SAFETY DATA SHEET (SDS)

High Purity/Pure Titanium dioxide - Silicon Carbide (TiO₂-SiC)

According to Regulation EC 1907/2006 (REACH)

SECTION 1: IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY

1.1. Product identifier

This product is considered as a substance

Name: High Purity/Pure Titanium dioxide - Silicon Carbide (TiO₂-SiC).

Trade Name: TiO₂-SiC-E-HP ; TiO₂-SiC-S-HP ; TiO₂-SiC-T-HP
TiO₂-SiC-R-HP ; TiO₂-SiC-G-HP ;
TiO₂-SiC-E-P ; TiO₂-SiC-S-P ; TiO₂-SiC-T-P ;
TiO₂-SiC-R-P ; TiO₂-SiC-G-P.

EC / List no.: 236-675-5 / 206-991-8
CAS no.: 13463-67-7 / 409-21-2

REACH Registration number: Not registered - R&D Sample < 1t/year

Description: High Purity/Pure TiO₂-SiC-based Extrudates, Grains, Spheres.

With particle size > 500μm

1.2. Relevant identified uses of the substance and uses advised against

Identified Use: Catalyst support.

No uses advised against identified in the registration dossier.

1.3. Details of the supplier of the safety data sheet

Manufacturer name and identification: ACM GmbH
Industriestraße 1, B310
77731 WILLSTÄTT

Phone: +49 (0) 7852 8 1150

Contact Persons responsible for the SDS: e-mail: info@acmgmbh.com

1.4. Emergency telephone number

National Poisons Information Service Available 24 hours a day, 365 days a year
SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance

Silicon Carbide (SiC) is not classified as hazardous substance according to CLP criteria (Regulation EC No 1272/2008).

Titanium Dioxide (TiO₂) is not classified as hazardous substance according to CLP criteria (Regulation EC No 1272/2008).

Cristobalite (SiO₂) is classified as Danger! According to the classification provided by companies to ECHA in CLP notifications this substance causes damage to organs through prolonged or repeated exposure, may cause cancer, is suspected of causing cancer and is harmful if inhaled. Cristobalite has been classified as Group 1 carcinogens –“carcinogenic to humans” by the International Agency for Research on Cancer (IARC). But, if the crystalline silica, quartz or cristobalite (fine fraction) content in mixtures and substances is below 1%, no classification is required (see the recommendation of IMA Europe - www.crystallinesilica.eu).

2.2. Label elements

No labelling required for TiO₂-SiC according to CLP criteria (Regulation EC No 1272/2008).

2.3. Other hazards

Silicon Carbide (SiC) does not fulfill PBT or vPvB criteria (REACH annex XIII).

According to ACGIH SiC is insoluble or made poorly soluble particles not otherwise specified (PNOS).

Careful! Silicon carbide (SiC) may contain small amounts of SiC nanofibers (below 0,1 % w/w). Raw, dry SiC nanofibers may become airborne during handling and become respirable in some conditions.

Some agencies (especially IARC and ACGIH) list SiC whiskers/fibers as potential carcinogens, based on experimental animal data. Any potential carcinogenicity of SiC fibers is limited to chronic overexposure of dry, respirable dust. No data exists for humans.

ACM recommends limiting dust’s inhalation during handling and storage (see sections 7 and 8 for more advices).
### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1. Substance

Titanium dioxide - Silicon Carbide (TiO$_2$-SiC) is considered as a multi constituent substance according to ECHA guidance “Identification and naming of substances under REACH and CLP”.

<table>
<thead>
<tr>
<th>Designation</th>
<th>Classification according to CLP criteria</th>
<th>Concentration (w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon carbide</td>
<td>Not classified.</td>
<td>20 – 95 %</td>
</tr>
<tr>
<td>Formula: β SiC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS -No : 409-21-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC -No : 206-991-8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDEX -No : NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Titanium dioxide</td>
<td>Not classified.</td>
<td>5 – 80 %</td>
</tr>
<tr>
<td>Formula: TiO$_2$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS -No : 13463-67-7</td>
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<td></td>
</tr>
<tr>
<td>EC -No : 236-675-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDEX -No : NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other unclassified components</td>
<td></td>
<td>0 - 20 %</td>
</tr>
<tr>
<td>SiC nanofibers</td>
<td>Not classified according to CLP criteria.</td>
<td>&lt; 0,1 %</td>
</tr>
<tr>
<td>IARC and ACGIH list SiC whiskers/fibers as potential carcinogens.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cristobalite (crystalline silica)</td>
<td>IARC classified cristobalite as Group 1 carcinogens - “carcinogenic to humans”</td>
<td>&lt; 1 %</td>
</tr>
<tr>
<td>Formula : SiO$_2$</td>
<td>No classification required for fine fraction under 1%. (see 2.1)</td>
<td></td>
</tr>
<tr>
<td>CAS -No : 14464-46-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC -No : 238-455-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDEX -No : NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total 100 %
SECTION 4: FIRST AID MEASURE

4.1. Description of first aid measures

**General advice:** IN CASE OF SEVERE OR PERSISTENT DISTURBANCES, CALL A DOCTOR OR SEEK EMERGENCY MEDICAL HELP. Show the safety data sheet if possible. Take care to self-protect by avoiding becoming contaminated. Use adequate respiratory protection.

**Skin contact:** Not expected to present a significant skin hazard under anticipated conditions of normal use, but, if irritation or rash occurs:

1) Take off all contaminated clothing and shoes.
2) Immediately flush affected area with plenty of soap and water – continue for at least 10 minutes.
3) If there are signs of irritation or other symptoms seek medical attention.

Wash clothing before reuse.

**Eye contact:** Before any action on a par with eyes, wash your hands with soap and water to avoid any risk of infection.

1) Flush eyes with water thoroughly and continuously for at least 15 minutes.
   - **Rinse instructions:**
     - Remove any contact lenses.
     - Keep eye wide open while rinsing.
     - Continue rinsing
     - Protect unharmed eye. Avoid splashing
     - Water flow always from the nose to the ear
     - Move the eye in all directions

2) Once done rinse, cover the eye with a compress.

3) If eye irritation, pain, swelling, lachrymation or photophobia persists, consult a physician, preferably an ophthalmologist.

