SPI Supplies Division
Structure Probe, Inc.
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Manufacturer's CAGE: 1P573

Safety Data Sheet

Date Effective: January 3, 2017

SPI # 02815-AB, 02815-NA, 02815-FA
SPI-Chem™ ERL 4221 Epoxy Plasticizer

Component of:
02680-AB SPI-Chem™ Low Viscosity Kit, Spurr Formula Kit I
02682-AB SPI-Chem™ Ultra-Low Viscosity Kit, n-OSA Formulation
02690-AB SPI-Chem™ Ultra-Low Viscosity Kit, Spurr Formula Kit II,

Section 1.1: Identification

Chemical Name/Synonyms ..... ERL-4221; Cycloaliphatic Epoxide Resin ERL-4221;
..... 7-Oxabicyclo[4.1.0]heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0]hept-3-yl methyl ester

Product or Trade Name ERL-4221

CAS No. 2386-87-0
EC No. 219-207-4

Chemical Formula..... $C_{14}H_{20}O_4$

Section 1.2: Relevant Uses/Restrictions

Epoxide resin for use in embedding for the microscopy laboratory.

Section 1.3: Supplier of the Safety Data Sheet

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Section 1.4: Emergency telephone number

Emergencies
Contacting CHEMTREC:

24 Hour Emergency Use Only #'s...
Worldwide phone: 1-(703)-741-5970
Toll-free phone: 1-(800)-424-9300 USA + Canada only

Section 2: Hazard Identification

2.1 Classification of the substance

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin sensitizer (category 1)

Acute aquatic toxicity (category 3)

2.2 Label elements

Pictogram

Signal Word: Warning

Hazard statements:

H317 May cause an allergic skin reaction
H402 Harmful to aquatic life

Precautionary statements:

P261	Avoid breathing dust/fume/gas/mist/vapors/spray
P273	Avoid release to the environment
P280	Wear protective gloves
P333+P313	If skin irritation or rash occurs: Get medical advice/attention
P501	Dispose of contents/container to an approved waste disposal plant

2.3 Other Hazards:

Hazardous Material Information System USA

Health 2
Fire Hazard 1
Reactivity 0
Personal Protection .....

NFPA Rating (estimated)

Health 2
Flammability..... 1
Reactivity 0

Section 3: Composition

Chemical Name	CAS No.	EC No.	Concentration
7-oxabicyclo[4.1.0] heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0]hept-3-yl methyl ester	2386-87-0	219-207-4	>99.7%
3-Cyclohexene-1-carboxylic acid, 3-cyclohexen-1-ylmethyl ester	2611-00-9		<0.3 %

Section 4: First Aid Measures

4.1 Description of first aid measures:

Eye Contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an eye doctor.

Skin Contact: Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands.

Inhalation: Move person to fresh air. If effects occur, consult a physician.

Ingestion: Rinse mouth with water and consult a physician.

4.2 Most important symptoms and effects, both acute and delayed: No additional information available.

4.3 Indication of any immediate medical attention and special treatment needed:

Notes to Physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

Section 5: Fire Fighting Measures

5.1 **Extinguishing Media: Water fog or fine spray.** Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Do not use direct water stream since it may spread fire. Alcohol resistant foams (ATC type) are preferred. General=-purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

5.2 **Fire Fighting Procedures:** Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire-affected zone until fire is out and danger of re-ignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Do not use direct water stream since it may spread fire. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage.

5.2 **Special hazards arising from the substance or mixture:** Container may rupture from polymerization. Violent steam generation or eruption may occur with application of direct water stream to hot liquids.

Hazardous combustion products: During a fire, smoke my contain the original material in addition to combustion products of varying composition which may be toxic and/ or irritating. Combustion products may include and are not limited to: Carbon monoxide and carbon dioxide.

5.3 Advice for firefighters

Special protective equipment and precautions for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire-fighting clothing (includes fire-fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire-fighting operations. If contact is likely, change to full chemical resistant fire-fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant section.

Section 6: Accidental Release Measures

6.1 Personal precautions: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment.

6.2 Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater.

6.3 Methods and material for containment and cleaning up: Contained spilled material if possible. Collect in suitable and properly labeled containers.

6.4 Reference to other sections

See Section 7, Handling, for additional precautionary measures.
See Section 8, Exposure Controls and Personal Protection, for additional information.
See Section 12, Ecological Information, for additional information.
See Section 13, Disposal Considerations, for additional information.

Section 7: Handling and Storage

7.1 Precautions for safe handling

Protective measures: Avoid prolonged or repeated contact with skin.
Avoid contact with eyes.

