



SHOWA DENKO K.K.

13-9, Shiba Daimon 1-chome,
Minato-Ku, Tokyo,
105-8518, Japan

Date of issue : 2016/06/07

SAFETY DATA SHEET

1. Identification of the substance/preparation and of the company/undertaking

Trade name : RIGOLAC™ H-297
 Company/undertaking identification : SHOWA DENKO K.K.
 Address : 13-9, Shiba Daimon 1-chome, Minato-Ku, Tokyo, 105-8518, Japan
 Department name : Functional Chemicals Division Functional Polymers Department
 Tel. : +81-3-5403-5600
 Fax : +81-3-5403-5720
 Emergency number : +81-270-32-1151 (holiday and night) (Isesaki Plant)
 Recommended uses and restrictions : Industrial use
 Reference no. : FPPI-41340 JP-EN

2. Hazards identification

[GHS classification]

Physical hazards : Flammable liquids, Category 3
 Health hazards : Acute toxicity (inhalation:vapour) Category 4
 : Skin corrosion/irritation, Category 2
 : Serious eye damage/eye irritation, Category 2A
 : Germ cell mutagenicity, Category 2
 : Reproductive toxicity, Category 1B
 : Specific target organ toxicity — single exposure, Category 1
 (central nervous system)
 : Specific target organ toxicity — Single exposure, Category 3, (Respiratory tract irritation)
 : Specific target organ toxicity — Repeated exposure, Category 1
 (respiratory system, liver, nervous system, blood)
 Environmental hazards : Hazardous to the aquatic environment — Acute Hazard, Category 2
 Other hazards than mentioned above are Not applicable or No data available.

[GHS label elements]

Hazard pictograms



Signal word

: Danger

Hazard statements

: (H226) Flammable liquid and vapour
 (H315) Causes skin irritation
 (H319) Causes serious eye irritation
 (H332) Harmful if inhaled
 (H335) May cause respiratory irritation
 (H341) Suspected of causing genetic defects
 (H360) May damage fertility or the unborn child
 (H370) Causes damage to organs (central nervous system)
 (H372) Causes damage to organs (respiratory system, liver, nervous system, blood) through prolonged or repeated exposure
 (H401) Toxic to aquatic life

Precautionary statements

Prevention precautionary statements

: (P201) Obtain special instructions (SDS) before use
 (P202) Do not handle until all safety precautions have been read and understood
 (P210) Keep away from heat/sparks/open flames/hot surfaces. - No smoking
 (P233) Keep container tightly closed
 (P240) Ground/bond container and receiving equipment
 (P241) Use explosion-proof electrical/ventilating/lighting equipment
 (P242) Use only non-sparking tools
 (P243) Take precautionary measures against static discharge
 (P260) Do not breathe dust/fume/gas/mist/vapours/spray
 (P264) Wash hands, forearms and face thoroughly after handling

Response Precautionary Statements	:	(P270) Do not eat, drink or smoke when using this product
	:	(P271) Use only outdoors or in a well-ventilated area
	:	(P273) Avoid release to the environment
	:	(P280) Wear protective gloves/protective clothing/eye protection/face protection
	:	(P302+P352) If on skin: Wash with plenty of soap and water
	:	(P303+P361+P353) If on skin or hair: Immediately take off all contaminated clothing. Rinse skin with water/shower
	:	(P304+P340) If inhaled, remove to fresh air and keep at rest in a position comfortable for breathing
	:	(P305+P351+P338) If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
	:	(P308+P311) IF exposed or concerned: Call a POISON CENTER/doctor
	:	(P308+P313) IF exposed or concerned: Get medical advice/attention
Storage precautionary statements	:	(P312) Call a POISON CENTER or doctor/physician if you feel unwell
	:	(P332+P313) If on skin and if skin irritation occurs, seek medical advice and attention
Disposal precautionary statements	:	(P337+P313) If eye irritation persists: Get medical advice/attention
	:	(P362+P364) Take off contaminated clothing and wash it before reuse
	:	(P370+P378) In case of fire: Use carbon dioxide (CO ₂), dry extinguishing powder, dry sand, alcohol resistant foam, Water spray for extinction
	:	(P403+P233) Store in a well-ventilated place. Keep container tightly closed
	:	(P403+P235) Store in a well-ventilated place. Keep cool
	:	(P405) Store locked up
	:	(P501) Dispose of contents/container in accordance with local / regional / national / international regulations.

