

LAB SAFETY

Refrigerator:

Refrigerators and freezers are not typically constructed to assure that there is no potential ignition source within the unit, therefore, it is not the best place for the storage of substances that are flammable at room temperature.

When a power outage occurs, with no power to continue cooling, the internal temperature of the refrigerator rises. This results in an increase in the concentration of flammable vapors within the refrigerator's interior. When power is restored, a spark generated by the refrigerator light door switch or the thermostatic control can ignite a violent explosion.

To prevent explosions from the storage of flammable and unstable chemicals, "lab-safe" refrigerators have been developed and are readily available. These refrigerators have their electrical components mounted on the outside of the unit to prevent sparking. For the safety of all laboratory personnel, the EHS Office suggests that flammable and unstable chemicals only be stored in a lab-safe refrigeration unit that meets National Fire Protection Association 45 – [Standard on Fire Protection for Laboratories Using Chemicals](#).

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Hearing conservation

The Industrial Hygiene Program (IHP) provides several services to limit employee exposure to noise which could cause hearing loss.

At your request, IHP will measure the noise exposure at your work location using a sound level meter and/or a noise dosimeter. Those employees whose exposure exceeds the 85 dBA threshold will be enrolled in the hearing conservation program and will be notified yearly to make an appointment with the audiologist at the Medical Department to have a hearing exam.

It is MIT's policy to require that all employees who are exposed at or above a time weighted average of 85 decibels for an 8 hour day to wear hearing protection which will be furnished by the Institute. Samples of various types of ear muffs, ear caps, and ear plugs are available for inspection in the Industrial Hygiene Program and may be purchased through the purchasing office. One type of muff and one type of plug is stocked at the IHP and can be purchased there. If you would like direction on ways to control noise in existing or new equipment, contact our office (Room N52-496) or feasible engineering controls.

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TiO₂ Nanoparticles

Nanoscale titanium dioxide has shown very different properties from the micron scale material in tests of lung toxicity. 14 to 40 nm titanium dioxide produced lung cancer in rats at doses of 10 mg/m³; micron sized dust produced cancer only at very high doses (250 mg/m³). Based on these results the National Institute of Occupational Safety and Health (NIOSH) issued a recommended safe occupational exposure limit of 0.1 mg/m³ for nanoscale material and 1.5 mg/m³ for micron size material.

The International Agency for Research on Cancer (IARC) has also determined that titanium dioxide is a category 2B carcinogen: possibly carcinogenic to humans. Nanoscale titanium dioxide when inhaled could travel to the brain by way of olfactory neurons. Once in the brain, it caused oxidative stress and neuronal degeneration in several areas, including the hippocampus which is involved with short-term memory.

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TiO₂ nanoparticles

There is currently no consensus about the ability of nanoparticles to penetrate through the skin. Particles in the micrometer range are generally thought to be unable to penetrate through the skin.

There is also a concern that nm titanium dioxide particles have higher photo-reactivity than coarser particles and may generate free radicals that can cause cell damage. Some manufacturers (sun screen and cosmetics) have addressed this issue by coating the particles to prevent free radical formation.