

Assignment.....metals in the environment, my topic is lead

[Literature](#), [Russian Literature](#)



1) Explain how the metal or coal bi-product becomes a toxicological problem. Include in your discussion how the metal is transformed and the physiological effects in the body. Explain remediation in individuals.

Lead and its derivatives are the fifth most commonly used metal in the world. It is naturally found in trace quantities. The approximate concentration of lead in the Earth's crust is 20ppm. The mobilization and transfer of lead is mainly through human means, however, foul weather and volcanic emissions also play their part. A research conducted in the 1960's concluded that the amount of lead introduced into the environment via human means was 100 times more than that the amount added naturally (Wright A. & Welbourn, 2002). This research proved that lead contamination was one of the hazards brought by industrialization.

The form of lead that is most responsible for lead transmission is tetraethyl lead. Tetraethyl lead is a lead derivative that is used as an additive in gasoline. Other sources of inorganic lead are lead containing sweeteners, lead salts in paints and anticorrosion coats, in batteries, in protective glass that are used against radioactive substances and in insecticide. Lead is also used in water distribution networks and is also used in containers that hold food and drinks. The usage of lead in these sensitive areas can cause mobilization of lead if the liquid medium is soft, acidic or poorly buffered. This translates into lead contamination in drinking water and food and drink vessels. As mentioned afore, paints and anticorrosive agents contain high concentrations of lead. As anticorrosive coats or paints wear off they mobilize particles of lead dust into the air. Lead dust is a direct means of contact with lead particles, and it can also settle in soils or aquatic mediums.

Most forms of lead are insoluble. This means that even though practice of using lead derivative compounds in products has ceased, lead and its derivatives are still in the environment.

The dispersal of lead is through three major mediums; the atmosphere, the water and the soil. The dispersal of inorganic lead through the atmosphere is dependent on the particle size of lead. Lead particles having larger size, greater than $2\mu\text{m}$ in diameter; tend to fall close to their source of origin. They continue to contaminate and pollute the water and soil around the source. Particles which are smaller in size, less than $2\mu\text{m}$ in diameter; are capable of travelling larger distances. Transference through atmosphere not only depends on particle size, it also depends on wind speed, direction and precipitation. Most lead particles that are generated from industries are larger in size and thus, remain localized to the vicinity of the source.

The atmosphere dispersal method is responsible for deposition of lead particles in soil and water. Lead particles that are deposited into soil or water do not undergo chemical reactions. Lead present in soil does not react or dissolve with the surface or ground water. Further, since lead is pH sensitive the concentration of lead within aquatic bodies never reaches a high concentration. Higher pH of the aquatic body results in higher concentration of dissolved lead. Like other elements, lead also makes its way into food chains. Unlike other elements such as mercury, the concentration of lead within organisms decreases with higher trophic levels. This suggests that lead mobilization through the food chain is minimized. It is quite clear that lead particles are immobilized in the soil or aquatic medium; they however are highly mobile in the atmosphere.

The foremost medium of dispersal for lead particles is the atmosphere. Therefore the primary sources of lead particles are industries, old plumbing systems and local anomalies. The main intake of lead is through dietary ingestion of lead. The intake of lead can be through ingestion of food contaminated with lead or through lead contaminated water. The third exposure is through mouthing of objects that are contaminated by lead dust or soil. The latter specifically applies to young children. Inhalation of lead particles leads to the same catastrophic effect.

Lead has proven itself to be a poisonous element. Concentrations of lead in the blood stream are known to cause a disease known as Plumbism. Plumbism is characterized by abdominal and joint pain, headache and lethargy. Introduction of lead into the blood stream interferes with the haem system in a number of ways. It causes decreased hemoglobin synthesis, resulting in anemia and paleness. Further, the skeletal system acts as a reservoir for lead. Though accumulation of lead does not have any direct consequences to the skeletal systems, it acts as a means of measure of lead exposure (Luch, 2010). Lead concentrations are also known to cause high blood pressure in adults. Lead exposure in young children causes severe neurological disorders. This includes drastic change in behavior, lowering of IQ and formulation of short attention span.

2) Discuss the one important case study that brings the danger of the metal or coal bi-product to the forefront of environmental concern. Give dates, and a chronological sequence of events.

4, 500 hectares in proximity of Agrio and Guadiamar rivers were

contaminated by four million cubic meters of acidic water and one million cubic meter of waste comprising of intensive level of toxic compounds which was accidentally discharged from the mine at Aznalcóllar, in the Doñana National Park in Spain, 12 years ago. Pyritic sludge from the mine affected the flora and fauna quite extensively.

Also, on October 4th 2010, the largest ecological disaster in occurred in Hungary. Red mud comprising of toxic materials from aluminium holding pods reached Danube from the Kolontar.

As a result of which ten human lives and destruction of houses and crops was observed.

Nematodes (microscopic soil worms that are indicators of the biological state of soil) from Spanish study showed that the same strategies could be adopted to lower the effects in Hungary as well. Nematodes were effectively utilized in Spain for normalizing the conditions, however it took several years to do so , and the process is still going on. The biologists were of the view that nematodes can significantly reduce the consequences of spillage as they accelerate the cycle of nutrients. Without micro fauna the roots would asphyxiate and do not grow which leads to the decreased agriculture activity and fertility.

References:

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