

## 1 Identification

### Product identifier

**Product name:** **Chloro(1,5-cyclooctadiene)(pentamethylcyclopentadienyl)ruthenium(II)**

**Stock number:** 46803

**CAS Number:**  
 92390-26-6

**Relevant identified uses of the substance or mixture and uses advised against.**

**Identified use:** SU24 Scientific research and development

### Details of the supplier of the safety data sheet

#### Manufacturer/Supplier:

Alfa Aesar  
 Thermo Fisher Scientific Chemicals, Inc.  
 30 Bond Street  
 Ward Hill, MA 01835-8099  
 Tel: 800-343-0660  
 Fax: 800-322-4757  
 Email: tech@alfa.com  
 www.alfa.com

**Information Department:** Health, Safety and Environmental Department

#### Emergency telephone number:

During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660. After normal business hours, call Carechem 24 at (866) 928-0789.

## 2 Hazard(s) identification

### Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)



GHS02 Flame

Water-react. 2 H261 In contact with water releases flammable gas.

**Hazards not otherwise classified** No information known.

### Label elements

**GHS label elements** The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)

### Hazard pictograms



GHS02

### Signal word

**Danger**

### Hazard statements

H261 In contact with water releases flammable gas.

### Precautionary statements

P231+P232 Handle under inert gas. Protect from moisture.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P233 Keep container tightly closed.

P370+P378 In case of fire: Use for extinction: CO2, sand, extinguishing powder.

P402+P404 Store in a dry place. Store in a closed container.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

### WHMIS classification

B6 - Reactive flammable material



### Classification system

#### HMIS ratings (scale 0-4)

#### (Hazardous Materials Identification System)

HEALTH	1	Health (acute effects) = 1
FIRE	2	Flammability = 2
REACTIVITY	2	Physical Hazard = 2

### Other hazards

#### Results of PBT and vPvB assessment

**PBT:** Not applicable.

**vPvB:** Not applicable.

## 3 Composition/information on ingredients

### Chemical characterization: Substances

#### CAS# Description:

92390-26-6 Chloro(1,5-cyclooctadiene)(pentamethylcyclopentadienyl)  
 ruthenium(II)

## 4 First-aid measures

### Description of first aid measures

#### After inhalation

Supply fresh air. If required, provide artificial respiration. Keep patient warm.

Seek immediate medical advice.

#### After skin contact

Immediately wash with water and soap and rinse thoroughly.

Seek immediate medical advice.

**After eye contact** Rinse opened eye for several minutes under running water. Then consult a doctor.

**After swallowing** Seek medical treatment.

#### Information for doctor

**Most important symptoms and effects, both acute and delayed** No further relevant information available.

**Indication of any immediate medical attention and special treatment needed** No further relevant information available.

Product name: **Chloro(1,5-cyclooctadiene)(pentamethylcyclopentadienyl)ruthenium(II)**

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## 5 Fire-fighting measures

### Extinguishing media

#### Suitable extinguishing agents

In case of fire, use sand, carbon dioxide or powdered extinguishing agent. Never use water.

Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

#### For safety reasons unsuitable extinguishing agents

Water

#### Special hazards arising from the substance or mixture

If this product is involved in a fire, the following can be released:

Carbon monoxide and carbon dioxide

Hydrogen chloride (HCl)

Metal oxide fume

#### Advice for firefighters

#### Protective equipment:

Wear self-contained respirator.

Wear fully protective impervious suit.

## 6 Accidental release measures

### Personal precautions, protective equipment and emergency procedures

Wear protective equipment. Keep unprotected persons away.

Ensure adequate ventilation

Keep away from ignition sources

**Environmental precautions:** Do not allow product to reach sewage system or any water course.

### Methods and material for containment and cleaning up:

Ensure adequate ventilation.

Do not flush with water or aqueous cleansing agents

**Prevention of secondary hazards:** Keep away from ignition sources.

### Reference to other sections

See Section 7 for information on safe handling

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

## 7 Handling and storage

### Handling

#### Precautions for safe handling

Keep container tightly sealed.

Ensure good ventilation at the workplace.

**Information about protection against explosions and fires:** Protect against electrostatic charges.

#### Conditions for safe storage, including any incompatibilities

#### Storage

**Requirements to be met by storerooms and receptacles:** Store in freezer (-20 °C).

#### Information about storage in one common storage facility:

Store away from air.