3. Composition/information on ingredients

Distinction of substance or mixture	:	Mixture
Generic name	:	Unsaturated polyester resin

Name	CAS No	Conc.	Formula	Kanpo-number	
Unsaturated polyester	Confidential	64 - 68%	Confidential	Confidential	Existing Chemical Substance
Styrene	100-42-5	34%	CH ₂ =CH-C ₆ H ₅	(3)-4	Existing Chemical Substance

4. First aid measures

First-aid measures after inhalation	:	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell, seek medical advice
First-aid measures after skin contact	:	Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse Seek medical attention if irritation develops
First-aid measures after eye contact	:	Rinse eyes immediately with low pressured flowing water for over 15 minutes. Consult an eye specialist
First-aid measures after ingestion	:	Rinse mouth with water, do not induce vomiting, call a doctor If the person vomits, keep body inclined to avoid inhaling the vomit into the lung. The vomit can hurt lung.
Personal Protection in First Aid and Measures	:	Wear suitable protective clothing, gloves and eye or face protection Wear respiratory protection

Most Important Symptoms/Effects

Most Important Symptoms/Effects	:	Dizziness, headaches, nausea, red flare, weakness, deterioration of consciousness, asthma, lung edema.
Other medical advice or treatment	:	Keep quiet and prolonged medical observation is needed.

5. Fire fighting measures

Extinguishing media

Suitable extinguishing media	:	carbon dioxide (CO ₂), Dry extinguishing powder, dry sand, alcohol resistant foam, Water spray
Unsuitable extinguishing media	:	Do not use water jet

Fire hazard

Fire hazard	:	Heat may cause pressure rise with explosion of container On burning: release of harmful/irritant gases/vapours
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Advice for firefighters

Firefighting instructions	:	Early fire: use dry extinguishing powder, carbon dioxide (CO ₂), dry sand. Massive fire: use alcohol resistant foam to shut off air.
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- Personal protection : Apply water spray or fog to cool nearby equipment
 (Emergency response) : Move undamaged containers from immediate hazard area if it can be done safely
 : Use a self-contained breathing apparatus and also a protective suit
 : Do the fire fighting from windward side to avert inhale a hazardous gas

6. Accidental release measures

Personal Precautions, Protective Equipment and Emergency Procedures

- General measures : Wear suitable protective clothing, gloves and eye or face protection
 : Do the operation from windward side and evacuate persons around leeward side area
 : Prepare extinguishing medias in preparation for ignition.
- Environmental precautions : Pay attention that products never flow out to river etc. and never cause influence to the environment

Methods and Equipment for Containment and Cleaning up

- For containment : Recover small spills with a suitable absorbent, like diatomaceous earth. Scoop absorbed substance into closing containers.
 : In the case of a large amount leakage, fenced by a clod or cloth and prevent the flowing. Collect leaking and spilled liquid in sealable containers
- Prevention Measures for Secondary Accidents : Eliminate all ignition sources if safe to do so
 : Prepare extinguishing medias in preparation for ignition.
 : Notify authorities if liquid enters sewers or public waters.

7. Handling and storage

Handling

- Technical measures : Provide ventilation system and use necessary personal protective equipment as described in "8. Exposure controls / Personal protection equipment."
- Precautions for safe handling : Do not handle until all safety precautions have been read and understood
 : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
 : Don't handle a container roughly, as falling down, falling damage in loading and dragging. Never touch, inhale and eat.
- Local and general ventilation : Treat in the local ventilation area, or in the place operating the general ventilation system

Storage precautionary statements

- Storage conditions : Keep out of direct sunlight
 : Store in a cool, well-ventilated place
 : Comply with relevant laws such as Fire Service Law and Industrial Safety and Health Law.
- Material used in packaging/containers : Use containers provided by Fire Service Law and United Nations Recommendations on the Transport of Dangerous Goods.

