

IMPACT OF HEAVY METALS ON ENVIRONMENTAL POLLUTION

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ABSTRACT

Heavy metals constitute a very heterogeneous group of elements widely varied in their chemical properties and biological functions. Heavy metals are kept under environmental pollutant category due to their toxic effects on plants, animals and human being. Heavy metal contamination of soil results from anthropogenic as well as natural activities. Anthropogenic activities such as mining, smelting operation and agriculture have locally increased the levels of heavy metals such as Cd, Co, Cr, Pd, As and Ni in soil up to dangerous levels. Heavy metals are persistent in nature, therefore get accumulated in soils and plants. Dietary intake of many heavy metals through consumption of plants has long term detrimental effects on human health. The impact of the heavy metals on aquatic organisms is due to the movements of pollutants from various diffuse or point sources which gives rise to coincidental mixtures in the ecosystem. Thus posing a great threat to aquatic fauna especially to fishes which constitutes one of the major sources of protein rich food for mankind. So we want to study the acute and sub-lethal toxic effects of heavy metals in Krishna river sediment, water and in aquaculture by using Atomic Absorption Spectroscopy.

Significance of study: Aquatic environment gets contaminated with a variety of pollutants generated from diverse sources (industries, agricultural and domestic). Amongst the pollutants pesticides, heavy metals, and detergents are the major cause of concern for aquatic environment because of their toxicity, persistency and tendency to accumulate in organisms.

Heavy metals are a group of 19 elements which have many similar physical and chemical properties and are remarkably varying from the remaining 97 known elements. Among the 19 heavy metals lead, cadmium, and mercury do not have any biological significance or beneficial use and known to be extremely toxic. Other metals are chromium, copper, manganese, nickel, tin and zinc once dispersed in the biosphere these metals cannot be recovered or degraded. Hence environmental effects of metal pollution are said to be permanent.

Metal pollution has harmful effect on biological systems and does not undergo biodegradation. Toxic heavy metals such as Pb, Co, Cd and Hg can be differentiated from other pollutants, since they cannot be biodegraded but can be accumulated in living organisms, thus causing various diseases and disorders even in relatively lower concentrations.

Thus there is urgent need to evaluate the extent of pollution created by the heavy metals and to monitor the agents responsible for aquatic pollution in Krishna river of Andhra Pradesh.

INTRODUCTION:

A 25-foot (7.6m) wall of heavy metal contaminated coal fly ash, resulting from the release of 5.4 million cubic yards of coal fly ash slurry into the Emory River. Tennessee and nearby land and water features in December 2008. Testing showed significantly elevated levels of arsenic, copper, barium, cadmium, chromium, lead, mercury, nickel, and thallium in samples of slurry and river water. Cleanup costs may exceed \$1.2 billion. A heavy metal is any metal or metalloid of environmental concern. The term originated with reference to the harmful effects of cadmium, mercury and lead, all of which are denser than iron. It has since been applied to any other similarly toxic metal, or metalloid such as arsenic, regardless of density. Commonly encountered heavy metals are chromium, cobalt, nickel, copper, zinc, arsenic, selenium, silver, cadmium, antimony, mercury, thallium and lead. More specific definitions of a heavy metal have been proposed; none have obtained widespread acceptance.

DEFINITION:

"A metal of relatively high density (Specific gravity greater than about 5) or of high relative atomic weight (especially one i.e. poisonous) one mercury or lead." It has been included density, atomic weight, atomic number, or periodic table position. Density criteria range from above 3.5 g/cm³ to above 7 g/cm³. Atomic weight definitions start at greater than sodium (22.98) to greater than 40.^[n 1] Atomic numbers of heavy metals are generally given as greater than 20; sometimes this is capped at 92 (uranium). Hawkes suggested referring to heavy metals as "all the metals in Groups 3 to 16 that are in periods 4 and greater. The term "heavy metals" was in use as far back as 1817, when Gmelin divided the elements into nonmetals, light metals and heavy metals. Light metals had densities of 0.860–5.0 gm/cm³; heavy metals 5.308–22.000. In 1868, Wanklyn and Chapman speculated on the adverse effects of the heavy metals "arsenic, lead, copper, zinc, iron and manganese" in drinking water.