**If swallowed:** Not expected to present a significant ingestion hazard under anticipated conditions of normal use. Do not induce vomiting unless if this is indicated by the physician or Poison Center. Do not give milk or alcoholic beverages.

1) Rinse mouth well. Do not give anything orally.
2) Get medical attention immediately
3) Keep them warm and get medical advice immediately
4) When vomiting occurs spontaneously, make the body leaned to prevent from inhaling to the bronchus.

Never give anything by mouth to an unconscious person.
If inhaled: If dust is inhaled, and if symptoms of pulmonary involvement develop:

1) Remove from exposure and move to fresh air immediately.
2) Ensure good air circulation. Remove anything that could be tightened, like a collar, a tie, a belt or a girdle.
3) If breathing is difficult, give oxygen if possible or assisted ventilation, (do not use mouth to mouth).
4) If unconscious, place in recovery position.
5) Get medical aid

4.2. Most important symptoms and effects, both acute and delayed

Silicon carbide is a mechanical irritant, prolonged contact may cause skin abrasion and may cause tearing and redness.

If dust is inhaled, any symptoms of pulmonary involvement may be develop (coughing, wheezing, or shortness of breath).

4.3. Indication of any immediate medical attention and special treatment needed

No specific treatment required.

SECTION 5: FIRE FIGHTING MEASURES

5.1. Extinguishing media

General information

Not inflammable. TiO$_2$-SiC is not combustible.

Suitable extinguishing media

- ABC dry chemical
- alcohol-resistant foam,
- CO$_2$,
- water fog
- Sand
- Fire blanket

Extinguishing media not to be used for safety reasons

Careful! Unlike sprays, powerful jets can disperse the firebox and aggravate the fire.

Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

5.2. Special exposure hazards arising from the substance

Silicon oxides and carbon oxides.
5.3. Protective Equipment and Precautions for Firefighters

Wear an approved positive pressure self-contained breathing apparatus in addition to standard firefighting gear.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Limit dust formation, use disposable (FFP3-EN149) dust protection mask.
Ensure adequate ventilation.

6.2. Environmental precautions

Be careful not to be dispersed into the air and rivers.

6.3. Methods and material for containment and cleaning up

Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section.
Avoid generating dusty conditions. Provide ventilation.

6.4. Reference to others sections

Refer to Section 8 for PPE
Refer to Section 4 for FIRST AID MEASURES
Refer to Section 5 for FIRE-FIGHTING MEASURES
Refer to Section 13 for DISPOSAL CONSIDERATIONS

SECTION 7: HANDLING AND STORAGE

Advises relating to storage premises apply to workshops where the product is handled. Risk management measures should be adapted to the operating conditions in accordance with product's exposure conditions (if dispersive use, amount used, frequency, containment level ...)
ACM highly recommends limiting dust’s inhalation during handling and storage.
7.1. Precautions for safe handling

**Hygiene measures:**
- Smoking, eating and drinking should be prohibited.
- Keep working clothes separately from street clothes.
- Do not wear work clothes soiled in places such as offices, meeting rooms, relaxation areas, company restaurants or cafeterias.
- Do not leave the property with work clothes or personal protective equipment.
- Wash contaminated clothing before reuse (Note that the leather or other porous materials cannot be cleaned: once contaminated, they should be disposed of as chemical waste).
- Wash thoroughly after handling this product and before breaks.
- Always wash up before eating, smoking or using the facilities.
- If necessary, take a shower after working.

**Organizational measures:**
- Training and information for workers
- Search for safer products or processes less exponents
- Limit working time for workers exposed
- Establish a procedure for chemical purchases (taking into account quantities and packaging)
- Managing the flow and storage of chemicals (unnecessary inventory, limiting the quantities stored ...)
- Waste Management (Do not use empty container before they have been cleaned).
- Establish Routine maintenance of facilities
- Restricting access to local

**Additional specific measures to inhalation risk:**
- Provide adequate local ventilation (10 to 15 air volume / hour). Use only in a well-ventilated area
- Avoid dust formation
- Reduce friction and impact between crude and grains
- It is recommended to work in an engineered closed system where respirable dust may be exhausted.
- When dispersed in water, solvent, polymer, or other carrier material (when wetted), TiO$_2$-SiC dust is non-respirable and non-hazardous.
7.2. Conditions for safe storage, including any incompatibilities

| Conditions of storage rooms and vessels | Storage in dry area and in a sealed container. Keep container closed where possible. Avoid dust generation. Identify the contents of all containers |
| Advice of storage of incompatible materials | None |
| Further information of storage | None |

7.3. Specific end use(s)

Apart from the uses mentioned in SECTION 1.2, no other specific uses are stipulated.
## SECTION 8: EXPOSURES CONTROL / PERSONAL PROTECTION

### 8.1. Exposure limits

Exposure limits: Ingredients with workplace control parameters

<table>
<thead>
<tr>
<th>Substance</th>
<th>Silicon carbide</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS No.</td>
<td>409-21-2</td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Limit value - Eight hours</th>
<th>Limit value - Short term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australia</strong></td>
<td>10 mg/m³ (1)</td>
<td>4 mg/m³, respirable aerosol</td>
</tr>
<tr>
<td></td>
<td>0,1 fibres/cm³, respirable fraction</td>
<td></td>
</tr>
<tr>
<td><strong>Belgium</strong></td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0,1 fibres/cm³, respirable fraction</td>
<td></td>
</tr>
<tr>
<td><strong>Canada - Ontario</strong></td>
<td>10 mg/m³ (1)(2)</td>
<td>3mg/m³ (2)(3)</td>
</tr>
<tr>
<td></td>
<td>0,1 fibres/cm³ (3)(4)</td>
<td></td>
</tr>
<tr>
<td><strong>Canada - Québec</strong></td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td><strong>Finland</strong></td>
<td>0,1 fiber/cm³</td>
<td></td>
</tr>
<tr>
<td><strong>France</strong></td>
<td>10 mg/m³, respirable fraction</td>
<td></td>
</tr>
<tr>
<td><strong>Ireland</strong></td>
<td>10 mg/m³ inhalable fraction</td>
<td>4 mg/m³ fibers, respirable fraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Latvia</strong></td>
<td>6 mg/m³</td>
<td></td>
</tr>
<tr>
<td><strong>New Zealand</strong></td>
<td>10 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td><strong>People's Republic of China</strong></td>
<td>8 mg/m³ inhalable fraction</td>
<td>4 mg/m³ respirable fraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Singapore</strong></td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td><strong>South Korea</strong></td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td><strong>Spain</strong></td>
<td>10 mg/m³ inhalable aerosol</td>
<td>3 mg/m³ respirable aerosol</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Switzerland</strong></td>
<td>10 mg/m³ inhalable aerosol</td>
<td>3 mg/m³ respirable aerosol</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>United Kingdom</strong></td>
<td>10 mg/m³ inhalable aerosol</td>
<td>4 mg/m³ respirable aerosol</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>USA - NIOSH</strong></td>
<td>10 mg/m³ total dust</td>
<td>5 mg/m³ respirable fraction</td>
</tr>
<tr>
<td><strong>USA - OSHA</strong></td>
<td>15 mg/m³ total dust</td>
<td>5 mg/m³ respirable dust</td>
</tr>
</tbody>
</table>

