQUATIC: INVERTERBRATES:**

<u>Test Type</u>	<u>Species</u>	<u>Value/Units</u>
EC50/48Hours	Daphnia	23 mg/l

**TOXICITY TO AQUATIC: Plants**

<u>Test Type</u>	<u>Species</u>	<u>Value/Units</u>
NOEC/192 Hours	Algae	>200 mg/l

Environmental Fate and Pathway

Mobility

Transport between environmental compartments: The atmosphere is the main environmental compartment for releases of styrene. In water, volatilization will result in substantial losses to the atmosphere with a half-life of approximately 4 hours. A calculated Koc value of 350 indicates no significant potential for geoaccumulation.

Persistence and Degradability

Biodegradation: Readily biodegradable in aerobic conditions.

Bioaccumulation: This material is not expected to bioaccumulate.

P-Tertiary Butyl Catechol 98-29-3

Ecotoxicity

No Data Available

Environmental Fate and Pathway

No Data Available

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**SECTION 13 - DISPOSAL CONSIDERATION**

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Contaminated product, soil, water, container, residues and spill cleanup materials may be hazardous wastes. Comply with federal/state/local regulations for container disposal.

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**SECTION 14 - TRANSPORT INFORMATION**

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**Special Requirements**

If you reformulate or further process this material, you should consider re-evaluation of the regulatory status of the components listed in the composite section of this sheet, based on final composition of your product.

Proper Shipping Name Styrene monomer, stabilized  
RQ STYRENE  
ID No. UN2055  
Hazard Class 3  
PG III

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## SECTION 15 - REGULATORY INFORMATION

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### Regulatory Status

Country	Inventory
Australia	AICS X
Canada	DSL X
Canada	NDSL
China	IECS X
European Union	EINECS X
European Union	ELINCS
European Union	NLP
Japan	ENCS X
Korea	ECL X
Phillippines	PICCS X
United Status	TSCA X

If identified components of this product are listed under the TSCA 12 (b) Export Notification rule, they will be listed below. Export notification required.

tert-Butylcatechol (CASRN 98-29-3) TSCA section 4

### SARA 302/304

This material contains a component(s) with known CAS numbers classified as hazardous substances subject to the reporting of CERCLA (40 CFR 302) and/or to the release reporting requirements of SARA (Section 302) based on reportable quantities (RQs).

#### Component

Styrene / CAS# 100-42-5 RQ 1,000 lbs

**SARA – SECTION 313 EMISSIONS REPORTING:** The material contains the following chemicals with known CAS numbers subject to the reporting requirements of SARA Title III, Section 313 and 40 CFR 372.

<u>Component Summary</u>	<u>Reporting Threshold</u>
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Styrene/CAS#100-42-5	0.1%
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**SARA – SECTION 311/312:** Based upon available information, this material is classified as the following health and/or physical hazards according to Section 311 & 312.

Immediate (Acute) Health Hazard  
Delayed (Chronic) Health Hazard  
Fire Hazard  
Reactive

### **STATE REPORTING**

- This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins under California Proposition 65 at levels which would be subject to the proposition.
- Hazardous Substances listed by the State of Pennsylvania must be identified when present in materials at levels greater than the state specified criterion. The criterion is  $\geq 1\%$ . Components with CAS numbers in this material at a level which could require reporting under the state are:

Styrene/CAS#100-42-5

- Environmentally Hazardous Substances listed by the State of Pennsylvania must be identified when present in materials at levels greater than the state specified criterion. The criterion is  $\geq 1\%$ . Components with CAS numbers in this material at a level which could require reporting under the state are:

Styrene/CAS#100-42-5

- Massachusetts Substances List (MSL) – Extraordinarily hazardous substances on the MSL-EHL must be identified when present in materials at levels greater than state specified criterion. The criterion is  $\geq 0.0001\%$ . Components with CAS numbers present in this material at a level which could require reporting under the statute are:

Styrene/CAS#100-42-5

- Massachusetts Substances List (MSL) – Hazardous substances on the MSL must be identified when present in materials at levels greater than state specified criterion. The criterion is  $\geq 1\%$ . Components with CAS numbers in this material at a level which could require reporting under the state are:

Styrene/CAS#100-42-5

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### **SECTION 16 – OTHER INFORMATION**

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**DISCLAIMER OF RESPONSIBILITY:** This document is generated for the purpose of distributing health, safety, and environmental data. It is not a specification sheet nor should any displayed data be construed as a specification. The information on this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, expressed or implied, regarding its correctness. Some information presented and conclusions drawn herein are from sources other than direct

test data on the substance itself. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage, or expense arising out or in any way connected with handling, storage, use or disposal of this product. If the product is used as a component in another product, this MSDS information may not be applicable.

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## **SECTION 17 - COMMENTS**

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The information accumulated herein is believed to be accurate, but is not warranted to be whether originating with Fibre Glast Developments or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.