1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier
Product Name Hafnium Oxychloride Solution

Other means of identification
Product Code SAC041
UN/ID No. 1760
Synonyms Hafnium Oxychloride Solution: Hafnium Chloride Oxide Solution, Hafnium Dichloride Oxide Solution, Hafnium Dichloride Monoxide Solution

Recommended use of the chemical and restrictions on use
Recommended Use Chemical intermediate.
Uses advised against

Details of the supplier of the safety data sheet
Manufacturer Address ATI, 1000 Six PPG Place, Pittsburgh, PA 15222 USA
Emergency telephone number Chemtrec: 1-800-424-9300

2. HAZARDS IDENTIFICATION

Classification
This material is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin corrosion/irritation</td>
<td>1B</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>1</td>
</tr>
<tr>
<td>May be corrosive to metals</td>
<td>1</td>
</tr>
</tbody>
</table>

Label elements
Emergency Overview

Danger

Hazard statements
May be corrosive to metals
Causes severe skin burns and eye damage
Causes serious eye damage

Appearance Liquid
Physical state Liquid
Odor Pungent, Slight chlorine

Precautionary Statements - Prevention
Do not breathe gas/mist/vapor/spray
Wear protective gloves/protective clothing/eye protection/face protection

**Precautionary Statements - Response**
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor/physician
IF ON SKIN (or hair): Rinse cautiously with water for several minutes. Remove/Take off immediately all contaminated clothing, Rinse skin with water/shower
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Wash contaminated clothing before reuse
Absorb spillage to prevent material damage

**Precautionary Statements - Storage**
Store in corrosion-resistant container

**Precautionary Statements - Disposal**
Dispose of contents/container to an approved waste disposal plant.

**Hazards not otherwise classified (HNOC)**
Not applicable
**Other Information**
Not applicable

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**3. COMPOSITION/INFORMATION ON INGREDIENTS**

**Synonyms**
Hafnium Oxychloride Solution: Hafnium Chloride Oxide Solution, Hafnium Dichloride Oxide Solution, Hafnium Dichloride Monoxide Solution.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>62 - 75</td>
</tr>
<tr>
<td>Hafnium Dichloride Oxide</td>
<td>13759-17-6</td>
<td>25 - 35</td>
</tr>
</tbody>
</table>

---

**4. FIRST AID MEASURES**

**First aid measures**

**Eye contact**
Flush with water for 15 minutes. See a physician.

**Skin Contact**
Wash off immediately with soap and plenty of water. Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

**Inhalation**
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a physician or poison control center immediately.

**Ingestion**
Do NOT induce vomiting. Have patient drink large quantities of water if able. Call Physician immediately for further instructions.

**Most important symptoms and effects, both acute and delayed**

**Symptoms**
May cause acute gastrointestinal effects if swallowed. Contact with skin may cause skin burns. May cause breathing difficulties if inhaled.

**Indication of any immediate medical attention and special treatment needed**

**Note to physicians**
Treat symptomatically.

---

**5. FIRE-FIGHTING MEASURES**

**Suitable extinguishing media**
Non-combustible.

**Unsuitable extinguishing media** Non-combustible.

**Specific hazards arising from the chemical**
Non-combustible.

**Hazardous combustion products** Hydrogen chloride gas may cause respiratory and/or eye irritation.

**Explosion data**
- Sensitivity to Mechanical Impact: None.
- Sensitivity to Static Discharge: None.

**Protective equipment and precautions for firefighters**
Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures**

**Personal precautions**
Use personal protective equipment as required.

**For emergency responders**
Use personal protective equipment as required. Follow Emergency Response Guidebook, Guide No. 154.

**Environmental precautions**
Collect spillage to prevent release to the environment.

**Methods and material for containment and cleaning up**

**Methods for containment**
Prevent further leakage or spillage if safe to do so.

**Methods for cleaning up**
Wash the spill location thoroughly with water. Respiratory protection may be needed. Skin and eye protection should be used during cleanup.

### 7. HANDLING AND STORAGE

**Precautions for safe handling**

**Advice on safe handling**
Handle in accordance with good industrial hygiene and safety practice. Ensure adequate ventilation, especially in confined areas.

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

**Storage Conditions**

**Incompatible materials**
Alcohols, phenols, and amines. Rubber, coatings, and some plastics.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control parameters**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water 7732-18-5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hafnium Dichloride Oxide 13759-17-6</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Appropriate engineering controls**

...
Engineering Controls
Avoid generation of uncontrolled mist.