**Remarks:**
Australia: (1) This value is for inhalable dust containing no asbestos and < 1% crystalline silica.
SAFETY DATA SHEET (SDS)
High Purity/Pure Titanium dioxide - Silicon Carbide (TiO_2-SiC)

According to Regulation EC 1907/2006 (REACH)

Version 1 Revision Date: - Supersede version: 2019-02-01

Canada - Ontario: (1) Inhalable aerosol (2) The value is for particulate matter containing no asbestos an <1 % crystalline silica. (3) Respirable aerosol. (4) Respirable fibres: length >5µm; aspect ratio =3:1, as determined by the membrane filter method at 400-450 times magnification (4-mm-objective), using phase contrast illumination
New Zealand: (1) The value is for inhalable dust containing no asbestos and <1 % free silica.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Limit value - Eight hours</th>
<th>Limit value - Short term</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS No.</td>
<td>13463-67-7</td>
<td></td>
</tr>
<tr>
<td>Remarks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>10 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Canada - Ontario</td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Canada - Québec</td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>6 mg/m³ total dust</td>
<td>12 mg/m³ total dust</td>
</tr>
<tr>
<td>France</td>
<td>10 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>10 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 mg/m³ (2)</td>
<td></td>
</tr>
<tr>
<td>Japan – JSOH</td>
<td>0,3 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td>Latvia</td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>10 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td>People's Republic of China</td>
<td>8 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>10 mg/m³</td>
<td>30 mg/m³</td>
</tr>
<tr>
<td>Romania</td>
<td>10 mg/m³</td>
<td>15 mg/m³ (1)</td>
</tr>
<tr>
<td>Singapore</td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td>South Korea</td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>10 mg/m³ inhalable aerosol</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>5 mg/m³ inhalable aerosol</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>3 mg/m³ respirable aerosol</td>
<td></td>
</tr>
<tr>
<td>USA-OSHA</td>
<td>15 mg/m³ total dust</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>10 mg/m³ inhalable aerosol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 mg/m³ respirable aerosol</td>
<td></td>
</tr>
</tbody>
</table>

Remarks: Australia: (1) This value is for inhalable dust containing no asbestos and < 1% crystalline silica. Ireland : (1) Inhalable fraction (2) Respirable fraction. Japan – JSOH: (1) nanoparticle, as Ti. New Zealand: (1) The value for inhalable dust containing no asbestos and less than 1% free silica. People's Republic of China: (1) Inhalable fraction. Romania: (1) 15 minutes average value.
SAFETY DATA SHEET (SDS)

High Purity/Pure Titanium dioxide - Silicon Carbide (TiO₂-SiC)

According to Regulation EC 1907/2006 (REACH)

<table>
<thead>
<tr>
<th>Substance</th>
<th>Cristobalite, total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS No.</td>
<td>14464-46-1</td>
</tr>
</tbody>
</table>

**Remarks**

<table>
<thead>
<tr>
<th>Country</th>
<th>Limit value - Eight hours</th>
<th>Limit value - Short term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>0,1 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>0,05 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Canada - Ontario</td>
<td>0,05 mg/m³(1)</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>0,15 mg/m³</td>
<td>0,3 mg/m³</td>
</tr>
<tr>
<td>France</td>
<td>0,05 mg/m³ respirable aerosol</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>0,15 mg/m³ respirable aerosol</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>0,1 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>0,05 mg/m³ respirable aerosol</td>
<td></td>
</tr>
<tr>
<td>South Korea</td>
<td>0,05 mg/m³ (respirable dust)</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>0,05 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>0,05 mg/m³ (1)</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>0,15 mg/m³ respirable aerosol</td>
<td></td>
</tr>
<tr>
<td>The Netherlands</td>
<td>0,075 mg/m³ respirable dust</td>
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</tr>
<tr>
<td>USA - NIOSH</td>
<td>0,05 mg/m³</td>
<td></td>
</tr>
<tr>
<td>USA - OSHA</td>
<td>0,5(30/(%silica+2))</td>
<td></td>
</tr>
</tbody>
</table>

Remarks: Australia: (1) Respirable dust, Canada – Ontario: (1) Respirable aerosol, France Bold type: Restrictive statutory limit values, Ireland: (1) Respirable fraction, New Zealand: (1) respirable aerosol, Spain: (1) Respirable fraction, Sweden: (1) Respirable dust.

**DN(M)EL**

The Derived No- or Minimum Effect Level (DN(M)EL) is the level of exposure above which a human should not be exposed to a substance. Please note that when more than one summary is provided, DN(M)EL values may refer to constituents of the substance and not to the substance as a whole. More detailed information is available in the REACH Registration dossiers.
SAFETY DATA SHEET (SDS)

High Purity/Pure Titanium dioxide - Silicon Carbide (TiO₂-SiC)

According to Regulation EC 1907/2006 (REACH)

Version 1

Revision Date: -

Supersede version: 2019-02-01

<table>
<thead>
<tr>
<th>SUBSTANCE</th>
<th>TARGET</th>
<th>EXPOSURE</th>
<th>MOST SENSITIVE STUDY</th>
<th>DNEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon Carbide</td>
<td>workers</td>
<td>inhalation</td>
<td>acute toxicity</td>
<td>94 mg/m³</td>
</tr>
<tr>
<td>General population</td>
<td></td>
<td>inhalation</td>
<td></td>
<td>23 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>dermal</td>
<td></td>
<td>200 mg/kg bw/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>oral</td>
<td></td>
<td>13 mg/kg bw/day</td>
</tr>
<tr>
<td>Titanium dioxide</td>
<td>workers</td>
<td>inhalation</td>
<td>Long-term</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>General population</td>
<td></td>
<td>inhalation</td>
<td></td>
<td>No hazard identified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>dermal</td>
<td></td>
<td>No hazard identified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>oral</td>
<td></td>
<td>700 mg/kg bw/day</td>
</tr>
</tbody>
</table>

**Predicted No-Effect Concentration (PNEC)**

Data not available for silicon carbide and cristobalite.

