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SAFETY DATA SHEET

Section 1- IDENTIFICATION		
COMPOSITION HfO2		PRODUCT NAME Hafnium Oxide
SUPPLIER: Plasmaterials, Inc. 2268 Research Drive Livermore, CA 94550 Ph: 925-447-4030	RECOMMENDED USE: Laboratory Chemicals Scientific Research	EMERGENCY TELEPHONE NUMBERS US: 001-800-424-9300 Europe: 001-703-527-3887

Section 2- HAZARD(S) IDENTIFICATION	
Physical Hazards: Not Classified	Health Hazards: Not Classified
Environmental Hazards: Not Classified	OSHA Defined Hazards: Not Classified
LABEL ELEMENTS:	
Hazard Symbol: None	Signal Word: None
<p style="text-align: center;"><u>HAZARD STATEMENTS</u></p> <p>-The substance does not meet the criteria for classification</p> <p style="text-align: center;"><u>PRECAUTIONARY STATEMENTS</u></p> <p>-P264: Wash face, hands and any exposed skin thoroughly after handling -P270: Do not eat, drink or smoke when using this product -P420: Store away from other materials -P501: Dispose of contents/container to an approved waste disposal plant</p> <p>Hazards not otherwise classified (HNOC): -None identified.</p>	

Section 3- COMPOSITION/INFORMATION ON INGREDIENTS		
COMPONENT	CAS-No	Molecular Weight
Hafnium Oxide	12055-23-1	210.49 g/mol
Additional Information: Hafnium is routinely found with a low level of Zirconium since separation of the elements is difficult.		

Section 4- FIRST AID MEASURES
<p>Inhalation: Remove victim from exposure to fresh air. Give oxygen if breathing is difficult. If not breathing, give artificial respiration. Consult a physician if symptoms develop or persist.</p> <p>Skin Contact: Wash off with soap and plenty of water. Consult a physician if irritation develops or persists.</p> <p>Eye Contact: Do not rub eyes. As a precaution, flush eyes with lukewarm water, lifting upper and lower lids, for at least 15 minutes. Consult a physician if irritation develops or persists.</p> <p>Ingestion: Rinse mouth with water. Never give anything by mouth to an unconscious person. Consult a physician if irritation develops or persists. If ingestion of a large amount does occur, call a poison control center immediately.</p> <p>Most Important Symptoms/Effects: The most important known symptoms and effects are described in the labeling (see section 2) and/or in section 11.</p> <p>Indication of any Immediate Medical Attention and Special Treatment Needed: No data available</p>

Section 5- FIREFIGHTING MEASURES

Suitable Extinguishing Media:

Water Spray, Alcohol-Resistant Foam, Dry Chemical Powder, Carbon Dioxide (CO₂)

Unsuitable Extinguishing Media:

Do not use water jet as an extinguisher, as this will spread the fire.

Specific Hazards Arising from the Chemical:

No data available

General Fire Hazards:

No unusual fire or explosion hazards noted.

Protective Equipment & Precautions for Firefighters:

As in any fire, Firefighters must wear full face, self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective clothing to prevent contact with skin and eyes.

Specific Methods:

Use water spray to cool unopened containers. Use standard firefighting procedures and consider the hazards of other involved materials.

Section 6- ACCIDENTAL RELEASE MEASURES

Personal Precautions: Avoid dust formation. Avoid breathing vapors, mist or gas. For personnel protection see Section 8.

Environmental Precautions: Avoid discharge into drains, water courses or onto the ground.

Methods for Containment & Clean Up: Stop the flow of material if this is without risk. Sweep up and shovel. Keep in suitable, closed containers for disposal. For waste disposal see Section 13.

Section 7- HANDLING AND STORAGE

Handling: Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs. Provide appropriate exhaust ventilation at places where dust is formed. Avoid prolonged exposure. Observe good industrial hygiene practices. Use care in handling and storage.

Storage: Store in original tightly closed container. Store in a dry, well-ventilated place. Store away from incompatible materials.

Section 8- EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines:

Occupational Exposure Limits/Components with Workplace Control Parameters:

Component	CAS-No.	Value	Control Parameters	Basis
Hafnium Oxide	12055-23-1	TWA	0.500000 mg/m ³	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract Irritation Eye Irritation Liver Damage		
		TWA	0.500000 mg/m ³	USA. NIOSH Recommended Exposure Limits
		TWA	0.5 mg/m ³	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract Irritation Eye Irritation Liver Damage		
		TWA	0.5 mg/m ³	USA. NIOSH Recommended Exposure Limits

Biological Limit Values: No biological exposure limits noted for the substance

Appropriate Engineering Controls: If material is ground, cut or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below recommended exposure limits.