CONTAMINATION SOURCES:

Tetraethyl lead (CH₃CH₂)₄Pb is probably the most significant heavy metal contaminant in recent use.

Heavy metals are found naturally in the earth, and become concentrated as a result of human caused activities. Common sources are from mining and industrial wastes; vehicle emissions; lead-acid batteries; fertilisers, paints and treated woods. Lead is the most prevalent heavy metal contaminant. As a component of tetra-ethyl lead it was used extensively in gasoline during the 1930s-1970s. Lead levels in the aquatic environments of industrialised societies have been estimated to be two to three times those of pre-industrial levels. Although the use of leaded gasoline was largely phased out in North America by 1996, soils next to roads built before this time retain high concentrations of lead.

ENTRY ROUTES:

Heavy metals enter plant, animal and human tissues via air inhalation, diet and manual handling. Motor vehicle emissions are a major source of airborne contaminants including arsenic, cadmium, cobalt, nickel, lead, antimony, vanadium,

zinc, platinum, palladium and rhodium. Water sources (groundwater, lakes, streams and rivers) can be polluted by heavy metals leaching from industrial and consumer waste; acid rain can exacerbate this process by releasing heavy metals trapped in soils. Plants are exposed to heavy metals through the uptake of water; animals eat these plants; ingestion of plant- and animal-based foods are the largest sources of heavy metals in humans. Absorption through skin contact with soil, is another potential source of heavy metal contamination. Heavy metals can accumulate in organisms as they are hard to metabolize.

DETRIMENTAL EFFECTS:

Heavy metals "can bind to vital cellular components, such as structural proteins, enzymes, and nucleic acids, and interfere with their functioning." Broadly, long-term exposure to heavy metals can have carcinogenic, central and peripheral nervous system and circulatory effects. For humans, typical presentations associated with exposure to the "classical" heavy metals; chromium (another heavy metal); and arsenic (a metalloid), are shown in the table.

PROPERTIES OF HEAVY METALS:

- They occur near the bottom of the periodic table.
- Have high densities.
- Toxic in nature.
- Non degradable.

Note: Arsenic is not actually a metal but is a semi metal i.e. its properties are intermediate between those of metals and non-metals.

HISTORICAL REPORTS:

Cadmium

Cadmium exposure is a phenomenon of the early 20th century, and onwards. In Japan in 1910, the Mitsui Mining and Smelting Company began discharging cadmium into the Jinzugawa river, as a byproduct of mining operations. Residents in the surrounding area subsequently consumed rice grown in cadmium contaminated irrigation water. They experienced softening of the bones and kidney failure. The origin of these symptoms was not clear; possibilities raised at the time included "a regional or bacterial disease or lead poisoning."

Mercury

The first emperor of unified China, Qin Shi Huang, it is reported, died of ingesting mercury pills that were intended to give him eternal life. The phrase "mad as a hatter" is likely a reference to mercury poisoning among milliners (so-called "mad hatter disease"), as mercury-based compounds were once used in the manufacture of felt hats in the 18th and 19th century. Historically, gold amalgam (an alloy with mercury) was widely used in gilding, leading to numerous casualties among the workers. It is estimated that during the construction of Saint Isaac's Cathedral alone, 60 workers died from the gilding of the main dome. Outbreaks of methylmercury poisoning occurred in several places in Japan during the 1950s due to industrial discharges of mercury into rivers and coastal waters. The best-known instances were in Minamata and Niigata. In Minamata alone, more than 600 people died due to what became known as Minamata disease. More than 21,000 people filed claims with the Japanese government, of which almost 3000 became certified as having the disease. In 22 documented cases, pregnant women who consumed contaminated fish showed mild or no symptoms but gave birth to infants with severe developmental disabilities. Since the industrial Revolution, mercury levels have tripled in many near-surface seawaters, especially around Iceland and Antarctica.