Protect from heat.

Store away from oxidizing agents.

#### Further information about storage conditions:

Store under dry inert gas.

Keep container tightly sealed.

**Specific end use(s)** No further relevant information available.

## 8 Exposure controls/personal protection

### Additional information about design of technical systems:

Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

### Control parameters

#### Components with limit values that require monitoring at the workplace:

The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.

**Additional information:** No data

### Exposure controls

#### Personal protective equipment

#### General protective and hygienic measures

The usual precautionary measures for handling chemicals should be followed.

Keep away from foodstuffs, beverages and feed.

Remove all soiled and contaminated clothing immediately.

Wash hands before breaks and at the end of work.

Maintain an ergonomically appropriate working environment.

**Breathing equipment:** Use suitable respirator when high concentrations are present.

#### Protection of hands:

Impervious gloves

Check protective gloves prior to each use for their proper condition.

The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.

**Penetration time of glove material (in minutes)** Not determined

#### Eye protection:

Safety glasses

Full face protection

**Body protection:** Protective work clothing.

## 9 Physical and chemical properties

### Information on basic physical and chemical properties

#### General Information

#### Appearance:

Form:	Crystalline
Color:	Yellow-brown
Odor:	Not determined
Odor threshold:	Not determined.

pH-value:	Not applicable.
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#### Change in condition

Melting point/Melting range:	143-147 °C (289-297 °F)
Boiling point/Boiling range:	Not determined

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USA

Product name: **Chloro(1,5-cyclooctadiene)(pentamethylcyclopentadienyl)ruthenium(II)**

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**Sublimation temperature / start:** Not determined  
**Flammability (solid, gaseous):** Contact with water liberates extremely flammable gases.  
**Ignition temperature:** Not determined  
**Decomposition temperature:** Not determined  
**Auto igniting:** Not determined.

**Danger of explosion:** Not determined.  
**Explosion limits:**  
**Lower:** Not determined  
**Upper:** Not determined  
**Vapor pressure:** Not applicable.  
**Density:** Not determined  
**Relative density:** Not determined.  
**Vapor density:** Not applicable.  
**Evaporation rate:** Not applicable.  
**Solubility in / Miscibility with Water:** Contact with water releases flammable gases  
**Partition coefficient (n-octanol/water):** Not determined.  
**Viscosity:**  
**dynamic:** Not applicable.  
**kinematic:** Not applicable.  
**Other information:** No further relevant information available.

### 10 Stability and reactivity

**Reactivity:** In contact with water releases flammable gases which may ignite spontaneously.  
**Chemical stability:** Stable under recommended storage conditions.  
**Thermal decomposition / conditions to be avoided:** Decomposition will not occur if used and stored according to specifications.  
**Possibility of hazardous reactions:**  
Reacts with strong oxidizing agents  
Contact with water releases flammable gases  
**Conditions to avoid:** No further relevant information available.  
**Incompatible materials:**  
Air  
Oxidizing agents  
Heat  
Water/moisture  
**Hazardous decomposition products:**  
Carbon monoxide and carbon dioxide  
Hydrogen chloride (HCl)  
Metal oxide fume

### 11 Toxicological information

**Information on toxicological effects:**  
**Acute toxicity:** No effects known.  
**LD/LC50 values that are relevant for classification:** No data  
**Skin irritation or corrosion:** May cause irritation  
**Eye irritation or corrosion:** May cause irritation  
**Sensitization:** No sensitizing effects known.  
**Germ cell mutagenicity:** No effects known.  
**Carcinogenicity:** No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.  
**Reproductive toxicity:** No effects known.  
**Specific target organ system toxicity - repeated exposure:** No effects known.  
**Specific target organ system toxicity - single exposure:** No effects known.  
**Aspiration hazard:** No effects known.  
**Subacute to chronic toxicity:** No effects known.  
**Additional toxicological information:** To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

### 12 Ecological information

**Toxicity:**  
**Aquatic toxicity:** No further relevant information available.  
**Persistence and degradability:** No further relevant information available.  
**Bioaccumulative potential:** No further relevant information available.  
**Mobility in soil:** No further relevant information available.  
**Additional ecological information:**  
**General notes:**  
Do not allow undiluted product or large quantities to reach ground water, water course or sewage system.  
Avoid transfer into the environment.  
**Results of PBT and vPvB assessment:**  
**PBT:** Not applicable.  
**vPvB:** Not applicable.  
**Other adverse effects:** No further relevant information available.

