

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	Hafnium Oxide, Enriched Hafnium
CAS No.	12055-23-1
Chemical Formula	HfO ₂
Molecular Weight	210.49
Supplier Address*	ISOFLEX USA PO Box 29475 San Francisco CA 94129 United States
Telephone	+1 415-440-4433
Fax	+1 415-563-4433
Emergency Phone Number (both supplier and manufacturer)	Infotrac/ +1 800-535-5053 *May include subsidiaries or affiliate companies/divisions
Email	iusa@isoflex.com
Website	www.isoflex.com
Preparation Information	ISOFLEX USA Product Safety +1 415-440-4433

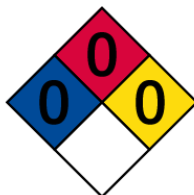
2. HAZARDOUS IDENTIFICATION

Emergency Overview:

OSHA Hazards: No known OSHA hazards
Not a dangerous substance according to GHS.

NFPA Ratings: (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health Hazard = 0 Flammability = 0 Reactivity = 0



HMIS Ratings: (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health Hazard = 0 Flammability = 0 Physical Hazard = 0

HEALTH HAZARD	0
FLAMMABILITY	0
PHYSICAL HAZARD	0

Potential Health Effects

<i>Inhalation</i>	May be harmful if inhaled. May cause respiratory tract irritation.
<i>Skin</i>	May be harmful if absorbed through skin. May cause skin irritation.
<i>Eyes</i>	May cause eye irritation.
<i>Ingestion</i>	May be harmful if swallowed.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name:	Hafnium Oxide
CAS No.:	12055-23-1
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4. FIRST AID MEASURES

<i>Inhalation Exposure</i>	Remove victim to fresh air, keep warm and quiet, give oxygen if breathing is difficult, and seek medical attention.
<i>Dermal Exposure</i>	Remove contaminated clothing, brush material off skin, wash affected area with mild soap and water. Seek medical attention if symptoms persist.
<i>Eye Exposure</i>	Flush with warm water, lifting upper and lower eyelids.
<i>Oral Exposure</i>	Give 1-2 glasses of water and induce vomit, seek medical attention. Never give anything by mouth to unconscious person. Rinse mouth with water.

5. FIREFIGHTING MEASURES

<i>Flash Point</i>	N/A
<i>Lower Explosive Limit</i>	N/A
<i>Upper Explosive Limit</i>	N/A
<i>Suitable Extinguishing Media</i>	Not applicable. Use extinguishing agent suitable for surrounding materials and type of fire.
<i>Special Fire Fighting Procedures</i>	Use NIOSH-approved self-contained breathing apparatus and full protective equipment. Fumes from fire are hazardous. Isolate runoff to prevent environmental pollution.
<i>Unusual Fire and Explosion Hazards</i>	None specified by manufacturer.
Firefighting	
<i>Protective Equipment</i>	Wear self-contained breathing apparatus for firefighting if necessary.
<i>Hazardous Decomposition Products</i>	Hazardous combustion products formed under fire conditions: Hafnium Oxide

6. ACCIDENTAL RELEASE MEASURES

<i>Personal Precautions</i>	Notify safety personnel of leaks or spills. Remove spills by vacuuming or wet sweeping in order to keep airborne dust at a minimum. Avoid dust formation. Avoid breathing vapors, mist or gas.
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<i>Environmental Precautions</i>	Do not let product enter drains.
<i>Methods for Cleaning Up</i>	Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

<i>Handling</i>	Avoid breathing dust. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for preventive fire protection.
<i>Storage</i>	Store in closed container in a cool, dry, well-ventilated, low-fire-risk area. Protect container from physical damage.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

<i>Respiratory Protection</i>	NIOSH-approved dust respirator
<i>Ventilation</i>	
<i>Local exhaust</i>	Employ to keep dust levels low
<i>Mechanical</i>	Employ to keep dust levels low
<i>Hand Protection</i>	Rubber gloves
<i>Eye Protection</i>	ANSI-approved chemical workers' goggles
<i>Other Protective Equipment</i>	Protective gear suitable to prevent contamination. ANSI- approved emergency eye wash and deluge shower.
<i>Work Hygienic Practices</i>	Implement engineering and work practice controls to reduce and maintain concentration of exposure at low level.

9. PHYSICAL AND CHEMICAL CHARACTERISTICS

Appearance

<i>Form:</i>	Solid
<i>Color:</i>	White

Safety Data

Specific Gravity:	9.687 (water-1)
Molecular Weight (naturally-occurring):	210.49
Vapor Pressure:	Not in sources searched
Vapor Density:	Not in sources searched
Boiling Point:	Approx 5400 °C
Melting Point:	2758° +/- 25 °C
Percent Volatile:	Not in sources searched
Evaporation Rate:	Not in sources searched
Solubility:	Insoluble in water

10. STABILITY AND REACTIVITY

<i>Stability</i>	Stable
<i>Conditions to Avoid (Stability)</i>	None
<i>Materials to Avoid</i>	None specified by manufacturer
<i>Hazardous Decomposition or Byproducts</i>	None specified by manufacturer
<i>Hazardous Polymerization</i>	No
<i>Conditions to Avoid (Poly)</i>	Not relevant

11. TOXICOLOGICAL INFORMATION

LD50-LC50 Mixture None specified by manufacturer

Routes of Entry

Inhalation Yes

Skin Yes

Ingestion Yes

Health Hazards - Acute and Chronic To best of manufacturer's knowledge, chemical, physical and toxic properties of hafnium oxide have not been thoroughly investigated and recorded. Hafnium is a poison by unspecified route. It is poorly soluble in water and thus is not absorbed efficiently by ingestion. Many hafnium compounds are poisonous.