Individual protection measures, such as personal protective equipment

Eye/face protection
If a risk of eye injury or irritation is present, appropriate eye protection is recommended; for example, tight-fitting goggles, foam-lined safety glasses, face shield, or other protective equipment that shields the eyes.

Skin and body protection
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Respiratory protection
When gases/mists/vapors are generated and if exposure limits are exceeded or irritation is experienced, proper approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations
Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>Liquid</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td></td>
<td>Odor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pungent, Slight chlorine</td>
</tr>
<tr>
<td>pH</td>
<td>$&lt;$1</td>
<td></td>
</tr>
<tr>
<td>Melting point / freezing point</td>
<td>°C / °F</td>
<td></td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaporation rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>-</td>
<td>Not flammable</td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper flammability limit:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower flammability limit:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Vapor density</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Specific Gravity</td>
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</tr>
<tr>
<td>Water solubility</td>
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</tr>
<tr>
<td>Solubility in other solvents</td>
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<td></td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Dynamic viscosity</td>
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<td>Not applicable</td>
</tr>
<tr>
<td>Explosive properties</td>
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<td></td>
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<tr>
<td>Oxidizing properties</td>
<td>Not applicable</td>
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<tr>
<td>Other Information</td>
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<tr>
<td>Softening point</td>
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<tr>
<td>Molecular weight</td>
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<td></td>
</tr>
<tr>
<td>VOC Content (%)</td>
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<td></td>
</tr>
<tr>
<td>Density</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Bulk density</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Reactivity
Chemical stability
Stable under normal conditions.

Possibility of Hazardous Reactions
None under normal processing.

Hazardous polymerization
Hazardous polymerization does not occur.

Conditions to avoid
To avoid thermal decomposition, do not overheat.

Incompatible materials
Alcohols, phenols, and amines. Rubber, coatings, and some plastics.

Hazardous Decomposition Products
Thermal decomposition produces hydrogen chloride gas.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Inhalation
Product not classified.

Eye contact
Causes severe eye damage.

Skin Contact
Causes severe skin burns.

Ingestion
Harmful if swallowed.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water 7732-18-5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hafnium Dichloride Oxide 13759-17-6</td>
<td>3500 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Information on toxicological effects

Symptoms
May cause skin burns. May cause severe upper respiratory irritation if inhaled. May cause acute gastrointestinal effects if swallowed. May cause burning sensation or redness in the eyes.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Acute toxicity
Harmful if swallowed.

Skin corrosion/irritation
Causes severe burns.

Serious eye damage/eye irritation
Causes severe eye damage.

Sensitization
Product not classified.

Germ cell mutagenicity
Product not classified.

Carcinogenicity
Product not classified.

Reproductive toxicity
Product not classified.

STOT - single exposure
Product not classified.

STOT - repeated exposure
Product not classified.

Aspiration hazard
Product not classified.

12. ECOLOGICAL INFORMATION

Not applicable
Ecotoxicity

This product as shipped is not classified for aquatic toxicity.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to microorganisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water 7732-18-5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hafnium Dichloride Oxide 13759-17-6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Other adverse effects

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging Disposal should be in accordance with applicable regional, national and local laws and regulations.

14. TRANSPORT INFORMATION

DOT Regulated
UN/ID No. 1760
Proper shipping name Corrosive liquid, n.o.s. (Hafnium Oxychloride)
Hazard Class 8
Packing Group II
Special Provisions B2, IB2, T11, TP2, TP27
Emergency Response Guide Number 154

15. REGULATORY INFORMATION

International Inventories
TSCA  Complies
DSL/NDSL Complies
EINECS/ELINCS Complies
ENCS Complies
IECSC Not Listed
KECL Complies
PICCS Not Listed
AICS Not Listed

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances
US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories
- Acute health hazard: Yes
- Chronic Health Hazard: No
- Fire hazard: No
- Sudden release of pressure hazard: No
- Reactive Hazard: No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water 7732-18-5</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

U.S. EPA Label Information
EPA Pesticide Registration Number: Not applicable

16. OTHER INFORMATION

NFPA
- Health hazards: 1
- Flammability: 0
- Instability: 0
- Physical and Chemical Properties -

HMIS
- Health hazards: 2
- Flammability: 0
- Physical hazards: 0
- Personal protection: X

Chronic Hazard Star Legend
* = Chronic Health Hazard

Issue Date: 06-Apr-2017
Revision Date: 20-Dec-2019
Revision Note: Updated to comply with GHS

Note:
The information provided in this safety data sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Additional information available from:
Safety data sheets and labels available at ATImetals.com

End of Safety Data Sheet

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North America; English