SECTION 1. IDENTIFICATION

GHS product identifier: Tetralon with Titanium Diboride

Other means of identification

Relevant identified uses of the substance or mixture and uses advised against: Hard ceramic material used in armor and cutting tool applications.

Supplier's details: CoorsTek, Inc.
16000 Table Mountain Parkway Golden, CO 80403
Phone: +1 303 271 7000
Fax: +1 303 271 7009

Emergency telephone number (with hours of operation): +1 303 271 7000
7:00 AM - 4:00 PM MST

SECTION 2. HAZARDS IDENTIFICATION

OSHA/HCS Status: While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

Classification of the substance or mixture: Not classified

GHS LABEL ELEMENTS

Signal word: No signal word

Hazard statements: No known significant effects or critical hazards

PRECAUTIONARY STATEMENTS

Prevention: Not applicable

Response: Not applicable

Storage: Not applicable

Disposal: Not applicable

Hazards not otherwise classified: None Known
SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/mixture: Mixture
Other means of identification: Not available

CAS NUMBER/OTHER IDENTIFIERS

CAS number: Not applicable
Product code: Not available

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>%</th>
<th>CAS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium diboride</td>
<td>60-100</td>
<td>12045-63-5</td>
</tr>
<tr>
<td>Chromium diboride</td>
<td>1 - 5</td>
<td>12007-16-8</td>
</tr>
<tr>
<td>Nickel</td>
<td>0 - 15</td>
<td>7440-02-0</td>
</tr>
<tr>
<td>Cobalt</td>
<td>0 - 15</td>
<td>7440-48-4</td>
</tr>
<tr>
<td>Iron</td>
<td>0 - 15</td>
<td>7439-89-6</td>
</tr>
<tr>
<td>Tungsten</td>
<td>0 - 6</td>
<td>7440-33-7</td>
</tr>
</tbody>
</table>

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.
### SECTION 4. FIRST AID MEASURES

**DESCRIPTION OF NECESSARY FIRST AID MEASURES**

- **Eye contact**: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

- **Inhalation**: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

- **Skin contact**: Flush contaminated skin with plenty of water. Get medical attention if symptoms occur.

- **Ingestion**: Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

### MOST IMPORTANT SYMPTOMS/EFFECTS, ACUTE AND DELAYED

**POTENTIAL ACUTE HEALTH EFFECTS**

- **Eye contact**: No known significant effects or critical hazards.

- **Inhalation**: Mechanical irritation of the nose, mouth, and throat may occur.

- **Skin contact**: No known significant effects or critical hazards

- **Ingestion**: No known significant effects or critical hazards

**OVER-EXPOSURE SIGNS/SYMPTOMS**

- **Eye contact**: No known significant effects or critical hazards

- **Inhalation**: No known significant effects or critical hazards

- **Skin contact**: No known significant effects or critical hazards

- **Ingestion**: No known significant effects or critical hazards

**INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED, IF NECESSARY**

- **Notes to physician**: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

- **Specific treatments**: No specific treatment

- **Protection of first-aiders**: No action shall be taken involving any personal risk or without suitable training.

See toxicological information (Section 11)
SECTION 5. FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA

Suitable extinguishing media
Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media
None known

Specific hazards arising from the chemical
No specific fire or explosion hazard

Hazardous thermal decomposition products
Decomposition products may include the following materials:
  • metal oxide/oxides

Special protective actions for fire-fighters
No special measures are required

Special protective equipment for fire-fighters
Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

SECTION 6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT & EMERGENCY PROCEDURES

For non-emergency personnel
No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering.

For emergency responders
If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in “For non–emergency personnel”.

Environmental precautions
Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

METHODS & MATERIALS FOR CONTAINMENT AND CLEANING UP

Spill
Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.
SECTION 7. HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING

Protective Measures
Put on appropriate personal protective equipment (see Section 8).

Advice on general occupational hygiene
Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. See also Section 8 for additional information on hygiene measures. Remove contaminated clothing and protective equipment before entering eating areas.

Conditions for safe storage, including any incompatibilities
No special precautions necessary.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

CONTROL PARAMETERS

Occupational exposure limits
None

Appropriate engineering controls
Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls
Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

INDIVIDUAL PROTECTION MEASURES

Hygiene measures
Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection
Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with sideshields.