Advice on general hygiene conditions: Wash thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities:

Storage Temperature: 0-30 °C
Use within 36 months

7.3 Specific end uses

Epoxide resin for use in embedding for the microscopy laboratory.
This material is not being offered for clinical or diagnostic applications, agricultural uses or for human or animal consumption.

Section 8: Exposure Controls and Personal Protection

8.1 Control parameter and Personal Protection:

Workplace exposure limits: Contains no substances with occupational exposure limit values.

Biological limit values: No available information.

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Ventilation: Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations.

8.2.2 Individual protection measures

Eye/Face Protection: face shield and safety glasses that comply with government standards Such as NIOSH (US) or EN 166 (EU).

Skin Protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly. Items which cannot be decontaminated, such as shoes, belts and watchbands, should be removed and disposed of properly.

Hand Protection: Use chemical resistant gloves classified under Standard EN374: Protective gloves against chemicals and micro-organisms. Examples of preferred glove barrier materials include: Butyl rubber, Ethyl vinyl alcohol laminate ("EVAL"), Nitrile/butadiene rubber ("nitrile" or "NBR"), Neoprene, Polyvinyl chloride ("PVC" or "vinyl"). When prolonged or frequently repeated contact may occur, a glove with a protection class of 6 (breakthrough time greater than 480 minutes according to EN 374) is recommended. When only brief contact is expected, a glove with a

Protection class of 1 or higher (breakthrough time greater that 10 minutes according to EN 374) is recommended. NOTICE: The selection of a specific glove for a Particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals, which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/ specifications provided by the glove supplier.

Respiratory Protection: Not required with good general ventilation.

Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

8.2.3 Environmental exposure controls: No additional relevant information available.

Section 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance: Colorless liquid

Odor: Odorless

Odor threshold: Not applicable

pH: No test data available

Melting point/Freezing point: Not applicable to liquids

Boiling point/Boiling point range: > 250 °C Estimated (760 mmHg)

Flash Point – Closed cup: 118 °C Pensky-Martens Closed Cup ASTM D 93

Evaporation rate: No data available

Flammability (solid, gas): No data available

Upper/lower flammability or explosive limits: Not test data available

Vapor Pressure: <0.01 mmHg @ 20°C Estimated

Vapor density (air = 1): 8.7 @ 20 °C Literature

Specific Gravity (H_2O = 1): 1.173 20 °C/20 °C ASTM D4052

Solubility in water (by weight): <0.06% @ 20 Literature

Partition coefficient (n-octanol/water): 1.34 Measured

Auto-ignition temperature: No test data available

Decomposition temperature: No data available

Viscosity: No data available

Explosive properties: No data available

Oxidizing Properties: No data available

9.2 Other information

No further information available.

Section 10: Stability and Reactivity

10.1 Reactivity – Stable under recommended storage conditions.

10.2 Chemical Stability – No data available.

10.3 Possibility of Hazardous Reactions – Hazardous polymerization can occur. Polymerization can be catalyzed by acids, amines, strong bases. Masses of more than one pound (0.5 kg) of product plus an aliphatic amine will cause irreversible polymerization with considerable heat build-up.

10.4 Conditions to avoid

Exposure to elevated temperatures can cause product to decompose.
Avoid contact with Acids, Amines, Strong bases.
Avoid unintended contact with Lewis acids.
Avoid unintended contact with amines.

10.5 Incompatible materials – Avoid contact with oxidizing materials.

10.6 Hazardous decomposition products – Decomposition products depend upon temperature, air supply, and the presence of other materials. Uncontrolled exothermic reaction of epoxy resins release phenolics, carbon monoxide, and water.

Section 11: Toxicological Information

Information on the likely routes of exposure

11.1 Information on toxicological effects

a. acute toxicity

Ingestion: Very low toxicity if swallowed.

Harmful effects not anticipated from swallowing small amounts.
Approximate. LD50, Rat 5,000 mg/kg

b. skin corrosion/irritation

Prolonged contact may cause slight skin irritation with local redness.
Prolonged skin contact is unlikely to result in absorption of harmful amounts.
LD50 Rabbit >23,000 mg/kg

c. serious eye damage/irritation

May cause slight eye irritation. Corneal injury is unlikely.

d. respiratory or skin sensitization

At room temperature, exposure to vapor is minimal due to low volatility.
Single exposure is not likely to be hazardous.

Sin contact may cause an allergic skin reaction.

e. germ cell mutagenicity

The following information is based on limited data and/or screening studies:

Has been toxic to the fetus in lab animals at doses toxic to the mother.
Did not cause birth defects in laboratory animals.

