OhioEPA
State of Ohio Environmental Protection Agency

Pollution Prevention Fact Sheet

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Persistent, Bioaccumulative and Toxic Chemicals

Antimony and Antimony Compounds

What are PBT chemicals?

Persistent, bioaccumulative and toxic (PBT) chemicals do not readily break down in the environment, are not easily metabolized, may accumulate in human or ecological food-chains through consumption or uptake and may be hazardous to human health or the environment. A PBT chemical, once released to the environment, may present increasing long-term toxic effects to human health and the environment, even if the release was of a small amount. The U.S. Environmental Protection Agency (U.S. EPA) has created a priority in its hazardous waste minimization program to reduce the presence of PBT chemicals, promote pollution prevention and avoid the transfer of PBT chemicals across environmental media.

Antimony is a high priority PBT chemical.

What is the adverse effect of antimony?

Exposure to antimony at high levels can result in a variety of adverse health effects.

Breathing high levels for a long time can irritate your eyes and lungs and can cause heart and lung problems, stomach pain, diarrhea, vomiting and stomach ulcers.

In short-term studies, animals that breathed very high levels of antimony died. Animals that breathed high levels had lung, heart, liver and kidney damage. In long-term studies, animals that breathed very low levels of antimony had eye irritation, hair loss, lung damage and heart problems. Problems with fertility were also noted. In animal studies, problems with fertility have been seen when rats breathed very high levels of antimony for a few months.

Ingesting large doses of antimony can cause vomiting. Long-term animal studies have shown liver damage and blood changes when animals ingested antimony. Antimony can cause irritation after dermal exposure.

Lung cancer has been observed in some studies of rats that breathed high levels of antimony. No human studies are available. It is not clear whether antimony will cause cancer in people.

Antimony can have beneficial effects when used for medical reasons. It has been used as a medicine to treat people infected with parasites.

Antimony is a silvery-white metal. Antimony oxide is used to produce fire retardants, paints, ceramics and fireworks. Antimony alloys are used in lead storage batteries, solder, sheet and pipe metal, bearings, castings, type metal, ammunition and pewter. Antimony does not degrade and is not destroyed by combustion. It cycles between the soil, the atmosphere, surface waters and ground water. Breathing or ingesting high levels of antimony for a long time can cause heart and lung problems, joint or muscle pain, stomach pain, diarrhea, vomiting and stomach ulcers. Antimony usage and pollution should be reduced wherever possible.

In 1999, Ohio's hazardous waste program regulated facilities reported generating 1.4 million pounds of antimony and antimony compounds in waste.

Where is antimony found?

Antimony is a silvery-white metal. Small amounts of antimony are found in the earth's crust. Antimony ores are mined and then mixed with other metals to form antimony alloys or combined with oxygen to form antimony oxide.

Antimony oxide is a white powder that does not evaporate. Most antimony oxide produced is added to textiles and plastics as fire retardant. It is also used in paints, ceramics and fireworks, and as enamels for plastics, metal and glass.

Antimony metal is too easily broken to be used by itself. To make it stronger, a little antimony is usually mixed with other metals such as lead and zinc to form mixtures of metals called alloys. These alloys are used in lead storage batteries, solder, sheet and pipe metal, bearings, castings, type metal, ammunition and pewter.

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Antimony is released to the environment from natural sources and from its industrial processing.

Little or no antimony is mined in the United States. Antimony ore and impure metals are brought into this country from other countries for processing. Small amounts of antimony are also released into the environment by incinerators and coal-burning power plants.

In the air, antimony is attached to very small particles. It may stay in the air for many days.

Antimony is found at low levels in some rivers, lakes and streams.

Antimony cannot be destroyed in the environment. Most antimony ends up in soil or sediment, where it attaches strongly to particles that contain iron, manganese or aluminum.

Who is at risk?

Because antimony is found naturally in the environment, the general population is exposed to low levels of it primarily in food, drinking water and air. People may also be exposed by skin contact with soil, water and other substances that contain antimony.

Antimony may be found in air near industries that process or release it, such as smelters, coal-fired power plants and refuse incinerators. In polluted areas containing high levels of antimony, it may be found in the air, water and soil.

Workers may be exposed to high levels of antimony in the workplace. Most exposed are those who work in industries that process antimony ore and metal, or make or process chemicals that contain antimony, such as antimony oxide. They may be exposed to antimony by breathing dust or by skin contact.

People with existing chronic respiratory or cardiovascular problems could be at special risk to antimony, since antimony may exacerbate one or both types of health problems. Because antimony is excreted in the urine, individuals with kidney dysfunction may be unusually susceptible.

How can people reduce risk of antimony exposure?

There are reliable and accurate ways of measuring antimony levels in the body. Antimony can be measured in the urine, feces and blood for several days after exposure. High levels of antimony in these fluids will show that one has been exposed to high levels of antimony. However, it is not clear if such measurements can tell how much antimony one has been exposed to, for how long, or what, if any, short-term or long-term health effects there will be.

The U.S. EPA has set a limit of 145 parts of antimony in 1 billion parts of water (ppb) in lakes and streams to protect human health from the harmful effects of antimony taken in through water and contaminated fish and shellfish.

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.5 mg/m^3 of antimony in workroom air to protect workers during an eight-hour work shift (40-hour workweek). The National Institute of Occupational Safety and Health (NIOSH) also recommends that the concentration in workroom air be limited to 0.5 mg/m^3 for antimony, averaged over an eight-hour work shift.

Sources

Agency for Toxic Substances and Disease Registry
www.atsdr.cdc.gov

TOXNET, National Library of Medicine, National Institutes of Health
www.toxnet.nlm.nih.gov

The Office of Pollution Prevention was created to encourage multi-media pollution prevention activities in Ohio to reduce risk to public health, safety, welfare and the environment. Pollution prevention stresses source reduction and, as a second choice, environmentally-sound recycling while avoiding cross media transfers. The office develops information related to pollution prevention, increases awareness of pollution prevention opportunities, and can offer technical assistance to business, government, and the public.

For more information, visit the Office of Pollution Prevention's Web site at
www.epa.state.oh.us/opp

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