

## Potential for worker exposure to nano-size titanium dioxide above the recommended limit when spraying paint

### **Exposure to airborne nano-titanium dioxide during airless spray painting and sanding**

*Gavin H. West, Michael R. Cooper, Leonard G. Burrelli, Daniel Dresser, and Bruce E. Lippy. Journal of Occupational and Environmental Hygiene, 2019.*

#### **Overview**

This study estimated exposures to nano-size titanium dioxide (TiO<sub>2</sub>) while spraying and sanding a commercially available paint. The National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit (REL) is eight times lower for ultrafine TiO<sub>2</sub> (0.3 mg/m<sup>3</sup>) compared to fine TiO<sub>2</sub> (2.4 mg/m<sup>3</sup>), as time-weighted average concentrations for up to 10 hours per day during a 40 hour workweek. Ultrafine includes nanoparticles. Air samples were collected while a tradesperson performed the tasks in an environmentally controlled chamber. Dust capture during sanding was provided by a dust collection bag or local exhaust ventilation attached to a high efficiency vacuum. Personal and bystander exposures were characterized using particle counts, airborne mass concentrations, and electron microscopy.

#### **Key Findings**

- Characterization of the paint before testing indicated that most of the TiO<sub>2</sub> primary particles in the paint were nano-size and bound together to form larger structures, called agglomerates.
- Sonication in acetone caused the nanoparticles to separate, raising the question of whether paint thinners and mechanical mixing could mimic this effect observed in the lab.
- Individual nanoparticles were detected by particle counters during spraying and sanding but could not be confirmed by electron microscopy.
- Exposures during sanding were below the NIOSH REL. Dust levels were relatively low, and local exhaust ventilation significantly reduced the number of airborne nanoparticles.
- The researchers concluded that workers could potentially be exposed to levels above the NIOSH REL for ultrafine TiO<sub>2</sub> when applying the paint with an airless sprayer.
- They recommended that employers and industrial hygienists should characterize exposures and use the hierarchy of controls to protect the health of employees.
- Future research should consider whether chemicals commonly used in construction, including those found in paint thinners, could impact occupational exposure to nanomaterials in paints.

#### **For more information, contact:**

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#### **See abstract:**

<http://bit.ly/2vntBK0>

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