ANGSTROM SCIENCES
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# MATERIAL SAFETY DATA SHEET

COMPLIES WITH 29 CFR 1910.1200.
OSHA HAZARD COMMUNICATION RULE

**DATE OF LAST REVISION: 03-04-07**

## CHEMICAL IDENTITY

| | |
|---|---|
| LABEL IDENTITY | **ZIRCONIUM METAL** |
| FORMULA | **Zr** |
| CHEMICAL FAMILY | **GROUP 4 METAL** |
| CAS REGISTRY NUMBER | **7440-67-7** |
| HAZARDOUS INGREDIENTS | **ZIRCONIUM, Zr** |

%: **99.7** TWA: **5mg/m3** STEL: **10mg/m3**

## PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| COLOR, FORM AND ODOR | **Similar to Stainless Steel** |
| BOILING POINT @ 760MM HG | **4377°C** |
| VAPOR DENSITY (AIR=1) | **NA** |
| VAPOR PRESSURE | **0 @ 2°C** |
| % VOLATILE BY VOLUME | **None** |
| REACTION WITH WATER | **ND** |
| EVAPORATION RATE | **None** |
| SOLUBILITY IN WATER | **Insoluble** |
| FREEZING/MELTING POINT | **1852°C** |
| SPECIFIC GRAVITY (H2O = 1) | **6.49** |
| BULK DENSITY | **405 lb/ft$^3$** |

## FIRE AND EXPLOSION HAZARD DATA

IGNITION POINT: **Solid metal will not ignite. High surface area material such as 10 micron powder may ignite at room temperature.**
MINIMUM EXPLOSIBLE CONCENTRATION (g/m$^3$): **Less than 100. Varies with particle size.**
EXTINGUISHING MEDIA: **Dry table salt. Type D fire extinguisher.**
FIRE FIGHTING PROCEDURES: **If metal fines become ignited it is advisable to allow the material to burn out. Fires can be controlled by smothering with dry table salt or using Type D dry powder fire extinguisher material.**
UNUSUAL FIRE & EXPLOSIVE HAZARDS: **Do not spray water on burning zirconium. Carbon dioxide is not effective in extinguishing burning zirconium.**

**If a fire starts in mass of wet metal fines, the initial fire may be followed by an explosion. Therefore, when in doubt, personnel should retire and not attempt to extinguish the fire. The explosive characteristic of such material is caused by the steam and hydrogen generated within the burning mass.**

FIRE DANGER: **fine chips, turnings, or grinding dust produced from this metal are flammable.**

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## HEALTH HAZARD INFORMATION

TOXICITY DATA: **Zirconium metal is nontoxic.**

HMIS RATING:
HEALTH: **0** FLAMMABILITY: **0** REACTIVITY: **0** PERSONAL PROTECTION: **ND**

ROUTES OF ENTRY
INHALATION: **NO**
SKIN: **NO**
INGESTION: **NO**

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: **no data**
EFFECTS OF OVEREXPOSURE (acute and chronic): **None**
References: **NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards**
**OSHA 29 CFR 1910, Table Z-1-A, Jan. 1989**
**ILO - Encyclopedia of Occupational Health and Safety**
**Patty's Industrial Hygiene and Toxicology, 3rd Edition, Volume 2A**

CARCINOGENICITY: **no** NTP: **no** IARC MONOGRAPHS: **no** OSHA REGULATE: **no**

EMERGENCY FIRST AID PROCEDURES:
INGESTION: **NA**
INHALATION: **NA**
SKIN CONTACT: **NA**
EYE CONTACT: **Normal procedure for foreign object.**

## REACTIVITY DATA

STABILITY: **Stable**
INCOMPATIBILITY (MATERIALS TO AVOID): **Zirconium metal is rapidly dissolved by hydrofluoric acid or hydrofluoric-nitric acid mixtures.**
**Above 200°C, zirconium reacts exothermically with fluorine, chlorine, bromine, iodine, and halocarbons, including carbon tetrachloride, carbon tetrafluoride and Freons™.**
**Nitryl Fluoride, FNO2 will initiate a reaction with zirconium metal at room temperature to produce a glowing or white incandescence.**
HAZARDOUS DECOMPOSITION PRODUCTS: **Zirconium metal does not decompose. The above reactions with incompatible materials will generate hazardous reaction products such as flammable hydrogen, toxic fumes of nitrogen oxides, or corrosive zirconium halide vapors.**
HAZARDOUD POLYMERZATION: **Will Not Occur**
CONDITIONS TO AVOID: **See Fire Hazards Section**

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## SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: **No special procedures.**

WASTE DISPOSAL METHOD: **Fine, non-recyclable scrap should be burned in small quantities under controlled conditions. The resulting zirconium oxide is inert and may be deposited in a landfill.**

## SPECIAL PROTECTIVE INFORMATION

| | |
|---|---|
| RESPIRATORY PROTECTION | **NA** |
| PROTECTIVE GLOVES | **Advisable, to avoid cuts** |
| EYE PROTECTION | **NA** |
| ADDITIONAL PROTECTIVE MEASURES | **NA** |

## SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING/STORAGE: **Machining of zirconium may result in fine turnings or chips. Any material with a dimension less than 0.0625 inch (1/16") or a cross section less than 0.0078 inch square (1/16 x 1/8), if present in any quantity, can be ignited and can sustain combustion. Keep away from any source of ignition.**
**Keep fine turnings completely dry, or very wet. If wet, the water content should be more than 25% by weight for maximum safety in handling. Severe explosions can result from ignition of zirconium powder or machining fines containing moisture in the concentration range of 5 to 10%.**

OTHER PRECAUTIONS: **Very finely divided scrap or sawdust, with a dimension less than 0.012", should be considered to be pyrophoric and should not be accumulated. Dispose of these materials only.**
**In some cases, when the chemical corrosion resistance of zirconium is exceeded, a corrosion product containing fine zirconium particulate can form on the surface of the metal which can be easily ignited. This film can be rendered non-flammable by simple oxidation treatments such as heating to 250°C for 1 hour or 100°C for 1 days.**

Department of Transportation Classification: **Not hazardous by D.O.T. Regulations.**
D.O.T Proper Shipping Name: **NA** D.O.T. ID Number: **NA**



**NA= NOT APPLICABLE** **ND= NO DATA FOUND** **NR=NOT RECORDED**