Lead

The adverse effects of lead were known to the ancients. In the 2nd century BC the Greek botanist Nicander described the colic and paralysis seen in lead-poisoned people. Dioscorides, a Greek physician who is thought to have lived in the 1st century CE, wrote that lead "makes the mind give way". Lead was used extensively in Roman aqueducts from about 500 BC to 300 AD. Julius Caesar's engineer, Vitruvius, reported, "water is much more wholesome from earthenware pipes than from lead pipes. For it seems to be made injurious by lead, because white lead is produced by it, and this is said to be harmful to the human body." In 2013, the World Health Organization estimated that lead poisoning resulted in 143,000 deaths, and "contribute[d] to 600,000 new cases of children with intellectual disabilities", each year.

Chromium

Chromium(III) compounds and chromium metal are not considered a health hazard, while the toxicity and carcinogenic properties of chromium(VI) have been known since at least the late 19th century. In 1890, Newman described the elevated cancer risk of workers in a chromate dye company. Chromate-induced dermatitis was reported in aircraft workers during World War II. In 1963, an outbreak of dermatitis, ranging from erythema to exudative eczema, occurred amongst 60 automobile factory workers in England. The workers had been wet-sanding chromate-based primer paint that had been applied to car bodies. In Australia, chromium was released from the Newcastle Orica explosives plant on August 8, 2011. Up to 20 workers at the plant were exposed as were 70 nearby homes in Stockton. The town was only notified three days after the release and the accident sparked a major public controversy, with Orica criticised for playing down the extent and possible risks of the leak, and the state Government attacked for their slow response to the incident.

Arsenic

Orpiment, a toxic arsenic mineral used in the tanning industry to remove hair from hides. Arsenic, as realgar (As_4S_4) and orpiment (As_2S_3), was known in ancient times. Strabo (64–50 BCE – c. AD 24?), a Greek geographer and historian, wrote that only slaves were employed in realgar and orpiment mines since they would inevitably die from the toxic effects of the fumes given off from the ores. Arsenic contaminated beer poisoned over 6,000 people in the Manchester area of England in 1900, and is thought to have killed at least 70 victims. Clare Luce, American ambassador to Italy from 1953 to 1956, suffered from arsenic poisoning.

METAL TOXICITY:

Metal toxicity or **metal poisoning** is the toxic effect of certain metals in certain forms and doses on life. Some metals are toxic when they form poisonous soluble compounds. Certain metals have no biological role, i.e. are not essential minerals, or are toxic when in a certain form. In the case of lead, any measurable amount may have negative health effects. Often heavy metals are thought as synonymous, but lighter metals may also be toxic in certain circumstances, such as beryllium and lithium.

Toxic metals sometimes imitate the action of an essential element in the body, interfering with the metabolic process to cause illness. Many metals, particularly heavy metals are toxic, but some heavy metals are essential, and some, such as bismuth, have a low toxicity. Most often the definition of toxic metals includes at least cadmium, lead, mercury and the radioactive metals. Metalloids (arsenic, polonium) may be included in the definition. Radioactive metals have both radiological toxicity and chemical toxicity. Metals in an oxidation state abnormal to the body may also become toxic: chromium(III) is an essential trace element, but chromium(VI) is a carcinogen.

Toxic metals can bioaccumulate in the body and in the food chain. Therefore, a common characteristic of toxic metals is the chronic nature of their toxicity. This is particularly notable with radioactive heavy metals such as radium, which imitates calcium to the point of being incorporated into human bone, although similar health implications are found in lead or mercury poisoning. The exceptions to this are barium and aluminium, which can be removed efficiently by the kidneys.

Testing for poisoning

People are continually exposed to metals in the environment. Medical tests can detect metals often, but this is to be expected and alone is not evidence that a person is poisoned. Metal screening tests should not be used unless there is reason to believe that a person has had excessive exposure to metals. People should seek medical testing for poisoning only if they are concerned for a particular reason, and physicians should consider a patient's history and physical examination before conducting tests to detect metals.