SKIN PROTECTION

Hand protection
Wear gloves if needed.

Body protection
Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection
Appropriate footwear should be selected based on the task being performed and the risks involved.

Respiratory protection
Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
### SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td></td>
</tr>
<tr>
<td>Physical state</td>
<td>Solid</td>
</tr>
<tr>
<td>Color</td>
<td>Grayish-white</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless.</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>pH</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>Not available</td>
</tr>
<tr>
<td>Boiling point/boiling range</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not available</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not available</td>
</tr>
<tr>
<td>Lower and upper explosive (flammable) limits</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not available</td>
</tr>
<tr>
<td>Relative density</td>
<td>4.53</td>
</tr>
<tr>
<td>Solubility</td>
<td>Insoluble in the following materials: cold water and hot water.</td>
</tr>
<tr>
<td>Partition coefficient: n- octanol/water</td>
<td>Not available</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not available</td>
</tr>
<tr>
<td>Volatility</td>
<td>Not available</td>
</tr>
</tbody>
</table>
SECTION 10. STABILITY AND REACTIVITY

Reactivity
No specific test data related to reactivity available for this product or its ingredients.

Chemical stability
The product is stable

Possibility of hazardous reactions
Under normal conditions of storage and use, hazardous reactions will not occur

Conditions to avoid
No specific data

Incompatible materials
Reactive or incompatible with the following materials: acids and alkalis.
Non-reactive or compatible with the following materials: oxidizing materials.

Hazardous decomposition products
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11. TOXICOLOGICAL INFORMATION

INFORMATION ON TOXICOLOGICAL EFFECTS

Acute toxicity
There is no data available

Irritation/Corrosion
There is no data available

Sensitization
There is no data available

Carcinogenicity
There is no data available

Specific target organ toxicity (single exposure)
There is no data available

Specific target organ toxicity (repeated exposure)
There is no data available

Aspiration hazard
There is no data available

Information on the likely routes of exposure
Not available

POTENTIAL ACUTE HEALTH EFFECTS

Eye contact
No known significant effects or critical hazards.

Inhalation
No known significant effects or critical hazards.

Skin contact
No known significant effects or critical hazards.

Ingestion
No known significant effects or critical hazards.
SECTION 11. TOXICOLOGICAL INFORMATION CONTINUED

SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Eye contact</th>
<th>No known significant effects or critical hazards.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>Heating this material to temperatures above 500F can produce harmful fumes. Toxic gases can be formed above 750F. Inhaling decomposition products can cause the temporary condition of “Polymer fume fever”. Symptoms are flu-like and include fever, cough, and malaise.</td>
</tr>
<tr>
<td>Skin contact</td>
<td>No known significant effects or critical hazards</td>
</tr>
<tr>
<td>Ingestion</td>
<td>No known significant effects or critical hazards</td>
</tr>
</tbody>
</table>

DELAYED AND IMMEDIATE EFFECTS AND ALSO CHRONIC EFFECTS FROM SHORT AND LONG TERM EXPOSURE

SHORT TERM EXPOSURE

| Potential immediate effects | No known significant effects or critical hazards |
| Potential delayed effects   | No known significant effects or critical hazards |

LONG TERM EXPOSURE

| Potential immediate effects | No known significant effects or critical hazards |
| Potential delayed effects   | No known significant effects or critical hazards |

POTENTIAL CHRONIC HEALTH EFFECTS

| General | No known significant effects or critical hazards |
| Carcinogenicity | No known significant effects or critical hazards |
| Mutagenicity | No known significant effects or critical hazards |
| Teratogenicity | No known significant effects or critical hazards |
| Developmental effects | No known significant effects or critical hazards |
| Fertility effects | No known significant effects or critical hazards |

NUMERICAL MEASURES OF TOXICITY

| Acute toxicity estimates | There is no data available |
SECTION 12. ECOLOGICAL INFORMATION

Toxicity  There is no data available
Persistence and degradability  There is no data available
Bioaccumulative potential  There is no data available

MOBILITY IN SOIL
Soil/water partition coefficient ($K_{OC}$)  Not available.
Other adverse effects  No known significant effects or critical hazards

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods  The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions, and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains, and sewers.