8. Exposure controls / Personal protection equipment

Products

- Japan administration level : No information
 Exposure limits : No information

Unsaturated polyester

- Japan administration level : No information
 Exposure limits (JSOH) : No information
 Exposure limits (ACGIH) : No information

Styrene

- Japan administration level : 20ppm
 Exposure limits (JSOH) : 20ppm(85mg/m³)(skin)
 Exposure limits (ACGIH) : TWA 20 ppm, STEL 40 ppm

Appropriate engineering controls

- : Install the local exhaust ventilation in handling area
 : Emergency safety showers should be available in the immediate vicinity of any potential exposure
 : Install hand-washing and eye-washing etc. station

Protective equipment

- Respiratory protection : Approved organic vapour respirator. Self contained breathing apparatus. air-supplied respirator.
- Hand protection : Oleum-proof gloves
- Eye protection : tightly fitting safety goggles
- Skin and body protection : Non-static creating clothing and conductive shoes should be worn

9. Physical and chemical properties

Appearance	: Liquid (Thick liquid)
Colour	: Light yellow
Odour	: Hydrocarbons, aromatic
pH	: not applicable
Melting point	: -30.6°C (styrene)
Boiling point	: 145°C (styrene)
Flash point	: 32°C (seta closed cup)
Explosive limits (g/m ³)	: No data
Explosive limits (vol %)	: 0.7 - 6.8vol% (styrene)
Vapour pressure	: 0.7kPa (20°C) (styrene)
Relative vapour density at 20 °C	: 3.59 (air=1, 20°C) (styrene)
Specific gravity density	: 1.0 - 1.2 (25°C)
Solubility	: Not soluble in water. Soluble in organic solvents.
Log Pow	: logPow=2.95 (styrene)
Auto-ignition temperature	: 490°C (styrene)
Decomposition temperature	: No data available
Viscosity	: 0.4 - 0.6 Pa.s (25°C)

10. Stability and reactivity

Reactivity	: Can polymerise exothermically if heated, exposed to air, sunlight or by addition of free radical initiators
Chemical stability	: Stable under sealed condition in a cool, well-ventilated place.
Possibility of hazardous reactions	: No data available
Conditions to avoid	: Light (daylight). Overheating. Static electrical charge. Do not use perforated, permeable or soluble materials.
Incompatible materials	: Do not use peroxides in excess amount for curing.
Hazardous decomposition products	: Carbon monoxide. Carbon dioxide.

11. Toxicological information**Toxicological information of Products**

: No information about all of the items

Toxicological information of Unsaturated polyester resin

: No information about all of the items

Toxicological information of styrene

Acute toxicity (oral)	: Rat, LD50 = 5000 mg/kg (Initial Risk Assessment of the Chemical Substances)
Acute toxicity (inhalation:vapour)	: Rat, LC50 (4hr) = 2770 ppm (11690 mg/m ³) (Initial Risk Assessment of the Chemical Substances)
Skin corrosion/irritation	: Severe irritation and partial degeneration were observed in a skin irritation study using the rabbit. (Initial Risk Assessment of the Chemical Substances)
Serious eye damage/irritation	: Moderate conjunctival irritation and damage lasted for 7 days in an eye irritation study using the rabbit. (Initial Risk Assessment of the Chemical Substances)
Skin sensitization	: No information.
Respiratory sensitization	: No information.
Germ cell mutagenicity	: Positive in the observation of bone marrow cell in chromosome aberration study by inhalation exposure in the rat. (Initial Risk Assessment of the Chemical Substances) Positive in the observation of bone marrow cell and etc., in sister chromatid exchange analysis by inhalation exposure in the mouse. (Initial Risk Assessment of the Chemical Substances) Positive in sperm morphology aberration assay in the mouse and rat. (Initial Risk Assessment of the Chemical Substances) Negative in Ames test using salmonella typhimurium. (Initial Risk Assessment of the Chemical Substances)
Carcinogenicity	: Carcinogenicity classification of IARC: Group 2B (possibly carcinogenic to humans). Carcinogenicity classification of ACGIH: A4 (not classifiable as a human carcinogen) No significant increase was detected in the mortality and etc., in the followup survey of 40688 workers who were exposed to styrene in 660 factories in EU. (EU-RAR)
Reproductive toxicity	: No effect was noted in parental animals of 250 ppm treated group (F0) but significant decrease in survival rate was noted in pups (F1) in three-generation reproduction study using rat (administration by drinking-water). (Initial Risk Assessment of the Chemical Substances) Aberration in righting reflex and such many parameters of behavioral tests was noted in pups of the groups treated at 50 ppm and above in inhalation exposure study in the