### 13 Disposal considerations

**Waste treatment methods:**  
**Recommendation:** Consult state, local or national regulations to ensure proper disposal.  
**Uncleaned packagings:**  
**Recommendation:** Disposal must be made according to official regulations.

### 14 Transport information

<b>UN-Number</b> <b>DOT, IMDG, IATA</b>	UN3395
<b>UN proper shipping name</b> <b>DOT</b>	Organometallic substance, solid, water-reactive (Chloro(1,5-cyclooctadiene)(pentamethylcyclopentadienyl)ruthenium(II))
<b>IMDG, IATA</b>	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE (Chloro(1,5-cyclooctadiene)(pentamethylcyclopentadienyl)ruthenium(II))

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USA

Product name: **Chloro(1,5-cyclooctadiene)(pentamethylcyclopentadienyl)ruthenium(II)**

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**Transport hazard class(es)**

DOT



**Class** 4.3 Substances which, in contact with water, emit flammable gases.  
**Label** 4.3  
**Class** 4.3 (W2) Substances which, in contact with water, emit flammable gases  
**Label** 4.3  
**IMDG, IATA**



**Class** 4.3 Substances which, in contact with water, emit flammable gases.  
**Label** 4.3

**Packing group**  
**DOT, IMDG, IATA**

II

**Environmental hazards:**

Not applicable.

**Special precautions for user**

Warning: Substances which, in contact with water, emit flammable gases  
F-G,S-M

**EMS Number:**

**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.

**Transport/Additional information:**

DOT

**Marine Pollutant (DOT):**

No

**UN "Model Regulation":**

UN3395, Organometallic substance, solid, water-reactive (Chloro(1,5-cyclooctadiene)(pentamethylcyclopentadienyl)ruthenium(II)), 4.3, II

**15 Regulatory information**

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

**GHS label elements** The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)

**Hazard pictograms**



GHS02

**Signal word** Danger

**Hazard statements**

H261 In contact with water releases flammable gas.

**Precautionary statements**

P231+P232 Handle under inert gas. Protect from moisture.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P233 Keep container tightly closed.

P370+P378 In case of fire: Use for extinction: CO2, sand, extinguishing powder.

P402+P404 Store in a dry place. Store in a closed container.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

**National regulations**

This product is not listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory. Use of this product is restricted to research and development only. This product must be used by or directly under the supervision of a technically qualified individual as defined by TSCA. This product must not be used for commercial purposes or in formulations for commercial purposes.

This product is not listed on the Canadian Domestic Substances List (DSL) or the Canadian Non-Domestic Substances List (NDSL).

**SARA Section 313 (specific toxic chemical listings)** Substance is not listed.

**California Proposition 65**

**Prop 65 - Chemicals known to cause cancer** Substance is not listed.

**Prop 65 - Developmental toxicity** Substance is not listed.

**Prop 65 - Developmental toxicity, female** Substance is not listed.

**Prop 65 - Developmental toxicity, male** Substance is not listed.

**Information about limitation of use:** For use only by technically qualified individuals.

**Other regulations, limitations and prohibitive regulations**

**Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.** Substance is not listed.

**The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.**

Substance is not listed.

**Annex XIV of the REACH Regulations (requiring Authorisation for use)** Substance is not listed.

**Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

**16 Other information**

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

**Department issuing SDS:** Global Marketing Department

**Date of preparation / last revision** 11/24/2015 / -

**Abbreviations and acronyms:**

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)

IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation

IATA: International Air Transport Association

CAS: Chemical Abstracts Service (division of the American Chemical Society)

HMIS: Hazardous Materials Identification System (USA)

WHMIS: Workplace Hazardous Materials Information System (Canada)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

vPvB: very Persistent and very Bioaccumulative

ACGIH: American Conference of Governmental Industrial Hygienists (USA)

OSHA: Occupational Safety and Health Administration (USA)

NTP: National Toxicology Program (USA)

IARC: International Agency for Research on Cancer

EPA: Environmental Protection Agency (USA)