SAFETY DATA SHEET

Issue Date 08-Jul-2015 **Revision Date** 23-Feb-2021 **Version** 6

Section 1: PRODUCT AND COMPANY IDENTIFICATION

Product identifier
Product Name Hafnium Tetrachloride
Product Code SAC027

Other means of identification
UN/ID No. 3260
Synonyms Hafnium Tetrachloride: Hafnium Chloride (Product #405)

Registration Number(s)

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

Emergency telephone number
Emergency Telephone Chemtrec +1 703-741-5970

Section 2: HAZARDS IDENTIFICATION

Classification of the substance or mixture

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

Label elements

Emergency Overview

Signal word Danger

Hazard statements
H290 - May be corrosive to metals
H314 - 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
• Do not breathe dust/fume
Precautionary Statements - Response

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
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 SWALLOWED: Rinse mouth. DO NOT induce vomiting
• 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

Other Information
Other hazards Harmful if swallowed
Hazards not otherwise classified (HNOC)
Reacts violently with water • (EUH014)

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms Hafnium Tetrachloride: Hafnium Chloride (Product #405)

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

Chemical Name	Poisonous and Deleterious Substances Control Law
Hafnium Tetrachloride 13499-05-3	-
Zirconium Tetrachloride 10026-11-6	-

Chemical Name	Class 1	Class 2
Hafnium Tetrachloride 13499-05-3	-	-
Zirconium Tetrachloride 10026-11-6	-	-

Section 4: FIRST AID MEASURES

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.

Skin Contact Brush off loose particles from skin. Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

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

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

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

Inhalation	Product not classified.
Skin Contact	Causes severe skin burns.
Eye contact	Causes severe eye damage.
Ingestion	Harmful if swallowed.
Note to physicians	Treat symptomatically.

Section 5: FIRE FIGHTING MEASURES

Flammable properties	Non-combustible.
Explosive properties	Not applicable.
Suitable extinguishing media	Non-combustible.
Unsuitable extinguishing media	Non-combustible. 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	Hydrogen chloride gas may cause respiratory and/or eye irritation.
Special protective equipment for fire-fighters	Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

Section 6: ACCIDENTAL RELEASE MEASURES

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 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.

Section 7: HANDLING AND STORAGE

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.

Storage

Storage Conditions	Keep in corrosion resistant containers. 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.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies

Chemical Name	Japan	ISHL Working Environmental Evaluation Standards - Administrative Control Levels	ACGIH TLV
Hafnium Tetrachloride 13499-05-3	-	-	TWA: 0.5 mg/m³ Hf
Zirconium Tetrachloride 10026-11-6	-	-	STEL: 10 mg/m³ Zr TWA: 5 mg/m³ Zr

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

Personal Protective Equipment

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.

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.

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

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical state Solid
Appearance Powder
Color white, orange
Odor Pungent, Slight chlorine.
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(ies)		
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	
Softening point	-	
Molecular weight	320.30 of Hafnium Tetrachloride	
VOC Content (%)	Not applicable	

Density -
Bulk density 110-130lb/ft3

Section 10: STABILITY AND REACTIVITY

Reactivity
Reacts with water

Stability Stable under normal conditions.

Explosion data
Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Possibility of Hazardous Reactions Reacts with water

Hazardous polymerization Hazardous polymerization does not occur

Conditions to avoid Dust formation and dust accumulation. 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.

Section 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.

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. May cause burning sensation or redness in the eyes.

Acute toxicity

Numerical measures of toxicity - Product Information

Numerical measures of toxicity - Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50

Hafnium Tetrachloride	112 mg/kg bw	-	-
Zirconium Tetrachloride	-	-	-

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

Skin corrosion/irritation Causes severe skin burns.

Serious eye damage/eye irritation Causes severe eye damage.

Sensitization Product not classified.

Germ cell mutagenicity Product not classified.

Carcinogenicity Product not classified.

Chemical Name	Japan	IARC
Hafnium Tetrachloride 13499-05-3		-
Zirconium Tetrachloride 10026-11-6		-

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.

Section 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	*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	*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

Bioaccumulation

Mobility

Other adverse effects

Chemical Name	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Endocrine disrupting potential
Hafnium Tetrachloride	-	-	-
Zirconium Tetrachloride	-	-	-

Section 13: DISPOSAL CONSIDERATIONS

Waste from residues/unused products 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.

Section 14: TRANSPORT INFORMATION

UN Number 3260
Packing Group II
Proper shipping name Corrosive solid, acidic, inorganic, n.o.s. (Hafnium Tetrachloride)
Hazard Class 8
Special Provisions IB8, IP2, IP4, T3, TP33

IMDG
Proper shipping name Corrosive solid, acidic, inorganic, n.o.s. (Hafnium Tetrachloride)
Hazard Class 8
UN/ID No. 3260
Packing Group II
Special Provisions IB8, IP2, IP4, T3, TP33

ICAO (air)
UN/ID No. 3260
Proper shipping name Corrosive solid, acidic, inorganic, n.o.s. (Hafnium Tetrachloride)
Hazard Class 8
Packing Group II
Special Provisions IB8, IP2, IP4, T3, TP33

ADR
UN/ID No. 3260
Proper shipping name Corrosive solid, acidic, inorganic, n.o.s. (Hafnium Tetrachloride)
Hazard Class 8
Packing Group II
ERG Code 154
Special Provisions IB8, IP2, IP4, T3, TP33

IATA
UN/ID No. 3260
Proper shipping name Corrosive solid, n.o.s. (Hafnium Tetrachloride)
Hazard Class 8
Packing Group II
Special Provisions IB8, IP2, IP4, T3, TP33

Japan
UN Number 3260
Proper shipping name Corrosive solid, acidic, inorganic, n.o.s. (Hafnium Tetrachloride)
Hazard Class 8
Packing Group II
Special Provisions IB8, IP2, IP4, T3, TP33

Section 15: REGULATORY INFORMATION

International Inventories

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

Chemical Name	Dangerous Substances	organic solvents	Harmful Substances Whose Names Are to be Indicated on the Label	ISHL - Prevention of Hazards Due to Specified Chemical Substances (Class 2)	Prevention of Lead Poisoning
Hafnium Tetrachloride 13499-05-3	>1 %	Not applicable	Not applicable	-	-
Zirconium Tetrachloride 10026-11-6	>1 %	Not applicable	Not applicable	-	-

Chemical Name	Class 2	Class 1	Poisonous and Deleterious Substances Control Law	Fire Service Law:
Hafnium Tetrachloride 13499-05-3	Not applicable	-	Not applicable	-
Zirconium Tetrachloride 10026-11-6	Not applicable	-	Not applicable	-

Section 16: OTHER INFORMATION

Prepared By

Issue Date 08-Jul-2015

Revision Date 23-Feb-2021

Revision Note SDS sections updated: 1, 10, 14.

Key or legend to abbreviations and acronyms used in the safety data sheet

Note:
This SDS complies with the requirements of JIS Z 7250:2010 and JIS Z 7252:2009 (Japan)
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