SECTION 1: Identification

1.1. Product identifier

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product name</td>
<td>HAFNIUM TETRAKIS(ETHYLMETHYLAMIDE), 99+%</td>
</tr>
<tr>
<td>Product code</td>
<td>OMHF083.1</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Formula</td>
<td>C12H32HfN4</td>
</tr>
<tr>
<td>Synonyms</td>
<td>TETRAKIS(ETHYLMETHYLAMIDO)HAFNIUM</td>
</tr>
<tr>
<td>Chemical family</td>
<td>ORGANOMETAL</td>
</tr>
</tbody>
</table>

1.2. Recommended use of the chemical and restrictions on use

Recommended use: Chemical intermediate
For research and industrial use only

1.3. Details of the supplier of the safety data sheet

GELEST, INC.
11 East Steel Road
Morrisville, PA 19067
USA
T 215-547-1015 - F 215-547-2484 - (M-F): 8:00 AM - 5:30 PM EST
info@gelest.com - www.gelest.com

1.4. Emergency telephone number

Emergency number: CHEMTREC: 1-800-424-9300 (USA); +1 703-527-3887 (International)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

<table>
<thead>
<tr>
<th>Classification</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHS-US classification</td>
<td></td>
</tr>
<tr>
<td>Flammable liquids Category</td>
<td>2</td>
</tr>
<tr>
<td>Skin corrosion/irritation Category 1B</td>
<td>H225</td>
</tr>
<tr>
<td>Skin corrosion/irritation Category 1B</td>
<td>H314</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation Category 1</td>
<td>H318</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure) Category 3</td>
<td>H335</td>
</tr>
</tbody>
</table>

Full text of H statements: see section 16

2.2. Label elements

<table>
<thead>
<tr>
<th>GHS-US labeling</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard pictograms (GHS-US)</td>
<td></td>
</tr>
<tr>
<td>Signal word (GHS-US)</td>
<td>Danger</td>
</tr>
<tr>
<td>Hazard statements (GHS-US)</td>
<td>H225 - Highly flammable liquid and vapor</td>
</tr>
<tr>
<td>Precautionary statements (GHS-US)</td>
<td></td>
</tr>
<tr>
<td>P280 - Wear protective gloves/protective clothing/eye protection/face protection</td>
<td></td>
</tr>
<tr>
<td>P260 - Do not breathe vapors</td>
<td></td>
</tr>
<tr>
<td>P264 - Wash hands thoroughly after handling</td>
<td></td>
</tr>
<tr>
<td>P210 - Keep away from heat, open flames, sparks. - No smoking</td>
<td></td>
</tr>
<tr>
<td>P240 - Ground/Bond container and receiving equipment</td>
<td></td>
</tr>
<tr>
<td>P241 - Use explosion-proof electrical equipment</td>
<td></td>
</tr>
<tr>
<td>P242 - Use only non-sparking tools</td>
<td></td>
</tr>
<tr>
<td>P243 - Take precautionary measures against static discharge</td>
<td></td>
</tr>
<tr>
<td>P271 - Use only outdoors or in a well-ventilated area</td>
<td></td>
</tr>
<tr>
<td>P301 + P330 + P331 - If swallowed: rinse mouth. Do NOT induce vomiting</td>
<td></td>
</tr>
<tr>
<td>P303 + P361 + P353 - If on skin (or hair): take off immediately all contaminated clothing. rinse skin with water/shower</td>
<td></td>
</tr>
<tr>
<td>P304 + P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing</td>
<td></td>
</tr>
<tr>
<td>P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing</td>
<td></td>
</tr>
<tr>
<td>P310 - Immediately call a doctor</td>
<td></td>
</tr>
</tbody>
</table>
HAFNIUM TETRAKIS(ETHYLMETHYLAMIDE), 99+%  
Safety Data Sheet

2.3. Hazards not otherwise classified (HNOC)
No additional information available

2.4. Unknown acute toxicity (GHS US)
No data available

SECTION 3: Composition/Information on ingredients

3.1. Substance
Name: HAFNIUM TETRAKIS(ETHYLMETHYLAMIDE), 99+%  
CAS No: 352535-01-4

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>GHS-US classification</th>
</tr>
</thead>
</table>
| Hafnium tetrakis(ethylmethylamide)    | (CAS No) 352535-01-4 | 99 - 100 | Flam. Liq. 2, H225  
Skin Corr. 1B, H314  
Eye Dam. 1, H318  
STOT SE 3, H335 |

Full text of hazard classes and H-statements: see section 16

3.2. Mixture
Not applicable

4.1. Description of first aid measures
First-aid measures general: Remove contaminated clothing and shoes. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If possible show this sheet; if not available show packaging or label.