<table>
<thead>
<tr>
<th>SUBSTANCE</th>
<th>TARGET</th>
<th>EXPOSURE</th>
<th>MOST SENSITIVE STUDY</th>
<th>PNEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium dioxide</td>
<td>workers</td>
<td>Fresh water</td>
<td>-</td>
<td>0,127 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Marine water</td>
<td></td>
<td>1 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sediment (fresh water)</td>
<td></td>
<td>≥1000 mg/L bw</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sediment (marine water)</td>
<td></td>
<td>100 mg/L bw</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil</td>
<td></td>
<td>100 mg/L bw</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Use personal protective equipment properly maintained. You must inspect protections before each use. Keep personal protective equipment in a clean place away from the work area.

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Eye/face protection:
It is recommended to contact lens wearers to use corrective lenses. If dust level is high use dust proof safety goggles tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection:
If the contact with the product cannot be avoided, use protective gloves which guarantee full protection, eg. PVC, neoprene or rubber. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Respiratory protection:
Avoid inhaling the dust; if in specific circumstances, compliance cannot be achieved, use a disposable (P3) dust protection mask.

Thermal hazards: No

Environmental hazards: No special measures required.
Explosive limits: Not applicable.
Density: 3.2 to 4.2 g/cm³
Bulk density: From 0.1 to 2 g/cm³.
Decomposition temperature: Not applicable.
Viscosity, dynamic: Not applicable.
Explosive properties: Not applicable.
Oxidizing properties: Not applicable.

9.2 Other information
Miscibility: Not determined for the substance
Conductivity: Not determined for the substance

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity
None under normal processing. No hazardous reactions known.

10.2. Chemical stability
This material is stable. No hazardous reactions known.

10.3. Possibility of hazardous reactions
1) It gradually generates the carbonate and the silicate by reacting with the fused alkali.
2) It's resolved by melted sodium carbonate, the sulfuric acid alkali, the boric oxide, and the lead chromate.
3) It reacts explosively when it is heated with the mixture of the potassium dichromate and lead chromate.
4) It's converted to the silicide by heated with oxides of copper, iron, nickel, platinum, and manganese.
## 10.4. Conditions to Avoid

It should not be mixed with the strong oxidant such as the mixture of the potassium dichromate and lead chromate.

## 10.5. Incompatible Materials

Strong oxidant such as the mixture of the potassium dichromate and lead chromate and acids.

## 10.6. Hazardous Decomposition Products

Silicon oxides and carbon oxides.

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. Information on toxicological effects

All information provided below refers to the public available information in the silicon carbide’s or in the titanium dioxide’s REACH registration dossier. For the cristobalite, the information’s are from the IMA Europe (see www.crystallinesilica.eu)

**a) Acute toxicity:**

**Route of Exposure: Inhalation**

**Silicon Carbide**

Test: CL50 - Routes of Exposure: Inhalation – species: Rat

**Bibliographic source:** British Journal of Industrial Medicine 1993; 50: 807-813

**Executive summary:** Silicon carbide (SiC) dust and other dusts for comparison were injected intratracheally at a high dose (50 mg) into rats and the response of the lungs and the lymph nodes was studied after an appropriate experimental period. The indices studied were: histological changes in the lung and lymph nodes, organ weights, the formation of collagenous fibres, and the appearance of quartz typical areas. No changes in the tissues studied in terms of damaging fibrogenic effects could be found after eight months (first series) and three and 12 months (second series). In particular the histological findings and the absence of quartz typical areas as well as the quantitative determination of collagen fibres show that SiC had no harmful effects on tissues. The substance SiC dust as such can be considered as inert from the experimental results based on qualitative and extremely sensitive procedures.

**Interpretation of results:** practically nontoxic.
Titanium dioxide

Study performed according to OECD Guideline 403 (Acute Inhalation Toxicity)
Conclusions: The Titanium Dioxide Powders, NP 89/117 and NP 89/118 were considered to be non-toxic to rats by the inhalation route at measured atmospheric concentrations of 5.09 and 3.43 mg/l respectively.
Interpretation of results: practically nontoxic.

Cristobalite

There is no specific acute toxicity data at doses that enable a categorical decision on the acute inhalation toxicity classification for any form of crystalline silica at 100%. Acute inhalation toxicity is not expected based on read across to an OECD compliant study, with a substance that contains 45% cristobalite and gives no indication of lethality. Hence further testing is not warranted in the interest of animal welfare.

Route of Exposure: Oral

Silicon Carbide

Study generated according to internationally accepted testing guidelines. (2008)
Test: DL50 - Routes of Exposure: Oral – species: Rat - NOAEL : 2 000 mg/kg bw
According to an acute oral toxicity test conducted with silicon carbide (crude and grains) it can be stated that the substances shows no orally toxic characteristics. The oral LD50 in rats was determined to be > 2000 mg/kg body weight.
Interpretation of results: nontoxic

Titanium dioxide

Study performed according to OECD Guideline 401 (Acute Oral Toxicity)
Conclusions: The acute oral median lethal dose of the test material was found to be greater than 2000 mg/kg body weight. No symbol and risk phrase are required according to EU labelling regulations.
Interpretation of results: practically nontoxic.

Cristobalite

The acute oral LD50 of cristobalite is greater than 2000 mg/kg.
Route of Exposure: Skin contact

Silicon Carbide

Study generated according to internationally accepted testing guidelines. (2008)
Test: DL50 - Routes of Exposure: Skin contact – species: Rat - Duration of exposure: 24h – NOAEL : 2000 mg/kg. According to an acute dermal toxicity test conducted with silicon carbide (crude and grains) it can be stated that the substance has no acute dermal toxic characteristics. The dermal LD50 in rats was determined to be > 2000 mg/kg body weight. Interpretation of results: nontoxic

No data available for titanium dioxide and cristobalite

b) Skin corrosion/irritation

Silicon Carbide

Study generated according to internationally accepted testing guidelines. (2008)
Methods: in vivo - species: Rat - Duration of exposure: 24h - Score : 0
The substance is not a skin irritant. No skin changes at the application sites were observed throughout the observation period.

