SAFETY DATA SHEET
ERL 4221 (CER 4221)

Version 2.2 • Date of issue: 2026-04-09

SECTION 1: Identification

1.1 GHS Product identifier

Product name	ERL 4221 (CER 4221)
Substance name	7-Oxabicyclo[410]heptane-3-carboxylic acid, 7-oxabicyclo[410]hept-3-ylmethyl ester
EC no.	219-207-4
CAS no.	2386-87-0

1.2 Recommended uses of the chemical and restrictions on use

Coatings, composites, sealants

1.3 Supplier's details

SPI Supplies Division Structure Probe, Inc.
206 Garfield Ave. West Chester, PA 19380
United States

E-mail Address
SDS@2spi.com

1.4 Emergency phone number

SPI Supplies / Structure Probe Inc.
Phone 1-610-436-5400
1-484-313-4165 (24/7)

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

GHS Rev. 7 (Hazcom 2024) classification in accordance with: OSHA (29 CFR 1910.1200)

- Skin sensitizer, Cat. 1, H317
- Germ cell mutagenicity, Cat. 2, H341
- Specific target organ toxicity following repeated exposure, Cat. 2, H373

2.2 GHS label elements, including precautionary statements

Pictograms

Signal word **Warning**

Hazard statements

H317	May cause an allergic skin reaction
H341	Suspected of causing genetic defects
H373	May cause damage to organs [kidney, liver, respiratory tract] through prolonged or repeated exposure

Precautionary statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/fume/gas/mist/vapors/spray.
P261	Avoid breathing dust/fume/gas/mist/vapors/spray.
P272	Contaminated work clothing should not be allowed out of the workplace.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352	IF ON SKIN: Wash with plenty of water.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P314	Get medical advice/attention if you feel unwell.
P321	Specific treatment (see on this if skin irritation or rash occurs).
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.
P405	Store locked up.
P501	Dispose of contents/container to industrial combustion plant.

SECTION 3: Composition/information on ingredients

3.1 Substances

Substance name	7-Oxabicyclo[410]heptane-3-carboxylic acid, 7-oxabicyclo[410]hept-3-ylmethyl ester
EC no.	219-207-4
CAS no.	2386-87-0
Formula	C14H20O4
Other names / synonyms	7-oxabicyclo[4.1.0]hept-3-ylmethyl 7-oxabicyclo[4.1.0]heptane-3-carboxylate; 7-Oxabicyclo[4.1.0]heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0]hept-3-ylmethyl ester; 7-Oxabicyclo[410]heptane-3-carboxylic acid, 7-oxabicyclo[410]hept-3-ylmethyl ester

Hazardous components

1. 7-Oxabicyclo[410]heptane-3-carboxylic acid, 7-oxabicyclo[410]hept-3-ylmethyl ester

Concentration	99.7 % (weight)
EC no.	219-207-4
CAS no.	2386-87-0

Impurities:

2. 3-Cyclohexene-1-carboxylic acid, 3-cyclohexen-1-ylmethyl ester

Concentration	0.3 % (weight)
EC no.	220-031-5
CAS no.	2611-00-9

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

If inhaled	Move person to fresh air; if effects occur, consult a physician.

In case of 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.
In case of 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.
If swallowed	Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms/effects, acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of immediate medical attention and special treatment needed, if necessary
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 Suitable extinguishing media
Use water fog or fine spray, alcohol-resistant foam, dry chemical or carbon dioxide. Do not use direct water stream sine 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 Specific hazards arising from the chemical
Container may rupture from polymerization. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. During a fire, smoke may 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 Special protective actions for fire-fighters
Wear positive-pressure self-contained breathing apparatus (SCBA) and protective firefighting clothing (includes firefighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during firefighting operations. If contact is likely, change to full chemical resistant firefighting 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 sections. Unusual Fire

Further information
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.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Isolate area. Keep unnecessary and unprotected personnel from entering the area. Refer to Section 7, Handling, for additional precautionary measures. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

6.2 Environmental precautions
Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

6.3 Methods and materials for containment and cleaning up
Contain spilled material if possible. Collect in suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Avoid prolonged or repeated contact with skin. Avoid contact with eyes.
Wash thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities
Shelf Life: Use within 24 Months
Storage Temperature: 0 - 30 °C

SECTION 8: Exposure controls/personal protection

8.1 Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values

8.2 Appropriate engineering controls
Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operation.

8.3 Individual protection measures, such as personal protective equipment (PPE)

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. 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 than 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.