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: Wash with plenty of soap and water. Get immediate medical advice/attention.

First-aid measures after eye contact: Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

First-aid measures after ingestion: Never give anything by mouth to an unconscious person. Get medical advice/attention.

4.2. Most important symptoms and effects, both acute and delayed
Symptoms/injuries: Causes severe skin burns and eye damage.
Symptoms/injuries after skin contact: Causes (severe) skin burns.
Symptoms/injuries after eye contact: Causes serious eye damage.
Symptoms/injuries after ingestion: May be harmful if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed
No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Unsuitable extinguishing media: Water.

5.2. Special hazards arising from the substance or mixture
Fire hazard: Highly flammable liquid and vapor. Irritating fumes of diethylamine and organic acid vapors may develop when material is exposed to water or open flame.

Explosion hazard: May form flammable/explosive vapor-air mixture.

5.3. Advice for firefighters
Firefighting instructions: Use water spray to cool exposed surfaces. Exercise caution when fighting any chemical fire.

Protection during firefighting: Do not enter fire area without proper protective equipment, including respiratory protection. Avoid all eye and skin contact and do not breathe vapor and mist.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
General measures: Eliminate every possible source of ignition. Use special care to avoid static electric charges.
6.1.1. For non-emergency personnel
Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders
Protective equipment : Equip cleanup crew with proper protection.

6.2. Environmental precautions
Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up
Methods for cleaning up : Clean up any spills as soon as possible, using an absorbent material to collect it. Sweep or shovel spills into appropriate container for disposal. Use only non-sparking tools.

6.4. Reference to other sections
See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage
7.1. Precautions for safe handling
Additional hazards when processed : Handle empty containers with care because residual vapors are flammable.
Precautions for safe handling : Provide good ventilation in process area to prevent accumulation of vapors. Containers must be properly grounded before beginning transfer. Take precautionary measures against static discharge. Use only non-sparking tools. Do not expose to moisture or air. Transfer product under an inert atmosphere.
Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse.

7.2. Conditions for safe storage, including any incompatibilities
Technical measures : Ground/bond container and receiving equipment. Proper grounding procedures to avoid static electricity should be followed. Use explosion-proof electrical equipment.
Storage conditions : Keep container tightly closed.
Storage area : Store in a well-ventilated place. Store away from heat.

SECTION 8: Exposure controls/personal protection
8.1. Control parameters
Hafnium tetrakis(ethylmethylamide) (352535-01-4)

| OSHA PEL (TWA) (ppm) | 25 ppm (Diethylamine) |

8.2. Exposure controls
Appropriate engineering controls : Provide local exhaust or general room ventilation.
Personal protective equipment : Avoid all unnecessary exposure. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
Hand protection : Neoprene or nitrile rubber gloves.
Eye protection : Chemical goggles or face shield. Contact lenses should not be worn.
Skin and body protection : Wear suitable protective clothing.
Respiratory protection : NIOSH-certified combination organic vapor - amine gas (brown cartridge) respirator.

SECTION 9: Physical and chemical properties
9.1. Information on basic physical and chemical properties
Physical state : Liquid
Appearance : Viscous liquid. Fumes in air.
Molecular mass : 410.9 g/mol
Color : Yellow. Amber.
Odor : Acrid. Amine.
Odor threshold : No data available
Refractive index : No data available
pH : No data available
Relative evaporation rate (butyl acetate=1) : No data available
Melting point : No data available
Freezing point : < 25 °C
Boiling point : 78 °C @ 0.01 mm Hg
Flash point : 10 °C
**HAFNIUM TETRAKIS(ETHYLMETHYLAMIDE), 99+%**  
**Safety Data Sheet**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Highly flammable liquid and vapor</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>&lt; 1 mm Hg</td>
</tr>
<tr>
<td>Relative vapor density at 20 °C</td>
<td>&gt; 1</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.324</td>
</tr>
<tr>
<td>Solubility</td>
<td>Reacts with water.</td>
</tr>
<tr>
<td>Log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Log Kow</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No data available</td>
</tr>
<tr>
<td>Explosion limits</td>
<td>No data available</td>
</tr>
</tbody>
</table>

9.2. **Other information**  
No additional information available

**SECTION 10: Stability and reactivity**

10.1. **Reactivity**  
No additional information available

10.2. **Chemical stability**  
Stable in sealed containers stored under a dry inert atmosphere.

