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REMOVAL OF FE AND PD BY DIFFERENT NANO MATERIALS : A REVIEW

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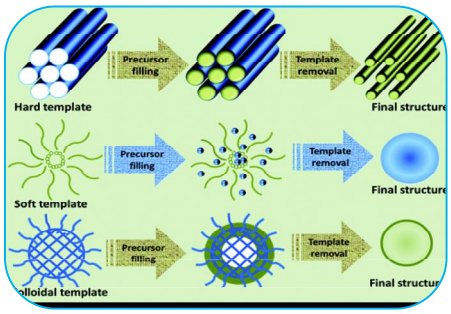
ABSTRACT :



Natural sources comprise volcanic activities, soil erosion, and activities of living organisms, and weathering of rocks and minerals, whereas anthropogenic sources include landfills, fuel combustion, street run-offs, sewage, agricultural activities, mining, and industrial pollutants, such as textile dyes. Heavy metals are classified as toxic and carcinogenic; they are capable of accumulating in tissues and cause diseases and disorders. Good precaution and adequate occupational hygiene should be taken in handling them. Although heavy metal poising could be diagnosed and medically treated, the best option is to prevent heavy metal pollution by various Treatment processes that could be for water, soil and air.

KEY WORDS: *Removal, Fe, Pd, Pb, and Nano materials ……..etc..*

INTRODUCTION:

Heavy metal contamination is one of the most important environmental issues. Therefore, appropriate steps need to be taken to reduce heavy metals and metalloids in water to acceptable levels. Several treatment methods have been developing decently to adsorb these pollutants. This paper reviews the ability of residuals generated as a by-product from the water treatment plants to adsorb heavy metals and metalloids from water. Water treatment residuals have great sorption capacities due to their large specific surface area and chemical composition. Sorption capacity is also affected by sorption conditions. A survey of the literature shows that water treatment residuals may be a suitable material for developing an efficient adsorbent for the removal of heavy metals and metalloids from water. Heavy metals are a group of trace elements that include metals and metalloids, such as arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, tin, and zinc. They have a relatively high density of over 4 × 106 mg/L. The metal ions are known to contaminate the soil, atmosphere, and water systems and are poisono use venin very low concentrations. There are two main sources of heavy metals in water—natural and anthropogenic.

SOURCES OF HEAVY METALS

Heavy metals differ widely in their chemical properties, and are used extensively in electronics, machines and the artifacts of everyday life, as well as in high-tech applications. As a result they are able to enter into the aquatic and food chains of humans and animals from a variety of nthropogenic sources as well as from the natural geochemical weathering of soil and rocks. The main sources of contamination include mining wastes, land fill eaches, municipal waste water, urban run off and industrial wastewaters, particularly from the electroplating, electronic and metal-finishing industries. With increasing generation of metals from technologies activities, the problem of waste disposal has

become one of paramount importance. Many aquatic environments face metal concentrations that exceed water quality criteria designed to protect the environment, animals and humans. The problems are exacerbated because metals have a tendency to be transported with sediments, are persistent in the environment and can bio accumulate in the food chain. Some of the oldest cases of environmental pollution in the world are due to heavy metal use, for example, Cu, Hg and Pb mining, smelting and utilization by ancient civilizations, such as the Romans and the Phoenicians.

The heavy metals are among the most common pollutants found in waste water. These metals pose a toxicity threat to human beings and animal seven at low concentration. Lead is extremely toxic and shows toxicity to the nervous system, kidneys and reproductive system. Exposure to lead causes irreversible brain damage and encephalopathy symptoms. Cadmium is used widely in electroplating industries, solders, batteries, television sets, ceramics, photography, insecticides, electronics, metal-finishing industries and metallurgical activities. It can be introduced into the environment by metal-ore refining, cadmium containing pigments, alloys and electronic compounds, cadmium containing phosphate fertilizers, detergents and refined petroleum products. Rechargeable batteries with nickel–cadmium compounds are also sources of cadmium. Cadmium exposure causes renal dysfunction, bonede generation, liver and blood damage. It has been reported that there is sufficient evidence for the carcinogenicity of cadmium. Copper as an essential trace element, is required by biological systems for the activation of some enzymes during photosynthesis but at higher concentrations it shows harmful effects on the human body. High level exposure of copper dust causes nose, eyes and mouth irritation and may cause nausea and diarrhea. Continuous exposure may lead to kidney damage and even death. Copper is also toxic to a variety of aquatic organism even at very low concentrations. Mining, metallurgy and industrial applications are the major sources of copper exposure in the environment.

STUDY AREA :-

Korba city is known as power generation centre of the Chhattisgarh state in India. It is situated in South –Central part of Korba district and North Eastern part of Chhattisgarh State.

Extensive use of chromium compounds in industrial

Applications has discharged Hugh amounts of waste water containing toxic chromium species into water bodies. Chromium enters into the environment by natural input sand anthropogenic sources. Volcanic eruptions, geological weathering of rocks, soils and sediments are the natural sources of chromium, whereas anthropogenic contributions of chromium come from the burning of fossil fuels, production of chromates, plastic manufacturing, electroplating of metals and extensive use in the leather and tannery industries. Hexavalent chromium is more toxic than trivalent chromium.

