

MATERIAL SAFETY DATA SHEET

Manufacturer: Strem Chemicals, Inc
 7 Mulliken Way
 Newburyport, MA 01950-4098 U.S.A.
 www.strem.com

Strem Customer Service (978) 499-1600
 CHEMTREC (Emergency Only) (800) 424-9300
 Poison Center (800) 562-8236

Section 1: Product Identification	
Chemical Name:	Bis(ethylcyclopentadienyl)ruthenium(II), 98% (99.9%-Ru), 44-0040, contained in 50 ml Swagelok® cylinder (96-1070) for CVD/ALD
Product Number:	98-4009
CAS Registry Number:	32992-96-4
Formula:	[(CH ₃ CH ₂)C ₅ H ₄]Ru
EINECS Number:	none
Chemical Family:	metallocene
Synonym:	diethylruthenocene

Section 2: Composition and Information on Ingredients				
Ingredient	CAS Number	Percent	ACGIH (TWA)	OSHA (PEL)
Title Compound	32992-96-4	100%	no data	no data

Section 3: Hazards Identification	
Emergency Overview:	Irritating to skin, eyes and respiratory tract. May be harmful if swallowed.
Primary Routes of Exposure:	Ingestion, inhalation
Eye Contact:	Causes slight to mild irritation of the eyes.
Skin Contact:	Causes slight to mild irritation of the skin.
Inhalation:	Irritating to the nose, mucous membranes and respiratory tract.
Ingestion:	Ingestion may lead to dizziness, abdominal cramps and vomiting.
Acute Health Affects:	Irritating to skin, eyes and respiratory tract.
Chronic Health Affects:	No information available on long-term chronic effects.
NTP:	No
IARC:	No
OSHA:	No

SECTION 4: First Aid Measures	
Eye Exposure:	Immediately flush the eyes with copious amounts of water for at least 10-15 minutes. A victim may need assistance in keeping their eye lids open. Get immediate medical attention.
Skin Exposure:	Wash the affected area with water. Remove contaminated clothes if necessary. Seek medical assistance if irritation persists.
Inhalation:	Remove the victim to fresh air. Closely monitor the victim for signs of respiratory problems, such as difficulty in breathing, coughing, wheezing, or pain. In such cases seek immediate medical assistance.
Ingestion:	Seek medical attention immediately. Keep the victim calm. Give the victim water (only if conscious). Induce vomiting only if directed by medical personnel.

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SECTION 5: Fire Fighting Measures

Flash Point: no data
Autoignition Temperature: no data
Explosion Limits: no data
Extinguishing Medium: carbon dioxide, foam or dry powder
Special Fire Fighting Procedures: If this product is involved in a fire, fire fighters should be equipped with a NIOSH approved positive pressure self-contained breathing apparatus and full protective clothing.
Hazardous Combustion and Decomposition Products: If involved in a fire, this material may emit irritating fumes.
Unusual Fire or Explosion Hazards: No unusual fire or explosion hazards.

SECTION 6: Accidental Release Measures

Spill and Leak Procedures: Small spills can be mixed with vermiculite, sodium carbonate or other suitable non-combustible adsorbent and swept up.

SECTION 7: Handling and Storage

Handling and Storage: Keep material in a tightly sealed container. Prolonged exposure to air and moisture will result in degradation of the product. Handle and store the material under an inert atmosphere of nitrogen or argon.

SECTION 8: Exposure Controls and Personal Protection

Eye Protection: Always wear approved safety glasses when handling a chemical substance in the laboratory.
Skin Protection: Wear protective clothing and gloves.
Ventilation: Handle the material in an efficient fume hood.
Respirator: If ventilation is not available a respirator should be worn. The use of respirators requires a Respirator Protection Program to be in compliance with 29 CFR 1910.134.
Ventilation: Handle the material in an efficient fume hood.
Additional Protection: No additional protection required.

SECTION 9: Physical and Chemical Properties

Color and Form: pale-yellow liq.
Molecular Weight: 287.37
Melting Point: no data
Boiling Point: no data
Vapor Pressure: no data
Specific Gravity: no data
Odor: none
Solubility in Water: insoluble

SECTION 10: Stability and Reactivity

Stability: air and moisture stable
Hazardous Polymerization: no hazardous polymerization
Conditions to Avoid: very strong oxidizing agents such as nitric acid may produce toxic volatile ruthenium tetroxide.
Incompatibility: Oxidizing agent, halogens and active metals
Decomposition Products: Carbon dioxide, carbon monoxide, organic fumes and ruthenium oxide

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SECTION 11: Toxicological Information

RTECS Data: No information available from the RTECS files.
Carcinogenic Effects: no data
Mutagenic Effects: no data
Tetratogenic Effects: no data

SECTION 12: Ecological Information

Ecological Information: No information available.

SECTION 13: Disposal Considerations

Disposal: Dispose of this material according to local, state and federal regulations.

SECTION 14: Transportation

Shipping Name (CFR): Non-hazardous
Hazard Class (CFR): NA
Additional Hazard Class (CFR): NA
Packaging Group (CFR): NA
UN ID Number (CFR): NA
Shipping Name (IATA): Non-hazardous
Hazard Class (IATA): NA
Additional Hazard Class (IATA): NA
Packaging Group (IATA): NA
UN ID Number (IATA): NA

SECTION 15: Regulatory Information

TSCA: Not listed in the TSCA inventory
SARA (Title 313): Title compound not listed
Second Ingredient: none
Third Ingredient: none

SECTION 16: Other Information

Disclaimer: The information herein is believed to be accurate and reliable as of the date compiled. However, Strem Chemicals, Inc. makes no representation, warranty, or guarantee of any kind with respect to the information contained in this document or any use of the product based on this information.
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