1. PRODUCT AND COMPANY IDENTIFICATION

Product Name          Tiona® Titanium Dioxide
Product code          Tiona RCL-3, Tiona RCL-4, Tiona RCL-6, Tiona RCL-9, Tiona 188, Tiona 595, Tiona 596, Tiona 696, Tiona AT-1
Recommended use       White pigment that imparts opacity to surface coatings, plastics and paper.
Manufactured by       Cristal USA Inc.
                      20 Wight Avenue, Suite 100
                      Hunt Valley, MD 21030
Company Switchboard Number     1-410-229-4400
Other Information     E-mail contact: regulatory.query@cristal.com
Emergency Telephone Number         Chemtrec: 1-800-424-9300

2. HAZARDS IDENTIFICATION

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Physical State</th>
<th>Odor</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>Solid</td>
<td>None</td>
</tr>
</tbody>
</table>

Potential Health Effects

Acute Toxicity

Skin          Non-corrosive and non-sensitizing. Prolonged contact may result in rashes/irritations due to drying of the skin and/or mechanical abrasion related to skin-to-clothing contact or skin-to-skin contact.

Inhalation     Inert nuisance dust. Temporary drying effect and/or irritation of mucous membranes may result from excessive exposure. Exposure to dust may aggravate pre-existing respiratory conditions.

Ingestion      No adverse health effects anticipated by this route during proper industrial handling.

Eyes           Inert foreign body hazard only.

Chronic Toxicity

Chronic effects  Titanium Dioxide is listed by IARC as possibly carcinogenic to humans (Group 2B). This listing is based on inadequate evidence of carcinogenicity in humans and sufficient evidence in experimental animals.
3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td>13463-67-7</td>
<td>80-99</td>
</tr>
<tr>
<td>Amorphous Silica</td>
<td>7631-86-9</td>
<td>0-10</td>
</tr>
<tr>
<td>Aluminum hydroxide</td>
<td>21645-51-2</td>
<td>0-6 (as Al2O3)</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Eye contact: In the case of contact with eyes, rinse immediately with plenty of water. If symptoms persist, call a physician.

Skin contact: Wash skin with soap and water. Use of moisturizer may be helpful.

Ingestion: No adverse health effects anticipated by this route during proper industrial handling.

Notes to physician: None.

5. FIRE-FIGHTING MEASURES

Flammable Properties: Not flammable.

Flash Point: None.

Suitable Extinguishing Media: No fire hazard.

Hazardous Combustion Products: No hazardous decomposition products.

Protective Equipment and Precautions for Firefighters: As in any fire, wear self-contained breathing apparatus and full protective gear.

NFPA Rating

- Health Hazard: 1
- Flammability: 0
- Reactivity: 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Avoid inhalation of dust by arranging adequate ventilation and use of an appropriate dust mask. Avoid excessive contact with the skin.

Methods for Containment: Prevent further leakage or spillage if safe to do so. Use dyking or absorbant to prevent run-off from entering waterways.

Methods for Cleaning Up: Use any feasible mechanical means (e.g. vacuuming, sweeping) but avoid dusting during clean up.

7. HANDLING AND STORAGE

Handling: Minimize breathing dust and contact with skin. Products supplied in groundable semi-bulk containers must be grounded to avoid discharge of static electricity while transporting the container or emptying its contents. Take suitable precautions against the discharge of static electricity during powder handling operations.
Storage

Keep in a dry place. Can cause slippery condition if wet.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td>TWA: 15 mg/m³</td>
<td>(vacated) TWA: 10 mg/m³</td>
</tr>
</tbody>
</table>

Engineering measures

Good natural ventilation will be sufficient in most circumstances. Local exhaust ventilation may be necessary if airborne dust concentration approaches the exposure limit.

Personal Protective Equipment

Eye/Face Protection

Safety glasses with side-shields or goggles.

Skin and Body Protection

Wear protective gloves/clothing.

Respiratory Protection

Use NIOSH approved dust or HEPA-type respirator if exposure limit(s) is or may be exceeded.

Hygiene Measures

Individuals having sensitive skin may find it beneficial to use a barrier cream or moisturizer when excessive or prolonged contact with the skin is likely.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White</td>
</tr>
<tr>
<td>Odor</td>
<td>None</td>
</tr>
<tr>
<td>Physical State</td>
<td>Solid</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flash Point</td>
<td>None</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Boiling Point/Range</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Melting Point/Range</td>
<td>1830 °C</td>
</tr>
<tr>
<td>Explosion Limits</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flammability Limits in Air</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>3.7 - 4.2</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Insoluble in water</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not applicable</td>
</tr>
<tr>
<td>VOC Content(%)</td>
<td>None</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Stability

Stable under normal conditions.

Incompatible Products

None.