People who have metal tests when such testing is not indicated often have results higher than the typical range, even when they are not experiencing metal toxicity. People who get such results may be overly concerned, then seek further unnecessary health care.

Treatment for poisoning

Chelation therapy is a medical procedure that involves the administration of chelating agents to remove heavy metals from the body. It should only be used in people who have a diagnosis of metal intoxication. That diagnosis should be validated with tests done in appropriate biological samples.

Specific types of poisoning:

Aluminium phosphide poisoning:

Aluminium has no known biological role and its classification into toxic metals is controversial. Significant toxic effects and accumulation to tissues have been observed in renally impaired patients.

Acute aluminium phosphide poisoning (AAIPP) is a large, though under-reported, problem in the Indian subcontinent. Aluminium phosphide (AIP), which is readily available as a fumigant for stored cereal grains, sold under various brand names such as QuickPhos and Celphos, is highly toxic, especially when consumed from a freshly opened container. Death results from profound shock, myocarditis and multi-organ failure. Aluminium phosphide has a fatal dose of between 0.15 and 0.5 grams (0.0053 and 0.0176 oz). It has been reported to be the most common cause of suicidal death in North India.

Arsenic poisoning:

Arsenic poisoning is a medical condition caused by elevated levels of arsenic in the body. The dominant basis of arsenic poisoning is from ground water that naturally contains high concentrations of arsenic. A 2007 study found that over 137 million people in more than 70 countries are probably affected by arsenic poisoning from drinking water.

Beryllium poisoning:

Beryllium poisoning is illness resulting from the toxic effect of beryllium in its elemental form or in various chemical compounds. The toxicity of beryllium depends upon the duration, intensity and frequency of exposure (features of dose), as well as the form of beryllium and the route of exposure (i.e. inhalation, dermal, ingestion). According to the International Agency for Research on Cancer (IARC), beryllium and beryllium compounds are Category 1 carcinogens; they are carcinogenic to both animals and humans.

Cadmium poisoning:

Cadmium is an extremely toxic metal commonly found in industrial workplaces. Due to its low permissible exposure limit, overexposures may occur even in situations where trace quantities of cadmium are found. Cadmium is used extensively in electroplating, although the nature of the operation does not generally lead to overexposures.

Copper toxicity also called **copperiedus**, refers to the consequences of an excess of copper in the body. Copperiedus can occur from eating acid foods cooked in uncoated copper cookware, or from exposure to excess copper in drinking water or other environmental sources.

Lead poisoning

Lead poisoning is a medical condition in humans and other vertebrates caused by increased levels of the heavy metal lead in the body. Lead interferes with a variety of body processes and is toxic to many organs and tissues including the heart, bones, intestines, kidneys, and reproductive and nervous systems. It interferes with the development of the nervous system and is therefore particularly toxic to children, causing potentially permanent learning and behavior disorders. Symptoms include abdominal pain, confusion, headache, anemia, irritability, and in severe cases seizures, coma, and death. Lithium is used in some medications, specifically to treat bi-polar disorder. The level of **Lithium poisoning** "sufficient" medication is thought by many physicians to be close to toxic tolerance for kidney function. Therefore the patient is often monitored for this purpose.

Manganese poisoning, or manganism

Manganism or manganese poisoning is a toxic condition resulting from chronic exposure to manganese and first identified in 1837 by James Couper.

Mercury poisoning

Mercury poisoning is a disease caused by exposure to mercury or its compounds. Mercury (chemical symbol Hg) is a heavy metal occurring in several forms, all of which can produce toxic effects in high enough doses. Its zero oxidation state Hg^0 exists as vapor or as liquid metal, its mercurous state Hg_2^{2+} exists as inorganic salts, and its mercuric state Hg^{2+} may form either inorganic salts or organomercury compounds; the three groups vary in effects. Toxic effects include damage to the brain, kidney, and lungs. Mercury poisoning can result in several diseases, including acrodynia (pink disease), Hunter-Russell syndrome, and Minamata disease.