- rat during day 7-21 of pregnancy. (Initial Risk Assessment of the Chemical Substances)
 Increase of embryonic/fetal mortality and skeletal variation in F1 generation were noted in 250 ppm treated group in inhalation exposure test in the mouse during 6-16 day of pregnancy. (Initial Risk Assessment of the Chemical Substances)
 Decrease of number of sperm in epididymis, etc., were noted in 200 mg/kg/day group in 60-day oral dose administration study in male rat. NOAEL is 100 mg/kg/day. (Initial Risk Assessment of the Chemical Substances)
- Specific target organ toxicity : Tremor, loss of consciousness and such effect to central nervous system, irritation to
 -single exposure eye, nose and lung were noted in inhalation exposure studies in the mouse, rat and the guinea-pig. (Initial Risk Assessment of the Chemical Substances)
 Delayed response to visual and auditory stimulation was noted at and above 50 mL/m³ in 1.5-hour inhalation exposure study in volunteers. (Initial Risk Assessment of the Chemical Substances)
- Specific target organ toxicity : Styrene causes chronic bronchitis, obstructive lung damage and disorder of digestive
 -repeated exposure function in stomach by long-term inhalation exposure. (Initial Risk Assessment of the Chemical Substances)
 Decrease of thrombocyte and etc., were noted in the workers at styrene resin plant (estimated exposure concentration at 100-300 ppm). (Initial Risk Assessment of the Chemical Substances)
 Functional disorder was noted in neuropsychiatric functional examination in the workers who were exposed to the substance at 10-300 ppm in the plant. (Initial Risk Assessment of the Chemical Substances)
 Necrosis of hepatocyte was noted at 259 ppm in 14-day inhalation exposure test in the mouse. (Initial Risk Assessment of the Chemical Substances)
- Aspiration hazard : If liquid styrene is swallowed, chemical pneumonia may be caused due to aspiration to lung. (ICSC)

12. Ecological information

Ecological information of Products

: No information about all of the items

Ecological information of Unsaturated polyester resin

: No information about all of the items

Ecological information of Styrene

- Ecological information : Fish (fathead minnow) LC50(96hr), 4.02mg/L (Initial Risk Assessment of the Chemical Substances)
 Crustacea (Daphnia magna) EC50(48hr), 4.7mg/L (Initial Risk Assessment of the Chemical Substances)
 Algae (Selenastrum) ErC50(72hr) 4.9mg/L, (Initial Risk Assessment of the Chemical Substances)
- Persistence/degradability : Readily biodegradable in 2-weeks biodegradation study in accordance with Chemical Substance Control Law. (Safety Assessment Data of Existing Chemical Substance)
- Bioaccumulative potential : BCF = 13.5 (golden fish), 37 (calculation) (Initial Risk Assessment of the Chemical Substances)
 Octanol/water partition coefficient:
 logPow=2.95 (measured value), 2.89 (calculated value) (Initial Risk Assessment of the Chemical Substances)
- Mobility in soil : Soil absorption coefficient, Koc=960 (HSDB)
- Hazardous to the ozone layer : No information.

13. Disposal considerations

- Ecology - waste materials : Dispose of contents/container under national government /prefectural and city governments /cities, towns and villages regulations.
 Dispose of contents/container in accordance with licensed collector's sorting instructions.
- Contaminated container and packaging : Assure disposal complies with applicable regulations.
 Empty the packaging completely prior to disposal.
 Dispose of contents/container in accordance with licensed collector's sorting instructions.

14. Transport information

- International Regulations
- UN-No. (ADR) : 1866
- Class (ADR) : 3
- Proper Shipping Name (ADR) : RESIN SOLUTION flammable

Packing group (UN)	: III
Domestic regulations	
Precautions for transport	Based on relevant regulations in section 15, transport this product.
Other information	
ERG-No	: 128
Special precautions for user	: Load containers without turnover, drop and friction. Take measure certainly to prevent containers from collapsing. Check if there are no leaks. Keep containers tightly closed.