Titanium dioxide
Study performed according to the OECD Guideline 404 (Acute Dermal Irritation / Corrosion)
Conclusions: According to the criteria specified by Directive 67/548/EC and subsequent regulations none of the four test items is a skin irritant and therefore no classification is required.
Interpretation of results: GHS criteria not met.

Cristobalite

Not irritating to skin (OECD TG 404)

c) Serious eye damage/irritation

Silicon Carbide

Data waiving : Silicon carbide (crude and grains) is an inert chemical and is likely to cause mechanical eye irritation due to large particle size and shape. Mechanical eye irritation produced by silicon carbide would camouflage any chemical irritation that might be caused by the substance. For this reason and due to the unethical aspect of in vivo eye irritation testing of a mechanical irritant, it was not considered reasonable to perform an eye irritation study.
In addition, documented occupational experience with the handling and use of silicon carbide (crude and grains) has revealed no cases of eye or dermal corrosion (i.e. irreversible damage to the skin or to the eye).

**Titanium dioxide**

Study performed according to OECD Guideline 405 (Acute Eye Irritation / Corrosion).

**Conclusions:** The test substance produced conjunctival redness (score of 1 or 2) in the treated eye of all three rabbits. Fluorescein stain examinations were negative for corneal injury. The treated eyes of the rabbits were normal by 24 or 48 hours after instillation of the test substance. **Titanium dioxide** is not irritating to the eye.

**Interpretation of results:** GHS criteria not met.

**Cristobalite**

Not irritating to eye (OECD TG 405)

d) **Skin sensitisation**

No data available for Silicon carbide and cristobalite.

**Titanium dioxide**

Study performed according to OECD Guideline 429 (Skin Sensitisation: Local Lymph Node Assay)

**Conclusions:** Under the conditions of this study, titanium dioxide (sample: H-27416) did not produce a dermal sensitization response in mice. Based on these data, H-27416 is not a dermal sensitizer.

**Interpretation of results:** not sensitising

e) **Respiratory sensitisation**

No data available for Silicon carbide and cristobalite.

**Titanium dioxide**

**Bibliographic source:** Particle and Fibre Toxicology, 7: 35, 2010, Inhalation exposure to nanosized and fine TiO2 particles inhibits features of allergic asthma in a murine model.

**Conclusions:** According to the authors, healthy mice elicited pulmonary neutrophilia accompanied by increased chemokine CXCL5 expression when exposed to nTiO2. No such response was observed in animals exposed to pigment sized titanium dioxide.
Allergic pulmonary inflammation was dramatically suppressed in asthmatic mice which were exposed to nTiO2 or fTiO2 particles - i.e. the levels of leucocytes, cytokines, chemokines and antibodies characteristic to allergic asthma were substantially decreased. The authors mentioned that the results suggest that repeated airway exposure to TiO2 particles modulates the airway inflammation depending on the immunological status of the exposed mice.

**Interpretation of results:** not sensitising

**f) Germ cell mutagenicity**

**Silicon Carbide**

In vitro Study generated according to internationally accepted testing guidelines.

**Conclusions:** In conclusion, it can be stated that during the described mutagenicity test and under the experimental conditions reported, the test item extracts did not cause gene mutations by base pair changes or frameshifts in the genome of the tester strains used. Therefore extracts (polar and non-polar) of SiC, TRS-9899-100F are considered to be non-mutagenic in this bacterial reverse mutation assay.

**Titanium Dioxide**

No data available.

**Cristobalite**

Cristobalite has a genotoxic and mutagenic effect mainly through its inflammatory effects. Respirable cristobalite was unable to cause increased HPRT mutations in rat lung epithelial cells in vitro.

**g) Carcinogenicity**

**Silicon Carbide**

Results of current intraperitoneal carcinogenicity studies with mineral and vitreous fibres (1996). The study includes some 50 groups of male or female Wistar rats tested in three series. Except for one untreated group and 3 vehicle control groups, the animals were injected intraperitoneally (i.p.) once or repeatedly with dust suspensions and then examined, after lifetime observation up to 30 months, for tumours in the abdominal cavity. 1 granular dust (silicon carbide), 2 asbestos dusts (crocidolite, tremolite) and 11 vitreous fibre dust samples were administered.
5 of the vitreous fibre types were fine fibre fractions from 4 commercial insulation wools and 1 experimental wool, the others were prepared by milling glass microfibres, which have, per se, a small diameter range. The dosage per rat differed over a wide range. The lowest dose was 0.04 x 10^9 crocidolite fibres in 0.5 mg dust, and the highest amounted to 20 x 10^9 glass fibres in 1000 mg divided into 40 weekly injections.

Two mesotheliomas were found in a total of 395 rats treated with saline or granular silicon carbide (250 or 1000 mg).

Eleven fibre dusts produced dose-dependent mesotheliomas at rates of up to 97 %, but the calculated fibre number > 5 µm in length required for inducing a 25 % tumour risk differed between the fibre samples tested in the relation of 1 to about 1000. UICC-like crocidolite heads the ranking order; the glass fibre B-01, which possesses a low durability in the body, ends it together with a rather thin sample of glass fibre type B-09. The stone fibre MMVF-21 takes a high place in the ranking order, similar to the tremolite sample.

**Titanium dioxide**

**Methods:** Groups of 50 male and 50 female B6C3F1 mice each were fed a diet containing 2% corn oil and 25000 or 50000 ppm titanium dioxide for 103 weeks (7 days per week). A control group receiving corn oil in the diet was run concurrently. After the administration period the animals were observed for 1 additional week. The following parameters were assessed and presented: clinical signs, mortality, detailed clinical observations, body weight, and histopathology.

**Conclusions:** NOEL (tumourogenicity; mice): 50000 ppm (equivalent to 7500 mg/kg/day) According to the study authors, there was no clinical sign that was judged to be related to titanium dioxide exposure, with the exception of white faces. In male and female mice, no tumours occurred in dosed groups at incidences that were significantly higher than those for corresponding control groups. It can therefore safely be concluded that under the conditions of this bioassay, titanium dioxide was not carcinogenic by the oral route for B6C3F1 mice.