Personal Protective Equipment:

Eye/Face Protection: Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin and Body Protection: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Wear suitable protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory Protection: Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hygiene Measures: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of the workday. Routinely wash work clothing and protective equipment to remove contaminants.

Section 9- PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Solid

Odor: No information available

Odor Threshold: No information available

pH: No information available

Melting Point/Range: 2758°C / 4996°F

Boiling Point/Range: No information available

Flash Point: No information available

Evaporation Rate: No information available

Flammability (solid,gas): No information available

Flammability or Explosive Limits:

Upper: No data available

Lower: No data available

Vapor Pressure: No information available

Vapor Density: No information available

Relative Density: 9.680 g/mL at 25°C / 77°F

Solubility: No information available

Partition coefficient; n-octanol/water: No information available

Auto Ignition Temperature: No information available

Decomposition Temperature: No information available

Viscosity: No information available

Explosive Properties: No information available

Oxidizing Properties: No information available

Section 10- STABILITY AND REACTIVITY

Reactive Hazard: No information available

Stability: Stable under recommended storage conditions.

Conditions to Avoid: Contact with incompatible materials

Incompatible Materials: Strong oxidizing agents

Hazardous Decomposition Products: No information available

Hazardous Polymerization: No information available

Hazardous Reactions: No information available

Section 11- TOXICOLOGICAL INFORMATION

Information on likely Routes of Exposure:

Inhalation: No information available

Skin Contact: No information available

Eye Contact: No information available

Ingestion: No information available

Information on Toxicological Effects:

Acute Toxicity: No information available

Inhalation: No information available

Dermal: No information available

Skin Corrosion/Irritation: No information available

Serious eye damage/irritation: No information available

Respiratory or Skin Sensitization: No information available

Carcinogenicity: This product is not considered to be a carcinogen by IARC (Not Listed), ACGIH, NTP (Not Listed) or OSHA (Not Regulated).

Germ Cell Mutagenicity: No information available

Reproductive Effects: No information available

Development Effects: No information available

Specific Target Organ Toxicity – single exposure: No information available

Specific Target Organ Toxicity – repeated exposure: No information available

Aspiration Hazard: No information available

Additional Information: RTECS: Not available

-To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

Section 12- ECOLOGICAL INFORMATION

Toxicity: The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Persistence and Degradability: No information available

Bioaccumulation/Accumulation: No information available

Mobility in Soil: No information available

Results of PBT & vPvB assessment: PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

Other Adverse Effects: No information available.

Section 13- DISPOSAL CONSIDERATIONS

Waste Disposal Methods: Offer surplus and non-recyclable solutions to a licensed disposal company. Dispose of contaminated packaging as unused product. Dispose in accordance with all applicable regulations.

Section 14- TRANSPORT INFORMATION

DOT: Not regulated as dangerous goods

IATA: Not regulated as dangerous goods

IMDG/IMO: Not regulated as dangerous goods

Section 15- REGULATORY INFORMATION

US Federal Regulations: This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt.D): Not regulated

U.S. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050): Not regulated

SARA 302 Extremely Hazardous Substance: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

SARA 313 (TRI Reporting): This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313

SARA 304 Emergency Release Notification: Not regulated

SARA 311/312 Hazardous Chemical: No
CERCLA Hazardous Substance List (40 CFR 302.4): Not Listed
Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List: Not regulated
Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130): Not regulated
Safe Drinking Water Act (SDWA): Not regulated
US California Proposition 65: This product does not contain any chemicals known to the State of California to cause cancer, birth defects or any other reproductive harm.
US Massachusetts Right-To-Know (RTK) Components: Not regulated
US New Jersey Right-To-Know (RTK) Components: Hafnium Oxide (CAS No: 12055-23-1)
US Pennsylvania Right-To-Know (RTK) Components: Hafnium Oxide (CAS No: 12055-23-1)

Section 16- OTHER INFORMATION

The above information is accurate to the best of our knowledge. However, since data, safety standards and government regulations are subject to change, the conditions of handling and use, or misuse are beyond our control, Plasmaterials, Inc. makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Users should satisfy themselves that they have all current data relevant to their particular use.

The information in this SDS was obtained from sources, which we believe are reliable. However, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy or correctness.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.

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