

Reference

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- 7 Sadrieh, N., Wokovich, A.M., et al. (2010). Lack of Significant Dermal Penetration of Titanium Dioxide from Sunscreen Formulations Containing Nano- and Submicron-Size TiO₂ Particles. *Toxicological Sciences* 115 (1): 156-166.
- 8 Wu, J., Liu, W., et al. (2009). Toxicity and penetration of TiO₂ nanoparticles in hairless mice and porcine skin after subchronic dermal exposure. *Toxicology Letters* 191 (1): 1-8.
- 9 OSHA. *Nanotechnology Standards*. Retrieved June 24, 2011 from http://www.osha.gov/dsg/nanotechnology/nanotech_standards.html
- 10 NIOSH. (2010). Occupational Exposure to Carbon Nanotubes and Nanofiber [DRAFT]. *Current Intelligence Bulletin*. Rationale: "In this risk analysis, NIOSH has determined that workers may be at risk of developing adverse respiratory health effects if exposed for a working lifetime at the upper limit of quantitation (LOQ) of NIOSH Method 5040, currently the recommended analytical method for measuring airborne CNT. The LOQ for NIOSH Method 5040 is 7 µg/m³. Specifically, the animal data-based risk estimates indicate that workers may have >10% excess risk of developing early stage pulmonary fibrosis if exposed over a full working lifetime at the upper LOQ for NIOSH Method 5040. Until improved sampling and analytical methods can be developed, and until data become available to determine if an alternative exposure metric to mass may be more biologically relevant, NIOSH is recommending a REL of 7 µg/m³ elemental carbon (EC) as an 8-hr TWA respirable mass airborne concentration."
- 11 NIOSH. (2011). Occupational Exposure to Titanium Dioxide. *Current Intelligence Bulletin* 63. Rationale: "NIOSH recommends airborne exposure limits of 2.4 mg/m³ for fine TiO₂ and 0.3 mg/m³ for ultrafine (including engineered nanoscale) TiO₂, as time-weighted average (TWA) concentrations for up to 10 hr/day during a 40-hour work week. These recommendations represent levels that over a working lifetime are estimated to reduce risks of lung cancer to below 1 in 1,000. The recommendations are based on using chronic inhalation studies in rats to predict lung tumor risks in humans."
- 12 Recommended Spill Kit Contents:
 - Latex or Nitrile gloves
 - Disposable laboratory coat w/elastic wrists or Tyvek suit
 - Absorbent material
 - Pre-moistened wipes
 - Sealable plastic bags and tape
 - Hazardous waste containers with leak proof caps
 - Walk off mats (e.g., Tacki-Mat)
 - Dedicated HEPA vacuum, labeled 'For Nanomaterials Only'
 - Hazardous waste labels
 - 'Do not enter - Nanomaterial Spill Clean-up in Progress' sign
- 13 *Ibid.*
- 14 Nenogenotox (2010). *Definitions Glossary*. Retrieved June 15, 2011 from http://www.nanogenotox.eu/index.php?option=com_glossary&id=57&Itemid=100
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- 16 International Agency for Research on Cancer. (1996). *Carbon Black*, p. 149. Retrieved March 26, 2012 from <http://www.inchem.org/documents/iarc/vol65/carbon.html>
- 17 *Ibid.* (See Reference 9)
- 18 European Commission. (2011). *Chemicals: REACH and nanomaterials*. Retrieved June 24, 2011 from http://ec.europa.eu/enterprise/sectors/chemicals/reach/nanomaterials/index_en.htm
- 19 Environmental Protection Agency. (2011). *Control of nanoscale materials under the Toxic Substances Control Act*. Retrieved June 24, 2011 from <http://www.epa.gov/opptintr/nano>
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- 22 Courtesy of Dr. Paul Schulte, NIOSH