

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: Metallurgical Processing, Inc. **TELEPHONE NO:** (860) 224-2648
ADDRESS: 68 Arthur Street **DATE PREPARED:** January 2007
New Britain, CT 06050
TRADE NAME: ZETA - ZrN
CHEMICAL NAME: Zirconium Nitride

II. HAZARDOUS INGREDIENTS

The terms "hazardous" and "hazardous materials" as used within this MSDS should be interpreted as defined by, and in accordance with OSHA Hazard Communications Standard (29 CFR Part 1910, 1200) including cited Appendices, Lists, References, etc., all of which hereby incorporated by reference.

| MATERIAL OR COMPONENT | C.A.S. NO. | Wt. % | OSHA PEL (Mg/M ³) | ACGIH TLV (Mg/M ³) |
|--------------------------|------------|-------|----------------------------------|-----------------------------------|
| Zirconium, Zr | 7440-67-7 | 77.7 | 10 | 5 |
| Nitrogen, N ₂ | 7727-37-9 | 22.3 | N/A | N/A |

III. PHYSICAL DATA

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|---|-----------------------|--------------------------------------|-----------|
| BOILING POINT: | 8000°F | MELTING POINT: | 5306°F |
| SPECIFIC GRAVITY: (H₂O=1) | Approx. 7.0-9.0(60°F) | VAPOR PRESSURE: | N/A |
| VAPOR DENSITY (AIR=1) | N/A | SOLUBILITY IN H₂O: | Insoluble |
| % VOLATILES BY VOLUME: | N/A | EVAPORATION (BUTYL ACEATE=1) | N/A |

APPEARANCE: White-Gold colored coating about .0001" thick, odorless zirconium nitride is a chemically inert substance.

This extremely thin film of zirconium nitride coating is applied to carbide cutting tools, forming tools, and wear parts for extended part life.

IV. FIRE AND EXPLOSION DATA

FLASH POINT: None **FIRE POINT:** None

V. HEALTH HAZARD INFORMATION

WE DO NOT CONSIDER THE COATING IN THE FORM IT IS SOLD TO CONSTITUTE A PHYSICAL HAZARD OR HEALTH HAZARD. SUBSEQUENT OPERATIONS SUCH AS ABREADING, MELTING, WELDING, CUTTING OR PROCESSING IN ANY OTHER FASHION, ZIRCONIUM NITRIDE COATING OBJECT, MAY PRODUCE POTENTIALLY HAZARDOUS DUST OR FUMES WHICH CAN BE INHALED, SWALLOWED, OR COME IN CONTACT WITH THE SKIN OR EYES. THE DUST OR FUMES WHICH CAN BE INHALED, WILL CONSIST OF EXTREMELY MINUTE PARTICLES OF ZIRCONIUM NITRIDE TOGETHER WITH ARTICLES OF MATERIAL FROM THE COATED OBJECT(SUBSTRATE MATERIAL). USERS OF COATED TOOLS SHOULD CHECK MSDS SHEETS FOR SUBSTRATE MATERIAL FOR POSSIBLE HEALTH HAZARD EFFECTS FROM MATERIAL OF COATED OBJECT.

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|---------------------------------|--------------|-----------------------------|---|
| PRIMARY ROUTES OF ENTRY: | Inhalation | EMERGENCY FIRST AID: | Remove to fresh air, if continue, consult physician. |
| | Eye Contact | | Flush well with water to remove particulate. Get medical attention. |
| | Skin Contact | | Brush off excess dust. Wash out area with soap and water. |
| | Ingestion | | Seek medical help if large quantities of material have been ingested. |

EFFECT OF EXPOSURE: No toxic effects would be expected from exposure to the solid form of zirconium nitride coated tools. Prolonged, repeated exposure to fumes or dust generated during heating, cutting, brazing or welding may or may not cause adverse health effects associated with the listed constituents in excess of OSHA permissible exposure limits established in 29 CFR Subpart Z. (See Section II)

..... **V. HEALTH HAZARD INFORMATION (CON'D)**

EXPOSURE LIMITS: Section II lists specific ingredients and permissible exposure limits
Determine actual exposure by industrial hygiene monitoring

POSSIBLE SIGNS AND SYMPTOMS OF EXPOSURE TO DUST, WELDING, FUME AND GASES:

SHORT TERM EXPOSURE: Metallic taste; nausea, tightness of chest; fever; irritation of eyes, nose throat and skin; loss of consciousness / death due to welding gases or lack of oxygen.

There are no adverse effects for zirconium nitride coated products in there solid form. Adverse effects may or may not result from long-term (chronic) exposure to dust, fume, gases, etc. that occur by way of subsequent operations on the zirconium nitride coated product. It is believed there are nor reliable scientific studies which show that workers exposed to operations upon zirconium nitride coated products suffer increased incidence of lung cancer or other disease because of exposure to zirconium nitride.

Some studies would associate elements from various substrate materials (material the coated object is made of) with the potential for neurologic, pulmonary, skin or other disease. Chromium, cobalt and nickel in various chemical compounds have been identified as suspect human carinogens by the I.A.R.C., N.T.P. annual report. Users of zirconium nitride coated products should check MSDS sheets of substrate material for possible health hazard effects form material of coated object.

..... **VI. REACTIVITY DATA**

STABILITY: Chemically Stable
IMPCOMPATIBILITY: Reacts with strong acids
HAZARDOUS DECOMPOSITION PRODUCTS: Metallic Oxides

..... **VII. SPILL OR LEAK PROCEDURES**

STEPS TO BE TAKEN IN CASE OF RELEASE OR SPILL: N/A
WASTE DISPOSAL METHOD: Solids - Sales as scrap for reuse
Dust, etc. - Follow federal, state and local regulations regarding disposal.

..... **VIII. SPECIAL PROTECTION INFORMATION**

VENTILATION REQUIREMENTS: General - Recommended (to keep airborne concentration of dust and fumes below ACGIH TLV's
Local - As required

PERSONAL PROTECTIVE EQUIPMENT:

Respiratory: If fumes, missing or dust condition occurs and TLV as indicated in Section II is exceeded, provide NIOSH approved respirators.
Eye Protection: Recommended approved safety glasses of goggles when working with dusty material.
Gloves: As required
Other Clothing or Equipment: As required

..... **IX. SPECIAL PRECAUTIONS**

USE GOOD HOUSE KEEPING PRACTICES TO PREVENT ACCUMULATIONS OF DUST AND TO KEEP AIRBORNE DUST CONCENTRATIONS AT A MINIMUM.

THIS MATERIAL IS POTENTIALLY CONTAMINATED WITH COATING SUCH AS OILS FOR PRESERVATIVES AND OTHER CONTAMINANTS. IF THE MATERIAL IS CONTAMINATED, SPECIAL PRECAUTIONS (SUCH AS PROCESS CONTROL, AND PERSONAL PROTECTIVE EQUIPMENT APPROPRIATE TO THE NATURE OF THE SUSPECTED CONTAMINANTS SHOULD BE TAKEN TO AVOID RESULTING EXPOSURES WHEN HANDLING, CUTTING (THERMAL OR MECHANICAL) AND/OR HEATING OR MELTING.

While the information set forth in this material safety data sheet is believed to be accurate, as of the effective date, Metallurgical Processing, Inc. make no representations regarding the accuracy or completeness of the information and assumes no liability for any loss, damage, or injury of any kind which may result from or arise out of the use or reliance on the information by any person.

N/A = NOT APPLICABLE