

Properties of Lead

General

Elemental lead (Pb) is a heavy, soft, bluish metal that occurs in nature in the form of ores. Once lead is mined, processed and introduced into the environment, it is a potential problem forever. There is no technology that will destroy lead or render it permanently harmless.

Lead in the ambient air exists primarily as lead vapors, very fine particles, and organic halogens like lead bromide and lead chloride. Common sources that emit lead to the atmosphere are gasoline additives, nonferrous smelting plants, and battery and ammunition manufacturing. In 1985, motor vehicle emissions accounted for 81 percent of lead emissions nationwide. Today, lead is banned from use in gasoline. Lead emissions from stationary sources have been substantially reduced through control programs aimed toward attainment of the particulate matter and lead ambient air quality standards. Still, centuries of mining, smelting, and manufacturing have resulted in extensive environmental contamination. Lead is in food, water, air, soil, paint, and hundreds of other materials. All are potential pathways to human exposure.

Effects

Exposure to lead mainly occurs through inhalation and ingestion. Today there are three major sources of lead poisoning: lead-based paint, drinking water, and urban soil and dust. Airborne lead particles are easily deposited into the lungs. Inhaled lead enters the bloodstream and is distributed throughout the body. It accumulates in blood, bone, and soft tissue. If ingested, ten to fifteen percent is absorbed into the body. Children and pregnant women absorb even more.

Low-level lead poisoning may have nonspecific symptoms like headaches, abdominal pain, and irritability. Even at low doses, children and fetuses may suffer central nervous system damage or slowed growth. High blood-lead levels in children are associated with permanent deficiencies in growth and intelligence. Excessive exposure to lead may cause anemia, kidney disease, reproductive disorders, and neurological impairments.

Standards

In 2008, EPA substantially strengthened the National Ambient Air Quality Standards (NAAQS) for lead. The revised standards are 10 times more stringent than the previous ones and will improve health protection for at-risk groups, especially children. EPA's primary health-based standard went from $1.5 \mu\text{g}/\text{m}^3$ to $0.15 \mu\text{g}/\text{m}^3$ measured as total suspended particles (TSP). The secondary welfare-based standard is now identical in all respects to the primary.

EPA may require monitoring near existing industrial sources of lead, recently closed industrial sources, airports where piston-engine aircraft emit lead, and other sources of re-entrained lead dust.

