Chemical Profiles

Titanium Dioxide

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What are other names or identifying information for titanium dioxide?

CAS Registry No.: 13463-67-7
Other Names: TiO2, Titanium white
Main Uses: Pigment, filler, opacifying agent
Appearance: White powder.
Odour: Odourless

Canadian TDG: Not specifically listed in Canadian TDG Regulations, but may be regulated as part of a chemical family or group Not Otherwise Specified (N.O.S.). Consult the regulations.

What is the WHMIS classification?

The Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST) has not classified titanium dioxide (as reviewed on February 22, 2023).

Note that titanium dioxide has been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as A3 – Confirmed animal carcinogen, and by the International Agency for Research on Cancer (IARC) as 2B - Possibly carcinogenic to humans.

What are the most important things to know about titanium dioxide in an emergency?

Emergency Overview: White powder. Odourless. Will not burn. SUSPECT CANCER HAZARD. Suspected of causing cancer, if inhaled.

What are the potential health effects of titanium dioxide?

Main Routes of Exposure: Inhalation; skin contact; eye contact.

- **Inhalation:** At high concentrations: can irritate the nose and throat.
- **Skin Contact:** May cause mild irritation.
- **Eye Contact:** May cause slight irritation as a "foreign object". Tearing, blinking and mild temporary pain may occur as particles are rinsed from the eye by tears.
- **Ingestion:** Not harmful.
- **Effects of Long-Term (Chronic) Exposure:** Conclusions cannot be drawn from the limited studies available.
- **Carcinogenicity:** Possible carcinogen. May cause cancer based on animal information. Has been associated with: lung cancer.
    - International Agency for Research on Cancer (IARC): Group 2B - Possibly carcinogenic to humans.
    - American Conference for Governmental Industrial Hygienists (ACGIH) A3 - Confirmed animal carcinogen.
- **Teratogenicity / Embryotoxicity:** Not known to harm the unborn child.
- **Reproductive Toxicity:** Not known to be a reproductive hazard.
- **Mutagenicity:** Not known to be a mutagen.

What are first aid measures for titanium dioxide?

Inhalation: Take precautions to ensure your own safety before attempting rescue (e.g., wear appropriate protective equipment). Move victim to fresh air.

Skin Contact: Quickly and gently blot or brush away excess chemical. Wash gently and thoroughly with gently flowing water and non-abrasive soap.

Eye Contact: Quickly and gently blot or brush chemical off the face. Immediately flush the contaminated eye(s) with gently flowing water, occasionally lifting the upper and lower eyelids. If irritation or pain persists, see a medical professional.

Ingestion: Have victim rinse mouth with water. Get medical attention if the victim feels unwell.

First Aid Comments: If exposed or concerned, see a medical professional for advice. All first aid procedures should be periodically reviewed by a medical professional familiar with the chemical and its conditions of use in the workplace.

What are fire hazards and extinguishing media for titanium dioxide?

Flammable Properties: Does not burn.

Suitable Extinguishing Media: Not combustible. Use extinguishing agent suitable for surrounding fire.

Specific Hazards Arising from the Chemical: None known.

What are the stability and reactivity hazards of titanium dioxide?

- **Chemical Stability:** Normally stable.
- **Conditions to Avoid:** Generation of dust.
- **Incompatible Materials:** Chemically stable. Not corrosive to metals.
- **Hazardous Decomposition Products:** None known.
- **Possibility of Hazardous Reactions:** None known.

What are unintentional release measures for titanium dioxide?

Personal Precautions: Keep unnecessary and unprotected personnel out of spill area. Use personal protective equipment as required.

Methods for Containment and Clean-up: Avoid generating dust. Collect using shovel/scoop or approved HEPA vacuum and place in a suitable container for disposal. Avoid dry sweeping. If necessary, use a dust suppressant such as water. Do not use compressed air for clean-up.

What handling and storage practices should be used when working with titanium dioxide?

Handling: Before handling, it is important that all engineering controls are operating and that protective equipment requirements and personal hygiene measures are being followed. Immediately report leaks, spills or failures of the safety equipment (e.g., ventilation system). Avoid generating dusts. Keep containers tightly closed when not in use or empty. Prevent unintentional contact with incompatible chemicals.

Storage: Store in tightly closed, properly labelled containers.

What is the American Conference of Governmental Industrial Hygienists (ACGIH®) recommended exposure limit for titanium dioxide?

ACGIH® TLV® - TWA:

Nanoscale particles: 0.2 mg/m3 A3
Finescale particles: 2.5 mg/m3 A3

Exposure Guideline Comments: TLV® = Threshold Limit Value. TWA = Time-Weighted Average. A3 = Confirmed animal carcinogen.

Adapted from: 2022 TLVs® and BEIs® - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH)

NOTE: In many (but not all) Canadian jurisdictions, the exposure limits are similar to the ACGIH® TLVs®. Since legislation varies by jurisdiction, contact your local jurisdiction for exact details. A list is available in the OSH Answers on Canadian Governmental Occupational Health & Safety Departments.

A list of which acts and regulations that cover exposure limits to chemical and biological agents is available on our website. Please note that while you can see the list of legislation for free, you will need a subscription to view the actual documentation.

What are the engineering controls for titanium dioxide?

Engineering Controls: Use a local exhaust ventilation and enclosure, if necessary, to control amount in the air.

What Personal Protective Equipment (PPE) is needed when working with titanium dioxide?

Eye/Face Protection: Wear chemical safety goggles.

Skin Protection: Coveralls or long sleeve shirts and pants.

Respiratory Protection:

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode; or Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

APF = Assigned Protection Factor

Recommendations apply only to National Institute for Occupational Safety and Health (NIOSH) approved respirators. Refer to the NIOSH Pocket Guide to Chemical Hazards for more information.

NOTE: NIOSH has classified this substance as a potential occupational carcinogen, according to specific NIOSH criteria. This classification is reflected in these recommendations for respiratory protection, which specify that only the most reliable and protective respirators be worn at any detectable concentration. The requirements in Canadian jurisdictions may vary.

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