Symptoms typically include sensory impairment (vision, hearing, speech), disturbed sensation and a lack of coordination. The type and degree of symptoms exhibited depend upon the individual toxin, the dose, and the method and duration of exposure.

Silver poisoning, or Argyria

Argyria or argyrosis is a condition caused by inappropriate exposure to chemical compounds of the element silver, or to silver dust. The most dramatic symptom of argyria is that the skin turns blue or bluish-grey. It may take the form of generalized argyria or local argyria. Generalized argyria affects large areas over much of the visible surface of the body. Local argyria shows in limited regions of the body, such as patches of skin, parts of the mucous membrane or the conjunctiva.

Society and culture

It is difficult to differentiate the effects of low level metal poisoning from the environment with other kinds of environmental harms, including nonmetal pollution. Generally, increased exposure to heavy metal in the environment increases risk of developing cancer.

Without a diagnosis of metal toxicity and outside of evidence-based medicine, but perhaps because of worry about metal toxicity, some people seek chelation therapy to treat autism cardiovascular disease, Alzheimer's disease, or any sort of neurodegeneration. Chelation therapy does not improve outcomes for those diseases.

TOXIC HEAVY METALS CAN CAUSE THE FOLLOWING HEALTH PROBLEMS:

- Long term exposure to cadmium is associated with renal dysfunction. cadmium is biopersistent and once absorbed remains resident for many years. High exposure can lead to obstructive lung diseases and has been linked to lung cancer. Cadmium may also cause bone defects in humans and animals.
- Low exposure to chromium can irritate the skin and cause ulceration. long term exposure can cause kidney and liver damage. It can also cause damage to circulatory and nerve tissues.
- Aluminium toxicity is associated with the development of bone disorders including fractures, osteopenia and osteomalacia.
- Monomethylmercury causes damage to the brain and the central nervous system while fetal and post-natal exposure have given rise to abortion, congenital malformation and development changes in young children. Exposure to high levels of arsenic can cause death. All types of arsenic exposure can cause kidney and liver damage and in the most severe exposure there is erythrocyte hemolysis.
- High doses of copper can cause anemia, liver and kidney damage, and stomach and intestinal irritation.
- Excessive amounts of nickel can be mildly toxic. Long term exposure can cause decreased body weight, heart and liver damage and skin irritation.
- Manganese is known to block calcium channels and with chronic exposure results in CNS dopamine depletion. This duplicates almost all of the symptomology of parkinson's Disease.

BASIC SOIL CHEMISTRY AND POTENTIAL RISKS OF HEAVY METALS:

The most common heavy metals found at contaminated sites, such as Pb, Cr, As, Zn, Cd, Cu and Hg. Those metals are important they are capable of decreasing crop production due to the risk of bioaccumulation and biomagnification in the food

chain. The fate and transport of the heavy metal in soil depends significantly on the chemical form and speciation of the metal once in the soil, heavy metals are adsorbed by initial fast reactions, followed by slow adsorption reactions. Therefore redistributed into different chemical forms with varying bioavailability, mobility and toxicity. This distribution is believed to be controlled by reactions of heavy metals in soils such as ion exchange, adsorption and desorption, aqueous complexation, biological immobilization and mobilization, plant uptake, mineral precipitation.

HAZARDS OF HEAVY METALS CONTAMINATION:

The main threats to human health from heavy metals are associated with exposure to lead, cadmium, mercury, and arsenic. These metals have been extensively studied and their effects on human health regularly reviewed by international bodies such as the WHO.

Heavy metals have been used by humans for thousands of years. Although several adverse health effects of heavy metals have been known for a long period, exposure to heavy metals continues, and is even increasing in some parts of the world, in particular in less developed countries, though emissions have declined in most developed countries over past several years.

Cigarette smoking is a major source of cadmium exposure. In non-smokers, food is the most important sources of cadmium exposure. Recent data indicate that adverse health effects of cadmium exposure may occur at lower exposure levels than previously anticipated, primarily in the form of kidney damage but possibly also bone effects and fractures.

Long-term exposure to arsenic in drinking water is mainly related to increased risks of skin cancers. As well as the skin lesions such as hyperkeratosis and pigmentation changes. Clear exposure response relationships and high risks have been observed.

BRIEF EXPLANATION ABOUT TOXIC HEAVY METALS:

LEAD:

- Lead is a metal, it is present in the 4th group and period 6th of the periodic table.
- Lead atomic number 82, atomic mass 207.2 and density 11.4 gcm⁻³.
- Lead has a very low meltingpoint 327.4^oc and boiling point 1725^oC.
- Sulphur combined with lead to give PbS, PbSO₄.
- Oxygen combined with lead to give PbCO₃ and ranges from 10 to 30 mg kg⁻¹ in the earth's crust.
- Lead is used as solders, bearings, cable covers, ammunition, plumbing, pigments and caulking.
- Solders(Sn) and antimony (Sb) sleeve bearings, printing and high detail castings.
- Ionic Lead, Pb(II), lead oxides and hydroxides and lead-metal oxyanion complexes are the general forms of Pb that are released into the soil, ground water and surface waters.
- The most stable forms of lead are Pb(II) and lead hydroxyl complexes.
- Lead(II) is the most common and reactive form of Pb, forming mononuclear and polynuclear oxides and hydroxides.
- Lead hydroxides, lead sulphide is the most stable solid form with in the soil matrix and forms under reducing conditions, the concentration of sulphide increased.
- Lead(II) compounds are predominantly ionic forms I.e Pb²⁺, SO₄²⁻.
- Another lead(II) compounds such as PbO₂ are strong oxidants.
- Lead forms several basic salts such as Pb(OH)₂, 2PbCO₃ which is most widely used white paints pigment and the source of considerable chronic lead poisoning to children who ate peeling white paint.
- Lead dioxide and lead sulphate are participants in the reversible reaction that occurs during the charge and discharge of lead storage battery.
- The spectrophotometric dithizone method for Pb is subject to many interferences.

SOURCES OF LEAD:

Lead is used in the building industry for proofing flashing and for sound proofing .

- It is also used in solders, bearings, cable covers, ammunition, plumbing, pigments, paints important candles.
- Lead is used in pipes i.e. PVC.
- Lead is used in ceramics and dishware.
- Lead is also used in corrosion-resistant paints. It has a red bright red colour.
- Lead is used in batteries and sinkers in fishing.
- Lead enters water bodies from industrial mine and smeltr discharges from dissolution of old lead plumbing.
- Jewellery, drinking water, lunch-boxes.

HEALTH EFFECTS:

Inhalation and ingestion are the two routes of exposures and effects from both are the same.

- Lead affected by the gastrointestinal tract, kidney and central nervous system.
- Lead breaks the blood-brain barrier and interferes with the normal development of brain in infants.
- Lead is exposed from air and food in roughly equal proportions.

- Lead is observed to lower IQ levels in children shorted attention span, hyperactivity and mental deterioration with children under the age of six.
- Lead can cause serious injury to the brain nervous system red blood cells and kidneys.
- Exposure to lead can result in a wide range of biological effects depending on the level and duration of exposure.
- Various effects occur over a broad range of doses with the developing young and infants being more sensitive than adults.
- Lead poisoning, which is so severe as to cause evident illness.
- Higher concentrations are more likely to be found in leafy vegetables and fruits like corn, beans, tomatoes, squash, strawberries and apples.
- It is cummulation body poison. Natural waters generally upto 20ppb of Pb, although in some cases 400ppb.