Environmental and health risks.

Now we are going to describe the effects of the heavy metals in the environment. The three most pollutants heavy metals are Lead, Cadmium, and Mercury.

Effects of Antimony on the environment

Antimony is a metal used in the compound antimony trioxide, a flame retardant. It can also be found in batteries, pigments, and ceramics and glass. Exposure to high levels of antimony for short periods of time causes nausea, vomiting, and diarrhea. There is little information on the effects of long-term antimony exposure, but it is a suspected human carcinogen. Most antimony compounds do not bio accumulate in aquatic life.

Effects of Cadmium on the environment

Cadmium derives its toxicological properties from its chemical similarity to zinc an essential micronutrient for plants, animals and humans. Cadmium is biopersistent and, once absorbed by an organism, remains resident for many (over decades for humans) although it is eventually excreted. In

humans, long-term exposure is associated with renal disfunction. High exposure can lead to obstructive lung disease and has been linked to lung cancer, although data concerning the latter are difficult to interpret due to compounding factors. Cadmium may also produce bone defects (osteomalacia, osteoporosis) in humans and animals. In addition, the metal can be linked to increased blood pressure and effects on the myocardium in animals, although most human data do not support these findings.

Effects of Chromium on the environment

Chromiumis used inmetalalloys and pigments for paints, cement, paper, rubber, and other materials.Low - level exposure can irritate the skillln and cause ulceration. Long-term exposure can cause kidney and liver damage, and damage too circulatory and nerve tissue. Chromium often accumulates in aquatic life, adding to the danger of eating fish that may have been exposed to high levels of chromium.

Effects of Copper on the environment

Copper is an essential substance to human life, but in high doses it can cause anemia, liver and kidney damage, and stomach and intestinal irritation. People with Wilson's disealĺe are at greater risk for health effects from overexposure to copper. Copper normally occurs in drinking water from copper pipes, as well as from additives designed to control algal growth.

Effects of Lead on the environment

In humans 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 foetus and infant being more sensitive than the adult. High levels of exposure may result in toxicbio chemical effects in humans which in turn cause problems in the synthesis of haemoglobin, effects on the kidneys, gastrointestinal tract, joints and reproductive system, and acute or chronic damage to the nervous system.

Effects of Mercury on the environment

Mercury is a toxic substance which has no known function in human biochemistry orphysiology and does not occur naturally in living organisms. Inorganic mercury poisoning is associated with tremors, gingivitis and/or minor psychological changes, together with spontaneous abortion and congenital malformation. Mono methyl mercury causes damage to the brain and the central nervous system, while foetal and postnatal exposure have given rise to abortion, congenital malformation and development changes in young children.

Removal of heavy metal : a comprehensive and critical review

Recent studies have focused on a particular method for heavy metal ions removal, such as electro coagulation (EC), adsorption using synthetic and natural adsorbents, magnetic field implementation, advanced oxidation processes, membranes, etc. These studies stood on the advantages and disadvantages of a specific method for wastewater treatment, including heavy metal removal. A complete picture of the heavy metals removal methods from wastewater resources has not been drawn yet. Therefore, the present review comprehensively and critically discusses the available technologies to expel heavy metal ions from wastewater efficiently. Moreover, it is essential to choose the most applicable method based on the removal efficiency, chemicals added/adsorbents, initial concentration, optimal treated pH value, and other operating conditions. The methods discussed in this review are classified into adsorption-, membrane-, chemical-, electric-, and photo catalytic-based treatments. An assessment for each method is conducted. Additional details about the operating conditions, removal efficiency, and important remarks of each method are listed for the reported studies in the literature in the accompanying Supplementary Information file.

CONCLUSION :-

Heavy metals are important in many aspects to man, especially in manufacturing of certain important products for human use, such as accumulators (Pb), mercury Arch lamps, thermometers (Hg) and utensils (Al) and wide range of other products. But the biotoxic effects, when the unduly exposed to them could be potentially life treating hence cannot be neglected. While these metals are in many ways indispensable, Good precaution and adequate occupational hygiene should be taken in handling them. Although heavy metal poising could be diagnosed and medically treated, the best option is to prevent heavy metal pollution by various Treatment process that could be for water, soil and air.

REFERENCES:-

- WHO/ FAO/ IAEA. World Health Organization, Switzerland: Geneva; 1996. Trace Elements in Human Nutrition and Health.
- Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profile for Copper. Atlanta, GA: Centers for Disease Control.
- Wikipedia " heavy metals in water" and "water pollution" Ground water System soft the Indian Sub-Continent by Abhijit Mukherjee, Dipankar Saha, Charles Harvey, Richard Taylor, Kazi Mat in Ahmed.
- Water pollution: cause, control and effect by P K goel, New age international publications.
- National institute on Nutrition, Hyderabad, Roleof nutrients in environmental toxicity Annual report.
- NCERT Science and geography Books.

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