**Cristobalite**

Lung cancer excess risk is demonstrated only under high occupational exposures to Respirable crystalline silica. The lung cancer excess risk is restricted to subjects who contracted silicosis.

**h) Reproductive toxicity**

No data available for silicon carbide.
Titanium dioxide

Original reference was not obtainable, but the study was approved by the OECD procedure on Mutual Acceptance of Data (MAD).

Executive summary: The test item, titanium dioxide (CAS No. 13463-67-7), was given orally at dose levels of 0 and 1,000 mg/kg bw/day (limit test) to Sprague-Dawley male rats from 2 weeks before mating to the end of the mating period, and to females from 2 weeks before mating to day 3 of lactation including the gestation period. Ten males and 10 females were used in each group. Effects of the test item in general findings and reproductive development were examined. The results obtained in this study were summarized as follow:

1) Effects on general findings: No treatment-related changes were observed in clinical signs, body weight, food consumption, gross finding and histopathological finding of parental rats.

2) Effects on reproductive performance: There were no treatment-related changes in pre-coital time, copulation index, fertility index and pregnant index in any of treatment groups. Furthermore, there were no treatment-related changes in the number of corpora lutea and implantation, pre-implantation loss, and post-implantation loss.

3) Effects on F1 offspring: There were no treatment-related changes in the litter size at birth, neonatal death, sex ratio of neonates, viability index, body weights of neonates on Day 0 and 4 of lactation or gross finding at any of the doses tested.

Based on the results, it was concluded that the oral administration of titanium dioxide to parent animals resulted in no all parameters examined at 1,000 mg/kg bw/day. Therefore, no observed adverse effect levels (NOAEL) of the test item are considered to be above 1,000 mg/kg bw/day in both sexes for general toxicity, reproductive capability and F1 neonates.

Conclusions: This study found no indication of any reproductive toxicity in parent animals at the maximum tested dose of 1,000 mg/kg bw/day. Therefore, the NOAEL for reproductive toxicity was 1,000 mg/kg bw/day.

Cristobalite

Silica is essential for normal body function and is ingested orally via the consumption of foods containing silica naturally. An early one-generation study on Wistar rats gave no evidence of any adverse effects arising from long-term feeding of silica-rich water.

i) Target Organ Effects - single exposure (STOT SE)

No data available.

j) Target Organ Effects - repeated exposure (STOT RE)

Repeated dose toxicity: inhalation
Silicon carbide

Publication - Toxicological investigations on silicon carbide - 1. Inhalation studies (1993)
British Journal of Industrial Medicine 1993; 50: 797-806

The question of lung damage as a result of exposure to silicon carbide (SiC) was investigated by inhalation experiments to obtain information on the qualitative response of lung tissue to the test substance (SiC). For comparison, quartz, kaolinite, and tempered clay dusts were used. The indices for the effects of the dusts studied were organ weights, numbers of bronchoalveolar cells, lung surfactant phospholipid concentrations including subfractions, and lung clearance. Exposure to the test samples was carried out according to the Essen inhalation model in two independent series. The results of the two series were similar: Compared with sham controls, exposure to SiC did not affect the indices studied. Even at a low dose (a quarter of the SiC dose) quartz gave pronounced deviations in all indices. In particular, an increase in granulocytes indicated toxic properties of the dust. The long term elimination of quartz from the lung was worse than that of SiC. The kaolinite and tempered clay dusts were intermediate between SiC and quartz based on several of the indices studied. It is concluded that SiC is deposited practically inert in the lung.

Titanium dioxide

Methods: Groups of female B3C3F1/CrlBR mice were exposed to 10, 50 or 250 mg/m³ pigmentary titanium dioxide via whole body inhalation for 6 hours/day, 5 days/week for 13 weeks with recovery groups held for an additional 4, 13, 26 or 52 weeks postexposure. At each time point, selected lung responses were examined. The responses studied were chosen to assess a variety of pulmonary parameters including: inflammation, cytotoxicity, and epithelial- and fibroproliferative changes.

Conclusions: NOAEC (female mice): 9.5 mg/m³ air (analytical)
LOAEC (female mice): 47.0 mg/m³ air (analytical)

The following treatment-related findings were recorded for mice during the study: significant increase (p<0.05) of the number of neutrophiles recovered by lavage (BAL) of the lungs at the end of exposure, which remained significantly elevated (p<0.05) until the end of the post exposure period (week 52). Furthermore, lactate dehydrogenase in BAL was significantly (p<0.05) increased at the end of the exposure period and remained significantly elevated (p<0.05) until week 26 post exposure. Protein in BAL was significantly (p<0.05) increased at the end of the exposure period, which remained significantly elevated (p<0.05) until week 52 post exposure. Lastly, histopathology revealed alveolar type II cell hypertrophy (central lobular regions), which is also treatment-related.

Cristobalite

Prolonged and/or massive exposure to respirable crystalline silica-containing dust may cause silicosis, a nodular pulmonary fibrosis caused by deposition in the lungs of fine respirable particles of silica crystalline silica. There is a body of evidence supporting the fact that increased cancer risk would be limited to people already suffering from silicosis.
Worker protection against silicosis should be assured by respecting the existing regulatory occupational exposure limits and implementing additional risk management measures where required.

In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans (human carcinogen category 1). However, it pointed out that not all industrial circumstances, nor all crystalline silica types were to be incriminated. (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.)

In 2009, in the Monographs 100 series, IARC confirmed its classification of Silica Dust, Crystalline, in the form of Quartz and Cristobalite (IARC Monographs, Volume 100C, 2012).

In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. “There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk... (SCOEL SUM Doc 94-final, June 2003).

A multi-sectoral social dialogue agreement on Workers Health Protection through the Good Handling and Use of Crystalline Silica and Products Containing it was signed on 25 April 2006. This autonomous agreement, which received the European Commission’s financial support, is based on a Good Practices Guide. The requirements of the Agreement came into force on 25 October 2006. The Agreement was published in the Official Journal of the European Union (2006/C 279/02). The text of the Agreement and its annexes, including the Good Practices Guide, are available from http://www.nepsi.eu and provide useful information and guidance for the handling of products containing respirable crystalline silica. Literature references are available on request from EUROSIL, the European Association of Industrial Silica Producers.