Conditions to avoid

None.

Hazardous decomposition products

None.

Hazardous Reactions

None.

Hazardous Polymerization

Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Product information

Refer to the table below.
**Chemical Name** | **LD50 Oral** | **LD50 Dermal** | **LC50 Inhalation**
---|---|---|---
Titanium dioxide | 10000 mg/kg (Rat) | | |
Amorphous Silica | 5000 mg/kg (Rat) | 2000 mg/kg (Rabbit) | >2.2 mg/L (Rat) 4 h
Aluminum hydroxide | 5000 mg/kg (Rat) | | |

**Key**
- Rat = Rat
- Rabbit = Rabbit

**Chronic effects**
Titanium Dioxide is listed by IARC as possibly carcinogenic to humans (Group 2B). This listing is based on inadequate evidence of carcinogenicity in humans and sufficient evidence in experimental animals.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td></td>
<td>Group 2B</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**Target organ effects**
In lifetime inhalation studies of rats, airborne respirable-size titanium dioxide particles have been shown to cause lung tumors at concentrations associated with substantial particle lung burdens and consequential pulmonary overload and inflammation. However, other laboratory animals such as mice and hamsters did not develop lung tumors under similar testing with titanium dioxide. Furthermore, human epidemiology studies do not suggest an association between occupational exposure to titanium dioxide and risk for cancer.

### 12. ECOLOGICAL INFORMATION

**Ecotoxicity effects**
Refer to table below.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Toxicity to Algae</th>
<th>Toxicity to Fish</th>
<th>Microtox</th>
<th>Daphnia Magna (Water Flea)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amorphous Silica</td>
<td>EC50 = 440 mg/L 72 h</td>
<td>LC50= 5000 mg/L  Brachydanio rerio 96 h</td>
<td></td>
<td>EC50 = 7600 mg/L 48 h</td>
</tr>
</tbody>
</table>

**Persistence and degradability**
Product is not biodegradable.

**Bioaccumulation/Accumulation**
Does not bioaccumulate.

**Mobility**
There is no evidence of mobility of these products (solid particle).

### 13. DISPOSAL CONSIDERATIONS

**Waste Disposal Methods**
This material, as supplied, is not a hazardous waste according to state and federal regulations (40 CFR 261).

**Contaminated packaging**
Contaminated packages are not considered hazardous for disposal into sanitary landfill or industrial waste disposal landfill. Please review appropriate national and local waste regulations.

### 14. TRANSPORT INFORMATION

**DOT**
Not regulated

**ICAO**
Not regulated
15. REGULATORY INFORMATION

International Inventories

Tiona RCL-4 and Tiona 168 contain a non-hazardous organic (present at <1%) which is NOT listed on the country chemical inventories of China, Japan, Philippines & New Zealand.

Other than the special note above, the products on this SDS comply with the country chemical control inventories listed below.

USA (TSCA) Complies
Canada (DSL) Complies
European Union (EINECS) Complies
Japan (ENCS) Complies
China (IECSC) Complies
Korea (KECL) Complies
Philippines (PICCS) Complies
Australia (AICS) Complies
New Zealand (NZIoC) Complies

Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). These products do not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Health Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Chronic Health Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Fire Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Sudden Release of Pressure Hazard</td>
<td>No</td>
</tr>
<tr>
<td>Reactivity Hazard</td>
<td>No</td>
</tr>
</tbody>
</table>

Clean Water Act
These products do not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)
These products do not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CERCLA
These products, as supplied, do not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of these products.

U.S. State Regulations
California Proposition 65
WARNING: These products contain a chemical known to the State of California to cause cancer. 'Titanium dioxide (airborne, unbound particles of respirable size)' is listed as a carcinogen. The listing does not cover titanium dioxide when it is not airborne and remains bound in a product matrix.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No.</th>
<th>California Prop. 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td>13463-67-7</td>
<td>Titanium dioxide (airborne, unbound particles of respirable size)</td>
</tr>
</tbody>
</table>

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Amorphous Silica</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other International Regulations

Mexico

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Carcinogen Status</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td></td>
<td>Mexico: TWA 10 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexico: STEL 20 mg/m³</td>
</tr>
</tbody>
</table>

Canada

These products have been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the CPR.

WHMIS Hazard Class
D2A Very toxic materials

16. OTHER INFORMATION

HMIS Rating

Health Hazard 1
Flammability Hazard 0
Physical Hazard 0

Personal Protection E

Note
This Personal Protection rating will generally suffice for normal operating conditions. Please note, however, that the type of personal protection utilized may change based on specific use conditions. Consult the Exposure Controls/Personal Protection section of this SDS.

Revision Date 24-September-12

Reason for revision Correct French language translations.

Disclaimer
The information provided on this SDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS