SAFETY DATA SHEET

Issue Date 08-Jul-2015 **Revision Date** 15-Jan-2018 **Version** 3

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

Product identifier
Product Name Hafnium Tetrachloride

Other means of identification
Product Code SAC027
UN/ID No. 1759
Synonyms Hafnium Tetrachloride: Hafnium Chloride, (Product #405)

Recommended use of the chemical and restrictions on use
Recommended Use Hafnium compounds.
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
Emergency Telephone Chemtrec: 1-800-424-9300

2. HAZARDS IDENTIFICATION

Classification

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

Skin corrosion/irritation	Category 1B
Corrosive to metals	Category 1

Label elements

Emergency Overview

Danger

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

Appearance Powder **Physical state** Solid **Odor** Pungent, Slight chlorine.

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

Precautionary Statements - Response
IF SWALLOWED: Rinse mouth, Do NOT induce vomiting
IF ON SKIN (or hair): Brush off loose particles from skin, 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
Immediately call a POISON CENTER or doctor/physician
Wash contaminated clothing before reuse
Absorb spillage to prevent material damage

Precautionary Statements - Storage
Store in a dry place
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
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3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms Hafnium Tetrachloride: Hafnium Chloride, (Product #405).

Chemical Name	CAS No.	Weight-%
Hafnium Tetrachloride	13499-05-3	>95
Zirconium Tetrachloride	10026-11-6	<4

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4. FIRST AID MEASURES

First aid measures

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

Skin Contact Brush off loose particles from skin. 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 moist 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 If a fire occurs in the area, avoid water contact with the product to prevent evolution of hazardous gases.

Specific hazards arising from the chemical
Non-combustible.

Hazardous combustion products Not applicable.

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. 137.

Environmental precautions

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 Sweep or shovel material into dry containers. Avoid creating uncontrolled dust. 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. Protect from moisture. Reacts with water. Ensure adequate ventilation, especially in confined areas. Handle under inert gas such as nitrogen or argon to maintain the integrity of the product.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep in properly labeled containers. Keep in a dry, cool and well-ventilated place. Protect from direct sunlight. Containers may become pressurized: Handle and open container with care.

Incompatible materials Water, alcohols, phenols, and amines. Rubber, coatings, and some plastics. Reacts with metals to produce heat and corrosive gases.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Chemical Name	ACGIH TLV	OSHA PEL
Hafnium Tetrachloride 13499-05-3	TWA: 0.5 mg/m^3 Hf	-
Zirconium Tetrachloride 10026-11-6	STEL: 10 mg/m^3 Zr TWA: 5 mg/m^3 Zr	TWA: 5 mg/m^3 Zr (vacated) STEL: 10 mg/m^3 Zr

Appropriate engineering controls

Engineering Controls Avoid generation of uncontrolled particles. Local exhaust ventilation during processing is recommended.

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 particulates/fumes/gases 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

Physical state	Solid		
Appearance	Powder	**Odor**	Pungent, Slight chlorine.
Color	white, orange	**Odor threshold**	

Property	**Values**	**Remarks • Method**
pH	<1	
Melting point/freezing point	320 °C / 610 °F	
Boiling point / boiling range	-	
Flash point	-	Not applicable
Evaporation rate	-	Not applicable
Flammability (solid, gas)	-	Not flammable
Flammability Limit in Air		
Upper flammability limit:	-	
Lower flammability limit:	-	
Vapor pressure	-	Not applicable
Vapor density	-	Not applicable
Specific Gravity	2.8	
Water solubility	Reacts with water	hydrolyzes
Solubility in other solvents	-	
Partition coefficient	-	
Autoignition temperature	-	Not applicable
Decomposition temperature	-	Not applicable
Kinematic viscosity	-	Not applicable
Dynamic viscosity	-	Not applicable
Explosive properties	Not applicable	
Oxidizing properties	Not applicable	

Other Information

Softening point	-
Molecular weight	320.30
VOC Content (%)	Not applicable
Density	-
Bulk density	110-130lb/ft3

10. STABILITY AND REACTIVITY

Reactivity
Reacts with water

Chemical stability
Stable under normal conditions.

Possibility of Hazardous Reactions
Reacts with water.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid
Unintentional contact with water.

Incompatible materials
Water, alcohols, phenols, and amines. Rubber, coatings, and some plastics. Reacts with metals to produce heat and corrosive gases.

Hazardous Decomposition Products
Reacts with water to produce hydrogen chloride gas or hydrochloric acid and heat.

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 Product not classified.

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Hafnium Tetrachloride 13499-05-3	112 mg/kg bw	-	-
Zirconium Tetrachloride 10026-11-6	-	-	-

Information on toxicological effects

Symptoms May cause skin burns. May cause severe upper respiratory irritation if inhaled. May cause acute gastrointestinal effects if swallowed.

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

Acute toxicity Product not classified.
Skin corrosion/irritation May cause severe skin burns.
Serious eye damage/eye irritation May cause serious 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.
Target Organ Effects Product not classified.

Aspiration hazard Product not classified.

12. ECOLOGICAL INFORMATION

Ecotoxicity

This product as shipped is not classified for aquatic toxicity.

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Hafnium Tetrachloride 13499-05-3	The 72 h EC50 of Hafnium dioxide in water to Pseudokirchneriella subcapitata was greater than the solubility limit of 0.008 mg Hf/L .	The 96 h LC50 of Hafnium dioxide in water to Danio rerio was greater than the solubility limit of 0.007 mg Hf/L .	-	The 48 h EC50 of Hafnium dioxide to Daphnia magna was greater than the solubility limit of 0.007 mg Hf/L.
Zirconium Tetrachloride 10026-11-6	The 14 d NOEC of zirconium tetrachloride to Chlorella vulgaris was greater than 262 mg of ZrCl4/L.	The 96h LC50 value of zirconium tetrachloride to Oncorhynchus mykiss was greater than 51 mg ZrCl4/L and the 96 h LL50 of zirconium tetrachloride to Danio rerio was greater than 190 mg of ZrCl4/L	-	The 48 h EC50 of zirconium tetrachloride to Daphnia magna was greater than 190 mg of ZrCl4/L.

Persistence and degradability

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Bioaccumulation

Mobility

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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.	1759
Proper shipping name	Corrosive solid, n.o.s. (Hafnium Tetrachloride)
Hazard Class	8
Packing Group	III
Special Provisions	128, IB8, IP3, T1, TP33
Emergency Response Guide Number	137

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 contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Zirconium Tetrachloride 10026-11-6	5000 lb			X

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Chemical Name	Hazardous Substances RQs
Zirconium Tetrachloride 10026-11-6	5000 lb

US State Regulations

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

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania

Zirconium Tetrachloride 10026-11-6	X	X	X

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

16. OTHER INFORMATION

NFPA	**Health hazards** 1	**Flammability** 0	**Instability** 1	**Physical and Chemical Properties** -
HMIS	**Health hazards** 2	**Flammability** 0	**Physical hazards** 1	**Personal protection** X

Chronic Hazard Star Legend ** = Chronic Health Hazard*

Prepared By
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Revision Note
Updated Section(s): 2, 4, 5, 7, 8, 9, 10, 11, 16
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.

End of Safety Data Sheet

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