Health & Safety Executive (specific for UK): Detailed reviews of the scientific evidence on the health effects of crystalline silica have been published by HSE (Health and Safety Executive, UK) in the Hazard Assessment Documents EH75/4 (2002) and EH75/5 (2003). The HSE points out on its website that “Workers exposed to fine dust containing quartz are at risk of developing a chronic and possibly severely disabling lung disease known as "silicosis". In addition to silicosis, there is now evidence that heavy and prolonged workplace exposure to dust containing crystalline silica can lead to an increased risk of lung cancer. The evidence suggests that an increased risk of lung cancer is likely to occur only in those workers who have developed silicosis.

Repeated dose toxicity: oral

No data available for silicon carbide and cristobalite
Titanium dioxide

Methods: OECD Guideline 408 (Repeated Dose 90-Day Oral Toxicity in Rodents)
Conclusions: NOAEL (males & females; nominal concentration): >1000 mg/kg/day
NOAEL (males & females; actual concentration): >962 mg/kg/day
The NOAEL is based on a lack of test substance-related effects on any in-life, clinical pathology, or anatomic pathology parameter in rats dosed up to 1000 mg/kg/day.

Repeated dose toxicity: dermal

No data available for silicon carbide and cristobalite

Titanium dioxide

Methods: A group of 10 female, albino, immune-competent, hairless SKH: QS mice were treated once per week for 36 weeks with a TiO2 containing sunscreen. The sunscreen was applied at 2 mg/cm² to the head, ears, back, sides and tail of each mouse and sunscreen were left to equilibrate for 20 min. Mice receiving no sunscreen application were sham treated. Mice were washed after 2 hrs. Once per month, the thickness of the dorsal skin on each mouse was measured 72 hrs after the last irradiation. After 36 weeks mice were sacrificed, and skin neoplasms were counted and classified macroscopically. Major internal organs (brain, liver, spleen, kidneys, lung and heart) were histopathologically analyzed. Additionally, measurement of liver Ti by ICP-MS was conducted, and liver tissue was chosen for an analysis of altered gene expression.

Conclusions: This study evaluated the impact of sunscreen containing TiO2 as well as organic substances as active ingredients. Hairless mice were treated once per week for 36 weeks. Mice were sacrificed after 30 treatments and selected organs were histopathologically examined. No TiO2- treatment related effects could be observed.
Elevated TiO2 levels in liver tissue of treated animals was the only observed treatment related effect and could probably be explained by the fact that all mice per group were treated at the same time in one cage and oral application of TiO2 by grooming or after treatment in their home cages could not be excluded.
This study is not in accordance with any dermal toxicity testing guideline and due to major methodological restriction this study cannot be used for hazard assessment. However, this study demonstrates that the use of TiO2 containing sunscreen is not linked to any adverse effect in a hairless mice model.

k) Aspiration Hazard

No data available.
11.2. Other adverse effects

Exposure related observations in humans:

Publication British Journal of Industrial Medicine 1987; 44: 57-59

Mortality and cancer incidence among workers in an abrasive manufacturing industry

Details on study design: The study was of a cohort design with a comparison of the cancer morbidity and mortality with that of the general population. Complete personnel files were available from about 1955. These files were used to identify a cohort of men with at least five years employment sometime between 1955 and 1983. A total of 911 individuals were enrolled; 211 were women, both in administration and production, and of the 700 men, 521 were blue collar workers. All individuals were traced through the official registers and followed up until 31 December 1983 if not dead or emigrated before that date. Seven men had emigrated and eight could not be traced; all were blue collar workers. The loss to follow up was thus about 2% in total or 3% for the blue collar workers.

Information about mortality and cancer morbidity was collected through the National Death Register and the National Cancer Register, respectively. Only the underlying cause of death was considered and a restriction was made by excluding ages above 74 as the diagnostic validity is likely to decrease at higher ages. The observation periods were 1958-83 for mortality and 1958-81 for cancer morbidity, the reason for the difference in the observation period being the lack of cancer incidence data after 1981. Expected incidences were calculated with the person-year method using incidence rates for the general population, stratified for age, calendar year, and gender, for which procedure the EPILIN program was used.

Results: No significant increase was found in mortality or in cancer morbidity among the blue collar workers. Among the blue collar workers were four cases of non-malignant respiratory diseases (pneumonia (1), chronic bronchitis (2), and asthma (1)), whereas 3.2 cases of respiratory diseases would have been expected for the general population. No case of silicosis was found.

SECTION 12: ECOLOGICAL INFORMATION

All information provided below refers to the public available information in the silicon carbide's REACH registration dossier.

12.1. Aquatic toxicity - Component Information

Silicon Carbide

Long-term toxicity to aquatic invertebrates

Study generated according to internationally accepted testing guidelines (2008)

The observed difference in the reproduction rate is only very slight until day 19.
Perhaps the significant difference at day 22 on the reproduction is just the result of a slight effect on the date of the reproduction. Additionally the comparison with last 15 finalized Daphnia reproduction studies performed at the test facility demonstrates the value of the alive offspring per adult in the control of the current test appeared to be unusual high. Therefore the result of the present study appears to be a pseudo-effect, caused by unusual high reproductive activity in the control treatment of the study. The complete set of historical data of the 15 studies of the same type done before are provided to support this conclusion.

**Titanium dioxide**

Long-term sediment toxicity

Study generated according to OECD Guideline 219 (Sediment-Water Chironomid Toxicity Test Using Spiked Water)

Dispersions of the nano sized TiO2 materials P25 (anatase, rutile, 21 nm) and Homibkat UV 100 (anatase, 8 nm), which were applied via the overlying water to the test system were tested in a chronic sediment toxicity test according to OECD 219. Both materials did not affect the emergence and development rate of Chironomus riparius, resulting in 28 d-NOEC values of ≥ 100 mg n-TiO2/L (nominal). For Homibkat UV 100 all validity criteria were fulfilled. The mean emergence in the controls of the P25 test was 68% at test end. The minium as stated in the guideline is 70%. As deviation is only minor and all other validity criteria are fullfilled and P25 induced any effects, this test was not repeated.

No data available for Cristobalite.

12.2. Persistence and degradability

Chemically inert and insoluble in water; separation by mechanical processes (sedimentation, filtration, etc…)

12.3. Bioaccumulative potential

No potentials known for silicon carbide and cristobalite.