SECTION 14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th></th>
<th>DOT</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN Number</td>
<td>Not regulated</td>
<td>Not regulated</td>
<td>Not regulated</td>
</tr>
<tr>
<td>UN proper shipping name</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport hazard class(es)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Packing group</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Environmental hazards</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Additional information</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Special precautions for user  Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code  Not available
**SECTION 15. REGULATORY INFORMATION**

**U.S. Federal regulations**
- TSCA 8(a) PAIR: Tungsten
- TSCA 8(a) CDR Exempt/Partial exemption: Not determined
- United States inventory (TSCA 8b): Not determined
- Clean Water Act (CWA) 307: Nickel

**Clean Air Act Section 112**
- (b) Hazardous Air Pollutants (HAPs)
  - Listed

**Clean Air Act Section 602**
- Class I Substances: Not listed
- Class II Substances: Not listed

**DEA List I Chemicals**
- (Precursor Chemicals): Not listed

**DEA List II Chemicals**
- (Essential Chemicals): Not listed

**SARA 302/304**
- Composition/information on ingredients: No products were found
- SARA 304 RQ: Not applicable
- SARA 311/312: Not applicable

<table>
<thead>
<tr>
<th>Name</th>
<th>%</th>
<th>Fire Hazard</th>
<th>Sudden release of pressure</th>
<th>Reactive</th>
<th>Immediate (acute) health hazard</th>
<th>Delayed (chronic) health hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>5 - 10</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cobalt</td>
<td>5 - 10</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Chromium diboride</td>
<td>1 - 5</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**SARA 313**

<table>
<thead>
<tr>
<th>Product name</th>
<th>CAS Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form R - Reporting requirements</td>
<td>Nickel</td>
<td>7440-02-0</td>
</tr>
<tr>
<td></td>
<td>Cobalt</td>
<td>7440-48-4</td>
</tr>
<tr>
<td>Supplier notification</td>
<td>Nickel</td>
<td>7440-02-0</td>
</tr>
<tr>
<td></td>
<td>Cobalt</td>
<td>7440-48-4</td>
</tr>
</tbody>
</table>

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.
STATE REGULATIONS

- **Massachusetts**: The following components are listed: Tungsten; Cobalt; Nickel
- **New York**: The following components are listed: Nickel
- **New Jersey**: The following components are listed: Tungsten; Cobalt; Nickel
- **Pennsylvania**: The following components are listed: Tungsten; Cobalt; Nickel
- **California Prop. 65**: WARNING: This product contains a chemical known to the State of California to cause cancer.

<table>
<thead>
<tr>
<th>Ingredient Name</th>
<th>Cancer</th>
<th>Reproductive</th>
<th>No Significant risk level</th>
<th>Maximum acceptable dosage level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Cobalt</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

INTERNATIONAL REGULATIONS

- **International lists**: Australia inventory (AICS): Not determined.
- **China inventory (IECSC)**: Not determined.
- **Japan inventory**: Not determined.
- **Korea inventory**: Not determined.
- **Malaysia Inventory (EHS Register)**: Not determined.
- **New Zealand Inventory of Chemicals (NZIoC)**: Not determined.
- **Philippines inventory (PICCS)**: Not determined.
- **Taiwan inventory (CSNN)**: Not determined.

- **Chemical Weapons Convention List Schedule I Chemicals**: Not listed
- **Chemical Weapons Convention List Schedule II Chemicals**: Not listed
- **Chemical Weapons Convention List Schedule III Chemicals**: Not listed
**SECTION 16. OTHER INFORMATION**

**HAZARDOUS MATERIAL INFORMATION SYSTEM (U.S.A.)**

*Health:* 0  *Flammability:* 0  *Physical hazards:* 0

**Caution:** HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller +1 800 327 6868.

The customer is responsible for determining the PPE code for this material.

---

**NATIONAL FIRE PROTECTION ASSOCIATION (U.S.A.)**

*Health:* 0  *Flammability:* 0  *Physical hazards:* 0

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

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**HISTORY**

*Date of issue mm/dd/yyyy:* 10/15/2013

*Version:* 1

*Prepared by:* KMK Regulatory Services Inc.

*Key to abbreviations:*

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- UN = United Nations

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**Notice to reader**

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.