Carcinogenicity

NTP No

IARC No

OSHA No

Explanation Carcinogenicity Not relevant

Signs and Symptoms of Exposure May cause irritation to nose, throat and mucous membranes

Eyes May cause irritation

Skin May cause irritation

Inhalation May cause red, dry throat and cough

Ingestion May cause some discomfort

Medical Condition Aggravated by Exposure None

12. ECOLOGICAL INFORMATION

Toxicity No data available

Persistence and Degradability No data available

Bioaccumulative Potential No data available

Mobility in Soil No data available

PBT and vPvB Assessment No data available

Other Adverse Effect No data available

13. DISPOSAL CONSIDERATION

Product Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated Packaging Dispose of as unused product.

14. TRANSPORT INFORMATION

Transportation Requirements: Not classified by DOT or IATA

15. REGULATORY INFORMATION

US Federal

TSCA

CAS# 12055-23-1 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

*CERCLA Hazardous Substances
and Corresponding RQs*

None of the chemicals in this material have an RQ.

*SARA Section 302 Extremely
Hazardous Substances*

None of the chemicals in this product have a TPQ.

Section 313

No chemicals are reportable under Section 313.

Clean Air Act

This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depleters. This material does not contain any Class 2 Ozone depleters.

Clean Water Act

None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA

None of the chemicals in this product are considered highly hazardous by OSHA.

US States

CAS# 12055-23-1 is not present on state lists from CA, PA, MN, MA, FL or NJ.

California No Significant Risk Level

None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols

Not available

Risk Phrases

Not available

Safety Phrases

S 24/25 Avoid contact with skin and eyes

S 37 Wear suitable gloves.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 28A After contact with skin, wash immediately with plenty of water.

WGK (Water Danger/Protection)

CAS# 12055-23-1: No information available.

Canada - DSL/NDSL

CAS# 12055-23-1 is listed on Canada's DSL List.

Canada – WHMIS

Not available

16. OTHER INFORMATION

<i>Prepared By</i>	ISOFLEX USA PO Box 29475 San Francisco CA 94129 United States
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<i>Revision Number</i>	2
<i>Revision Note</i>	Required review and update

ISOFLEX USA's Commonly Used Abbreviations and Acronyms*

ACGIH	American Conference of Governmental Industrial Hygienists
ADR	European Agreement Concerning the International Carriage of Dangerous Goods by Road
ALARA	As Low As Is Reasonably Achievable
AMU	Atomic Mass Unit
ANSI	American National Standards Institute
BLS	Basic Life Support
CAM	Continuous Air Monitor
CAS	Chemical Abstracts Service (division of the American Chemical Society)
CEN	European Committee for Standardization
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CLP	Classification, Labelling and Packaging (European Union)
CPR	Controlled Products Regulations (Canada)
CWA	Clean Water Act (USA)
DAC	Derived Air Concentration (USA)
DOE	United States Department of Energy (USA)
DOT	United States Department of Transportation (USA)
DSL	Domestic Substances List (Canada)
EC50	Half Maximal Effective Concentration
EINECS	European Inventory of Existing Commercial Chemical Substances
EHS	Environmentally Hazardous Substance
ELINCS	European List of Notified Chemical Substances
EMS	Emergency Response Procedures for Ships Carrying Dangerous Goods
EPA	Environmental Protection Agency (USA)
EPCRA	Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986
GHS	Globally Harmonized System
HMIS	Hazardous Materials Identification System (USA)
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
IBC	Intermediate Bulk Containers
ICAO	International Civil Aviation Organization
IDLH	Immediately Dangerous to Life or Health
IMDG	International Maritime Code for Dangerous Goods
LC50	Lethal concentration, 50 percent
LD50	Lethal dose, 50 percent
LDLO	Lethal Dose Low
LOEC	Lowest-Observed-Effective Concentration
MARPOL	International Convention for the Prevention of Pollution from Ships
MSHA	Mine Safety and Health Administration (USA)
NCRP	National Council on Radiation Protection & Measurements (USA)

NDSL	Non-Domestic Substances List (Canada)
NFPA	National Fire Protection Association (USA)
NIOSH	National Institute for Occupational Safety and Health (USA)
NOEC	No Observed Effect Concentration
N.O.S.	Not Otherwise Specified
NRC	Nuclear Regulatory Commission (USA)
NTP	National Toxicology Program (USA)
OSHA	Occupational Safety and Health Administration (USA)
PBT	Persistent Bioaccumulative and Toxic Chemical
PEL	Permissible Exposure Limit
PIH	Poisonous by Inhalation Hazard
RCRA	Resource Conservation and Recovery Act (USA)
RCT	Radiation Control Technician
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (Europe)
RID	Regulations Concerning the International Transport of Dangerous Goods by Rail
RTECS	Registry of Toxic Effects of Chemical Substances
SARA	Superfund Amendments and Reauthorization Act (USA)
TDG	Transportation of Dangerous Goods (Canada)
TIH	Toxic by Inhalation Hazard
TLV	Threshold Limit Value
TPQ	Threshold Planning Quantity
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
UN	United Nations (Number)
VOC	Volatile Organic Compound
vPvB	Very Persistent Very Bioaccumulative Chemical
WGK	Wassergefährdungsklassen (Germany: Water Hazard Classes)
WHMIS	Workplace Hazardous Materials Information System

*One or more of the above-listed items may not appear in this document.

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