15. Regulatory information

Japanese Pollutant Release and Transfer Register Law (PRTR Law)	: Class 1 Designated Chemical Substances (Act Art.2 para. 2, Enforcement Order Art.1 Appended Table No.1) Styrene (34%)
Industrial Safety and Health Law	: Group 2 Specified Chemical Substance, Special Organic Solvents (Ordinance on Prevention of Hazards Due to Specified Chemical Substances Art.2 Para.1, Items 2, 3-2, 3-3) Styrene Working Environment Evaluation Standards, Administrative Control Levels (Law Art.65-2, Para.1) Styrene Harmful Substances Whose Names Are to be Indicated on the Label (Law Art.57, Para.1, Enforcement Order Art.18) Styrene Dangerous Substances - Flammable Substance (Enforcement Order Attached Table 1 Item 4) Styrene Substances with Health Hazards Prevention Guideline (Law Art.28 Para 3, MHLW Published Guideline) Styrene Notifiable Substances (Law Art.57-2, Enforcement Order Art.18-2 Attached Table No.9, and Law Art.56-1) Styrene Specified Chemical Substances, Special Control Substances (Ordinance on Prevention of Hazards Due to Specified Chemical Substances Art.38-3) Styrene
Japanese Poisonous and Deleterious Substances Control Law	: Not applicable
Chemical Substances Control Law	: Priority Assessment Chemical Substances (Article 2, Paragraph (5) of the Act) Styrene
Water Pollution Prevention Law	: Designated Materials (Article 2, Paragraph 4 of the Law, Article 3-3 of the Enforcement Order) Styrene
Fire Service Law	: Group 4 - Flammable liquids - 2nd Class petroleum - Insoluble (Law Art.2 Para.7, Attached Table 1, Group 4)
Offensive Odor Control Law	: Specified Offensive Odor Substances (Law Art.2-1, Enforcement Order Art.1) Styrene
Air Pollution Control Law	: Volatile Organic Compounds (Law Art.2 Para.4) (MOE Official Notice to Prefectures) Styrene
Law Relating to Prevention of Marine Pollution and Maritime Disasters	: Flammable Substances (Law Art.3,(6)-2, Enforcement Order, Art.1-7, Attached Table No.1-4) Styrene Noxious Liquid Substances - Category Y (Law Art.3(3), Enforcement Order, Art.1-2, Attached Table No.1 Item 2) Styrene
Ship Safety Act	: Flammable liquids
Civil Aeronautics Law	: Flammable liquids
Port Regulation Law	: Flammable liquids
Road Act	: Restriction for Vehicle Traffic (Enforcement Order Art.19-13, Publication of Japan Highway Public Corp.)
Law for the Control of Export, Import and Others of Specified Hazardous Wastes and Other Wastes (Basel Convention)	: Hazardous Substances Containing in Waste (Act Cat.2 para (1) Item (I) (a), 3 Ministry Notification No.2 of 1993) Styrene

Labor Standards Act : Chemical Substances Causing Occupational Illnesses (Act Art.75, Para.2, Ordinance Attached Table 1-2, Item 4-1, MHLW Notification No.36 of 1978)
Styrene

16. Other information

Name	TSCA	EC No	IECSC
Unsaturated polyester	Not listed	Not applicable	Not listed
Styrene	Listed	202-851-5	Listed

Company	SHOWA DENKO K.K.
Address	13-9, Shiba Daimon 1-chome, Minato-Ku, Tokyo, 105-8518, Japan
Departments	Functional Chemicals Division Functional Polymers Department
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The statements, contents, figures and other physical and chemical properties are not guaranteed. Hazard assessment, which has been prepared on the basis of documents and other information currently available data, it does not cover all the documents were not so, please use caution when handling.

This is a translation of original Safety Data Sheet prepared in Japanese. (JIS Z 7253-2012)

When using the product outside Japan, it must be handled in accordance with applied laws and regulations in that country or territory .