10.3. **Possibility of hazardous reactions**  
Reacts rapidly with water and moisture in air liberating ethylmethylamine.

10.4. **Conditions to avoid**  
Heat. Open flame. Sparks.

10.5. **Incompatible materials**  

10.6. **Hazardous decomposition products**  
Ethylmethylamine. Hafnium dioxide.

**SECTION 11: Toxicological information**

11.1. **Information on toxicological effects**

Acute toxicity : Not classified

### HAFNIUM TETRAKIS(ETHYLMETHYLAMIDE), 99+% (352535-01-4)

<table>
<thead>
<tr>
<th>Effect</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 oral rat</td>
<td>&gt; 10 g/kg</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>Causes severe skin burns and eye damage.</td>
</tr>
<tr>
<td>Serious eye damage/irritation</td>
<td>Causes serious eye damage.</td>
</tr>
<tr>
<td>Respiratory or skin sensitization</td>
<td>Not classified</td>
</tr>
<tr>
<td>Germ cell mutagenicity</td>
<td>Not classified</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Not classified</td>
</tr>
<tr>
<td>Reproductive toxicity</td>
<td>Not classified</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>May cause respiratory irritation.</td>
</tr>
</tbody>
</table>

Specific target organ toxicity (repeated exposure) : Not classified

Aspiration hazard : Not classified


Symptoms/injuries after skin contact : Causes (severe) skin burns.

Symptoms/injuries after eye contact : Causes serious eye damage.

Symptoms/injuries after ingestion : May be harmful if swallowed.

Reason for classification : Expert judgment

**SECTION 12: Ecological information**

12.1. **Toxicity**  
No additional information available
12.2. Persistence and degradability
No additional information available

12.3. Bioaccumulative potential
No additional information available

12.4. Mobility in soil
No additional information available

12.5. Other adverse effects
Other adverse effects : This substance may be hazardous to the environment.
Effect on ozone layer : No additional information available
Effect on the global warming : No known effects from this product.
GWPmix comment : No known effects from this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Waste disposal recommendations : May be incinerated. Dispose in a safe manner in accordance with local/national regulations.
Additional information : Handle empty containers with care because residual vapors are flammable.
Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

14.1. UN number
UN-No.(DOT) : 2924
DOT NA no. : UN2924

14.2. UN proper shipping name
Transport document description : UN2924 Flammable liquids, corrosive, n.o.s. (HAFNIUM TETRAKIS(ETHYLMETHYLAMIDE)), 3, II
Proper Shipping Name (DOT) : Flammable liquids, corrosive, n.o.s. (HAFNIUM TETRAKIS(ETHYLMETHYLAMIDE))
Class (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120
Packing group (DOT) : II - Medium Danger
Hazard labels (DOT) : 3 - Flammable liquid 8 - Corrosive

DOT Packaging Non Bulk (49 CFR 173.xxx) : 202
DOT Packaging Bulk (49 CFR 173.xxx) : 243
DOT Packaging Exceptions (49 CFR 173.xxx) : 150
DOT Symbols : G - Identifies PSN requiring a technical name

14.3. Additional information
Other information : No supplementary information available.

Transport by sea
DOT Vessel Stowage Location : B - (i) The material may be stowed “on deck” or “under deck” on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) “On deck only” on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded
DOT Vessel Stowage Other : 40 - Slow “clear of living quarters”

Air transport
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 1 L
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 5 L
SECTION 15: Regulatory information

15.1. US Federal regulations

Hafnium tetrakis(ethylmethylamide) (352535-01-4)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA
Hafnium tetrakis(ethylmethylamide) (352535-01-4)
Listed on the Canadian NDSL (Non-Domestic Substances List)

EU-Regulations
Hafnium tetrakis(ethylmethylamide) (352535-01-4)
Listed on ELINCS (European List of Notified Chemical Substances)

National regulations
No additional information available

15.3. US State regulations
No additional information available

SECTION 16: Other information

Full text of H-phrases:

<table>
<thead>
<tr>
<th>H225</th>
<th>Highly flammable liquid and vapor</th>
</tr>
</thead>
<tbody>
<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage</td>
</tr>
<tr>
<td>H318</td>
<td>Causes serious eye damage</td>
</tr>
<tr>
<td>H335</td>
<td>May cause respiratory irritation</td>
</tr>
</tbody>
</table>

HMIS III Rating
Health: 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given
Flammability: 3 Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F. as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)
Physical: 1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

Date of issue: 11/09/2016       Version: 1.0

SDS US (GHS HazCom 2012) - Custom
According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

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