In vitro genetic toxicity studies were negative in some cases and positive in others.
Animal genetic toxicity studies were negative.

f. carcinogenicity

Did not cause cancer in animal skin painting studies.

g. reproductive toxicity

Limited data in laboratory animals suggest that the material does not affect reproduction.

h. STOT-single exposure - no additional data available.

i..STOT-repeated exposure

In animals, effects have been reported on the following organs:

Kidney. Liver. Respiratory tract.

j. aspiration hazard – no additional data available.

Section 12: Ecological Information

12.1 Ecotoxicity

Material is harmful to aquatic organisms (LC50/EC50/IC50 between 10 and 100 mg/L in most sensitive species.

Fish Acute & Prolonged Toxicity

LC50, rainbow trout (Oncorhynchus mykiss), flow-through, 96 h: 24 mg/l

Aquatic Invertebrate Acute Toxicity

EC50, water flea (Daphnia magna), 48 h, immobilization: 40 mg/l

Aquatic Plant Toxicity

EC50, green alga (Selenastrum capricornutum), biomass growth inhibition, 72 h: 90 mg/l

12.2 Persistence and degradability

Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Indirect Photodegradation with OH Radicals

Rate Constant	**Atmospheric Half-life**	**Method**
1.63E-11	7.9 hours	Estimated

Stability in Water (1/2 life): 33 – 47 days

OECD Biodegradation Tests:

Biodegradation	**Exposure Time**	**Method**
71 %	28 days	OECD 301B Test

12.3 Bioaccumulative potential

Bioconcentration potential is low (BCF less than 100 or log Pow less than 3).

12.4 Mobility in soil

Potential for mobility in soil is very high (Koc between 0 and 50).

Henry's Law Constant (H): 3.60E-10 atm*m^3/mole; 25 °C Estimated.

Partition Coefficient, n-octanol/water (log Pow): 1.34 Measured

Partition Coefficient, soil organic carbon/water (Koc): 29 Estimated.

Given its very low Henry's constant, volatilization from a natural body of water or moist soil is not expected to be an important fate process.

12.5 Results of PBT and vPvB assessment: No data available.

12.6 Other adverse effects: No additional information available.

Section 13: Disposal Considerations

13.1 Waste treatment methods

This product, when being disposed of in it unused and uncontaminated state should be treated as a hazardous waste according to EC Directive 91/689/EEC. Any disposal practices must be in compliance with all national and provincial laws and any municipal or local by-laws governing hazardous waste. For used, contaminated and residual materials additional evaluations may be required. Do not dump into any sewers, on the ground, or into any body of water.

Section 14: Transport Information

DOT: Not dangerous goods.
IATA: Not dangerous goods.
IMDG: Not dangerous goods.

Section 15: Regulatory Information

15.1 Safety, health and environmental regulations/ legislation specific for the substance or mixture

National regulations

RCRA: To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

CERCLA: To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statue.

RTECS No.: RN7750000

SARA Title III:

Section 302: To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

Section 311/312:

Delayed (Chronic) Health Hazard: Yes
Fire Hazard: No
Immediate (Acute) Health Hazard: Yes
Reactive Hazard: Yes
Sudden Release of Pressure Hazard: No

Section 313: To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

State regulations

Pennsylvania Right To Know Components
CAS No. 2386-87-0: 7-Oxabicyclo[4.1.0] heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0]hept-3-yl methyl ester

New Jersey Right To Know Components
CAS No. 2386-87-0: 7-Oxabicyclo[4.1.0] heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0]hept-3-yl methyl ester

California Prop. 65 Components
This product does not contain chemicals known to the State of California to cause birth defects or other reproductive harm.

Other EU regulations

Global Chemical Inventory Listing:

Australia (AICS)	Listed	CAS# 2386-87-0
Canada (DSL/NDSL)	Listed in DSL	CAS# 2386-87-0
China (IECSC)	Listed	CAS# 2386-87-0
Europe (REACH)	Pre-registered	EINECS: 219-207-4
Japan (METI/ENCS)	Listed	CAS# 2386-87-0
Korea (KECI)	Listed	CAS# 2386-87-0 [KE-27441}
Taiwan (NCSR)	Listed	CAS# 2386-87-0

USA (TSCA) Listed CAS# 2386-87-0

15.2 Chemical Safety Assessment

Date of Preparation: January 3, 2017.

Abbreviations and acronyms
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
CMRG: Chemical Manufacturer's Recommended Guidelines
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
AIHA: American Industrial Hygiene Association
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bio-accumulative and Toxicological
vPvB: very Persistent and very Bio-accumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
STEL: Short Term Exposure Limit
CEIL: Ceiling

Section 16: Other Information

Disclaimer of Liability:

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