SECTION 9: Physical and chemical properties

Appearance (physical state, color, etc.)	viscous liquid
Odor	odorless
Odor threshold	no data available
pH	no data available
Melting point/freezing point	- 37 °C (lit.)
Initial boiling point and boiling range	> 250 C (Estimated)
Flash point	161 °C – open cup.
Evaporation rate	no data available
Flammability (solid, gas)	no data available
Upper/lower flammability or explosive limits	no data available
Vapor pressure	<0.01 mmHg at 25 °C
Vapor density	no data available
Relative density	1.17 g/mL at 25 °C
Solubility(ies)	< 1g/L in water at 20 °C
Partition coefficient: n-octanol/water	log Pow: 1.34
Auto-ignition temperature	no data available
Decomposition temperature	no data available
Viscosity	200 – 450 mPa*s

Additional properties

Physical state	Liquid
Color	colorless to yellow

Particle characteristics
not applicable (product is liquid)

SECTION 10: Stability and reactivity

10.1 Reactivity
Stable

10.2 Chemical stability
Stable under recommended storage conditions. See Storage, Section 7.

10.3 Possibility of hazardous reactions
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
Avoid contact with oxidizing materials. 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. Avoid contact with: Acids. Amines. Strong bases. Avoid unintended contact with: Lewis acids. Avoid unintended contact with amines.

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 toxicological effects

Acute toxicity
Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts. Approximate. LD50, Rat 5,000 mg/kg

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

Serious eye damage/irritation
May cause slight eye irritation. Corneal injury is unlikely.

Respiratory or skin sensitization
At room temperature, exposure to vapor is minimal due to low volatility; single exposure is not likely to be hazardous;

Sensitization Skin
Skin contact may cause an allergic skin reaction

Germ cell mutagenicity
In vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative.; 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.

Carcinogenicity
Did not cause cancer in animal skin painting studies.

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

Specific target organ toxicity (STOT) - single exposure
At room temperature, exposure to vapor is minimal due to low volatility; single exposure is not likely to be hazardous.

Specific target organ toxicity (STOT) - repeated exposure
In animals, effects have been reported on the following organs: Kidney. Liver. Respiratory tract.

Aspiration hazard
At room temperature, exposure to vapor is minimal due to low volatility; single exposure is not likely to be hazardous.

SECTION 12: Ecological information

Toxicity
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

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 h	Estimated

Stability in cm3/s Water (1/2 life):
33 - 47 d

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method
71 %	28 d	OECD 301B Test

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

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

SECTION 13: Disposal considerations

Disposal methods

Product disposal
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 (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations specifically for the product in question

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

SARA 311/312 Hazards
To the best of our knowledge this product does not contain chemicals at levels which require reporting under this statute.

SARA 313 Components
Delayed (Chronic) Health Hazard: Yes. Fire Hazard: No. Immediate (Acute) Health Hazard: Yes. Reactive Hazard: Yes. Sudden Release of Pressure Hazard: No

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New Jersey Right To Know Components
7-Oxabicyclo[4.1.0] heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0]hept-3-yl methyl ester (CAS 2386-87-0)

Pennsylvania Right To Know Components
7-Oxabicyclo[4.1.0] heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0]hept-3-yl methyl ester (CAS 2386-87-0)

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

Toxic Substances Control Act (TSCA) Inventory
Listed

Canadian Domestic Substances List (DSL)
Chemical name: 7-Oxabicyclo[4.1.0]heptane-3-carboxylic acid, 7-oxabicyclo[4.1.0]hept-3-ylmethyl ester
CAS: 2386-87-0

Canadian Domestic Substances List (DSL)
Chemical name: 3-Cyclohexene-1-carboxylic acid, 3-cyclohexen-1-ylmethyl ester
CAS: 2611-00-9

SECTION 16: Other information

16.1 Relevant Changes since previous version

Section 2 - Hazcom 2024 classifications updated to GHS Rev. 7 standards
Section 8 - updated occupational exposure classification
Section 9 - additional physical values and formatting
Section 16 - revision changes and abbreviation lists

16.2 Full Text Abbreviations

Abbr.	Descriptions of used abbreviations
Acute Tox.	acute toxicity
BCF	Bioconcentration Factor
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
Cat.	Category
CMR	Carcinogenic, Mutagenic or toxic for Reproduction
DMEL	Derived Minimal Effect Level
DOT	Department of Transportation
IMDG	International Maritime Dangerous Goods
IATA	International Air Transportation Administration
EC50	half-maximal effective concentration
IC50	half maximal inhibitory concentration
LD50	Leath Dose to 50% of test population
LC50	Lethal Concentration to 50% of test population
DNEL	Derived No-Effect Level

GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IUPAC	International Union of Pure and Applied Chemistry
PBT	Persistent, Bioaccumulative and Toxic
OECD	Organization for Economic Co-operation and Development
OSHA	Occupational Health and Safety Administration
PNEC	Predicted No-Effect Concentration
TSCA	Toxic Substances Control Act

16.3 Further information/disclaimer

Notice to reader:
To the best of our knowledge, the information contained herein is accurate and prepared in accordance with OSHA Hazard Communication Standard 29 CFR 1910.1200 (HazCom 2024, GHS Revision 7). However, neither the above-named manufacturer nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. All materials may present unknown hazards and should be used with caution.

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