Extended Abstract

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The International Debate on Insights into Mercury Cycle & Contamination

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Mercury (Hg), the most fascinating, rare and potent neurotoxic heavy metal along with distinctive, singular properties like a liquid at room temperature distinguishes it from other elements, belongs to d-group elements. It is non-essential, highly toxic and persistent pollutant that is globally distributed due to its strong persistence and bioaccumulative nature in the environment. Mercury has a high vapor pressure and low solubility, results in freely departure into the atmosphere. Also, Hg is a non-biodegradable element and hence remains persistent in the atmosphere for several years. Now these days the climax of mercury is ascending due to post-industrial activities like combustion of coal, fossil fuel and petroleum, the operation of mercurial fungicides in farming, paper manufacturing industry, mercury catalysts used in industries, Chlor-alkali plants , gold mining, manufacturing of non- ferrous metals, remission from previously deposited mercury on various surface environments like terrestrial region, and cement production leads to a significant increase in global mercury pollution. While other major factors of mercury pollution are natural sources like hydrological cycle, soil erosion, geothermal activities, and wildfires. Notably, mercury released by volcanic sources and burning of coal is an estimated global total of 60,000 kg and 3,000 tons of mercury per year and that is same as the amount released by all the industrial activities. Different forms of mercury are toxic at different levels, among all organic mercury (methyl mercury) is highly toxic while other naturally occurring compounds like mercury sulfide also known as cinnabar is non-toxic. Furthermore, methylmercury was responsible behind the Minamata disease in Japan (1952). During the Minamata disaster, industrial wastewater contaminated with methyl mercury was continuously discharged into the bay, which affected the aquatic life followed by human life and another case was held in Iraq (1971) where organo mercury fungicides were used in grains treatment which further consumed by humans, huge population was disturbed by these accidents .

Anthropogenic activities, fossil fuel combustion, and atmospheric circulation have enhanced 3 to 10 times Hg in soil and sediments. In 2005, the global Hg emission was reported to be 3000 tons. Moreover, 800 tons Hg per year alone released by the burning of fossil fuel and become the superior anthropogenic source of Hg in the atmosphere. Being recalcitrant in nature, removal of Hg is quite difficult and through bioaccumulation, it transfers to the food chain and causes a threat to the human being. As mercury is easily absorbed by alimentary tracts, it penetrates into the placenta, with the passage of the blood-brain barrier; it disrupts the function of the membrane, protein compounds, nucleic acids, and other enzymes. Heavy metal does not degrade easily like organic pollutants. Because of having versatile nature and the best conductor of electricity, it is also used in various applications like a thermometer, thermostats, catalysts, electrode materials, electrical switches, reflective liquid in liquid mirror telescope, medicine (dental amalgam), fluorescent light bulbs and ballast for submarines. Immense increase in the level of mercury in the terrestrial as well as aquatic ecosystem decreases plant yield and also disturbs the stability of the food web. There are 3 different categories of heavy metals to which we should show concern about, primarily the heavy metals like Hg, Cd, As, Sn, Pb, Co, Cu, Ni, Mn, Fe, etc., radionuclides like Ra, U, Th, Am etc., and the adored metals like Ag, Ru, Pt, Au, Pd etc. Among all mercury, cadmium, and