CADMIUM:

- Cadmium is present in the Second row of the Transtion elements.
- Cadmium atomic number is 48, its atomic weight is 112.4 and its density is 8.65 gms/cubic cms.
- Cadmium is most toxic in their ionic forms.
- Coal burning is the main source of environmental cadmium.
- The nature of the operation does not generally lead to over exposuese.
- Cadmium is also found in some Industrial paints.
- Cadmium is also present in manufaturing of some types of batteries.
- Exposures to Cadmium are addressed in specific standards for the genral industry, Shipyard employment construction industry and agricultural industry.
- Cadmium is also present as an impurity in several products including fertilizers, detergents and refined petroleum products.
- The agricultural inputs like fertilizers, pesticides and bio solids (sewage sludge) the disposal of industrial wastes or the deposition of atmospheriic contaminants increases.
- Agricultural crops led to research on the possible consequences of applying sewage sludge to soils used for crops meant for human consumption.
- The symptoms are the result of painful Osteomalacia it means bone disease combined with Kidney malfunction.
- The major threat to human health is chronic accumulation in the Kidneys leading to Kidney dysfunction.

Sources:

- Cadmium is used as an electrode in nicad battries
- Cadmium is used as a pigment in paints.
- Cigarette smoke
- Cadmium is used as Fertilizers and pesticides.
- Cadimum is exposure to our food supply sea food organ meats, Kidneys and also fran potatoes, Rice and other grains.

Health Effects:

- High exposure can lead to obstuctive lunge diseases and has been linked to lun cancer.
- In very high levels it posses serious health problems related to bone defects in humans and animals liver and Kidneys and can cause deathCigarette smoke
- Greater risk far health effects are Japan and Central Europe.
- The painful Osteomalacia, it means bone diseases combined with Kidney malfunction.
- The major threat to human health in chronic accumulation in the Kidneys leading to Kidney dysfunction.
- Food in take and tobacco smoking are the main routes by which Cadmium enters the body.

MERCURY:

- Mercury is a metal present in the IV Group and Period VI of the periodic table.
- Mercury atomic number is 80, its atomic weight is 200.6 and its density is 13.6 gms/cubic cms.
- Melting and Boiling points of Cadimum are -136 degrees and 357degrees.
- Mercury is usually recovered as a byproduct.
- Hg releases from coal combustion is a major source of Hg contamination.'
- It was releases from manometers at pressure mesuring stations along gas/oil pipelines also contribute to mecury contamination.
- The environment mercury usually exists in Mercuric (Hg+2) Mecurous (Hg 2) elemental (Hg)as alkylated form (methyl or Ethyl)
- Mercury and Mecurous are more stable under oxidising conditions.

- While mild reducing conditions exist organic or inorganic mercury may be reduced to elemental mercury.
- Mercury is most toxic in its alkylated forms which are soluble in water and volatile in air.
- The removal of mercury from solution is an important mechanism for the sorption to soils, sediments and humic materials..

Health Effects:

- Damage of brain, Kidneys and Lungs.
- Irritation of nose, skin and also skin burns.
- Excessive perspiration.
- Mercury poisoning can result in several diseases like Acrodyma, Huter Russel Syndrom and Minamata disease.
- Irritation of Respiratory System.
- Rashes
- Damage to the Central Nervous System
- Loss of hearing and Muscle coordination
- Fetal and Post natal exposure have gives rise to absorption
- Congential malformation and development changes in Young children.

Sources:

- It is used in Electrical switches, Fluorescent light bulbs and Mercury lamps
- Emission of mercury vapour from large industrial operations
- Incineration of municipal wastes
- Mercury from mercury containing products batteries, Thermometers etc.,
- The best and most convenient method is the flameless atomic absorption method while dithizone method may also be used as fairly selective for Hg.

Conclusion:

We want to study and quantify the factors responsible for contamination of heavy metals in krishna river water of Andhra Pradesh and we are going to suggest how to prevent the contamination caused by heavy metals, water, soil and aquaculture of river krishna.

Methodology:

Collection and analysis of soil, water, samples from surface and underground levels contamination of heavy metals and also in aquacultural.

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