**Titanium dioxide**

**Bioaccumulation aquatic/sediment:** Comparing titanium concentrations in worms (Lumbricum variegatus) exposed to 100 mg/L TiO2-NP via the sediment-overlaying water for 28 days to titanium concentrations in control worms, a significant difference cannot be detected.

**Bioaccumulation terrestrial:** Earthworms (Eisenia fetida) were exposed to 10 - 1000 mg/kg of different TiO2-NP (rutile/anatase, rutile, anatase) in artificial substrate for 28 days.
After a depuration period of 24 h, whole body burdens were determined. For the different nanomaterials, median biota-soil accumulation factors range from 0.08 -0.15 kg soil/kg earthworm and median biota-food accumulation factors range from 0.09 -0.11 kg food/kg earthworm indicating that earthworms do not bioaccumulate TiO2-NP via soil or food. Titanium in the earthworms was not localised and an adsorption of TiO2-NPs to the earthworms, however, cannot be excluded.

12.4. Mobility in soil

No data available.

No environmental problems known.

12.5. Results of PBT and vPvB assessment

Not matching PBT or vPvB criteria.

12.6. Other adverse effects

No environmental problems expected, if handled and treated in accordance with standard industrial.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Product Information

Disposal required in compliance with all waste management related state and local regulations. The choice of the appropriate method of disposal depends on the product composition by the time of disposal as well as the local statutes and possibilities for disposal. Hazardous waste according to European Waste Catalogue (EWC).

European Waste Code for the mixture: 06 08 99 (WASTES FROM THE MFSU OF SILICON AND SILICON DERIVATIVES Wastes not otherwise specified.)

Empty containers should be treated as waste.
Waste treatment methods must respect the "Waste hierarchy" according to the European directive 2008/98/CE:
(a) prevention;
(b) preparing for re-use;
(c) recycling;
(d) other recovery, e.g. energy recovery; and
(e) disposal.

SECTION 14: TRANSPORT INFORMATION

14.1 UN number
Not applicable, non hazardous material

14.2 UN proper shipping name
Not applicable, non hazardous material

14.3 Transport hazard class(es)
Not applicable, non hazardous material

14.4 Packing group
Not applicable, non hazardous material

14.5 Environmental hazards
Not applicable, non hazardous material

14.6 Special precautions for user
Not applicable, non hazardous material

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable, non hazardous material

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance

REACH

At the establishment date of the SDS:
- This substance is not identified as a substance of very high concern for Authorisation (SVHC)
- This substance is not under restrictions (Annex 17)
- This substance is not in the evaluation’s process

CLP

At the establishment date of the SDS:
- This substance is not included at CLP annex 6
15.2. Chemical Safety Assessment

Not relevant because the substance is not classified.

SECTION 16: OTHER INFORMATION

According to Article 31 of the Regulation (EC) No 1907/2006 (REACH), a Safety Data Sheet (SDS) must be provided for hazardous substances or preparations. This product does not meet the classification criteria of the Regulation (EC) No 1272/2008 (CLP). Therefore such document is outside the scope of Article 31 of REACH and the requirements for content in each section do not apply.

In accordance with REACH article 31(5), safety data sheets shall be supplied in an official language of the Member State(s) where the substance or mixture is placed on the market. This obligation, however, only applies for hazard-classified products which require a formal SDS. Since this product is not hazard-classified, this SDS is, in accordance with current regulation, provided in English language only.

Abbreviations, acronyms
REACH: Registration, Evaluation and Authorisation of Chemicals
OECD = Organization for Economic Co-operation and Development
PNOS: Particles Not Otherwise Specified
bw = body weight
bw/day = body weight/day
LD50 = 50% Lethal Dose - Chemical amount, given at once, which causes the death of 50% (one half) of a group of test animals
LC50 = 50% Lethal concentration - Concentration of a chemical in air or a chemical in water which causes the death of 50% (one half) of a group of test animals
LL = Lethal Loading
SDS: Safety Data Sheet
ECHA: European Chemicals Agency
CMR: Carcinogenic (C) or Mutagenic (M) or Toxic to reproduction (R)
PBT: Persistent, Bioaccumulative and Toxic
vPvB: veryPersistent and veryBioaccumulable
ADR: Accord for dangerous goods by road
EC: European Inventory
CAS: numerical identifier assigned by Chemical Abstracts Service (CAS)
PEL: Permissible Exposure Limits
SVHC: Substances of very high concern for Authorisation
TLV-TWA: Threshold Limit Value-Time Weighted Average (8 hours)
SAFETY DATA SHEET (SDS)

High Purity/Pure Titanium dioxide - Silicon Carbide (TiO$_2$-SiC)

According to Regulation EC 1907/2006 (REACH)

Version 1

Revision Date: -

Supersede version: 2019-02-01

ACGIH: American Conference of Governmental Industrial Hygienists
SiC : Silicon carbide
w/w: weight divided by weight (mass concentration)
IARC: The International Agency for Research on Cancer
NA: Not applicable
ACGIH: American Conference of Governmental Industrial Hygienists
MFSU : Manufacture, Formulation, Supply And Use

General information
This document was prepared by a competent person who has been properly trained for SDS’s drafting. The information contained herein is given in good faith and is accurate to the best of knowledge at the date indicated above. It is understood by the user that any use of the product for purposes other than those for which it was designed entails potential risk. The information given herein in no way dispenses the user from knowing and applying all provisions regulating his activity. The user bears sole liability for the precautions required when using the product. The regulatory texts indicated herein are intended to aid the user to fulfil his obligations.

Tracking

Version 1 Creation

Main bibliographic sources:

Data comes from registration dossiers submitted to ECHA
Candidate List of substances for authorization
REACH Annex XIV
REACH Annexe XVII
Guidance
  • Guidance on safety data sheets
  • Guidance on the Application of the CLP Criteria
  • Guidance on labelling and packaging
ACGIH review : https://www.acgih.org/
British Journal of Industrial Medicine:
1993, vol. 50, issue 9, part 1, pages 797-806
1993, vol. 50, issue 9, part 2, pages 807-813
http://www.iarc.fr/
GESTIS International Limit Values – DGUV
https://safesilica.eu/reach-classification-and-labelling/

End of the safety data sheet

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