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Study of Metal Contaminated Soil on Various part of Planet Earth

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Abstract

Exposure to toxic heavy metals is associated with many chronic diseases and can cause a wide variety of health problems. Urban soils receive varying inputs of heavy metals from a variety of mobile or stationary sources such as vehicular traffic, industrial plants, power generation facilities, residential oil burning, waste incineration, construction and demolition activities and re-suspension of surrounding contaminated soils and makes a significant contribution to the pollution in the urban environment. Therefore, the study of urban soil is important for determining the origin, distribution, and level of heavy metal contamination in urban environments. Present paper deal with the review of the soil analysis and hazardous effects on human health.

The study of environment is going on from centuries and the chemical composition of naturally occurring soil is keep on changing according to the climatic and atmospheric conditions of biosphere. This ratio is the deciding factor of fertility of soil and as the composition of soil keep on changing the fertility and quality of soil degrading simultaneously. Two main sources of metal concentration inherited from parent rock, during origin of earth and anthropogenic contamination [1]. It causes the change in heavy metal ratio in soil and plants during a period [2]. Although forests soil is less contaminated due to least human influence. The variation in the composition of heavy metal in soil have disasters effect on nature of mine soils and its risk assessment in their respective studies [3]. During extraction of heavy metal from mine the metal retained in soil so composition of soil changes [4]. Wide range of studies on Environmental Pollution are available according to climatic conditions, varies Urban to Rural Worldwide. The amount/concentration of iodine and carbonates in various samples of rocks and sea water varies according to the environmental condition, the distribution of iodine throughout earth crust including surface of soil water and percentage presence of mica in clay and shale [5]. There is a dense relation of environmental chemical composition of natural recourses and pollution in their separate studies [6]. The water in India is specified under BIS, Indian standard drinking water specifications, IS: 10500, [7]. The distribution of heavy metals in surface water of Ranipet industrial area in Tamil Nadu, India [8]. The influence of heavy metal on environment arises from sewage sludge of ferrosols [9]. The consequences of emission of heavy metal through various sources and their dominance of toxicity or traces of metal on soil and natural water in the different areas of Planet Earth [10,11]. Metals also have a vital advantage for our bodies or living organisms, these are utilized by various modes in any biological system as,

Nickel (Ni): Ni is cubic crystal, silvery and a d-block metal (period 4 and group 10). It has atomic number 28, atomic mass 58.7, density 8.9 g/cm3, high melting and boiling point. It is an element that occurs in the environment only at very low levels and is essential in small doses.

Chromium (Cr): Cr is a cubic crystal, steel gray, very hard and a d-block metal (period 4 and group 6). Chromium is required for carbohydrate and lipid metabolism and the utilization of amino acids. Chromium is used in metal alloys and pigments for paints, cement, paper, rubber, and other materials [12].

Zinc (Zn): Zn is a hexagonal crystal, bluish-white metal and a d-block metal (period 4 and group 12). It also has atomic number 30, atomic mass 65.4, density 7.15 g/cm^3. Then also from the use of liquid manure, composted materials, fertilizers, and pesticides in agriculture [13].

Copper (Cu): Cu is a cubic crystal, reddish and a d-block metal. (period 4 and group 11).Cu has atomic number 29, atomic mass 63.5, density 8.96 g/cm^3 ,High melting point 1357 K and boiling point 2840 K. It occurs in rocks, soil, water, air, plants, and animals. It is also an essential micronutrient required in the growth of both plants and animals.

Cadmium (Cd): Cd enters the environment through the uncontrolled burning of coal and garbage and through the food chain directly or indirectly from plants or animals [3].

Lead (Pb): Pb is cubic crystal, silver blue-white, soft and a p-block metal (period 6 and group 14). According to lead is a naturally occurring and found as a mineral combined with other elements such as sulphur (PbS, $PbSO_4$) and oxygen ($PbCO_3$).

Introduction

Urban soil is highly influenced anthropogenic sources such as industrial and economical activities. Bioaccumulation of various chemical in a living organism as compared to the chemical concentration in the environment was studied. Dietary intake of food may constitute a major source of long-term low level body accumulation of heavy metals [14]. Activates as agriculture, industrial waste, sewage wastewater, mining and metallurgy, manufacturing, fuel combustion and atmospheric deposition of dust particles can also introduce heavy metals into water bodies thereby contaminating them by human interference [15,16]. The multi-element analysis of roadside deposition and sedimentation in Honolulu (Hawaii), observed that Road deposited sedimentation (RDS) degraded the quality of water bodies, high concentration of transition metal like Pb, Cu and Zn were detected, which is the root cause of toxicity urban drainage system [17-19]. In India contamination of soil by heavy metal was analyzed near Ganga Plain [20]. The feasibility of estimating heavy metal in floodplain soil [21]. The deposition of cadmium lead and zinc in Europe during the period 1955–1987. Every metal has different effect on soil, the effect of Cu and Cd metal ions on plant growth and on various environmental pollution. The effect of contaminated elements on terrestrial environment due to bioavailability and toxicity [22,23]. Organic matter contamination and their availability on terrestrial environment and the carcinogenic, mutagenic, toxicity of organic pollutants including polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/Fs), polychlorinated naphthalene (PCNs), and polybrominated biphenyl ethers (PBDEs).Irrigated water plays an important role in heavy metal contamination in soil [19]. Uses of sewage water for irrigation for a long time degrades the quality of plants and increase the toxic elements [24]. The benefits of heavy metal and other substances content of waste sewage water, on horticultural crops [25,26] studied the impact of fertilizer on plants irrigated in sewage water. Random Rise in amount of heavy metal in plants and vegetables is due to irrigating plants with sewage water. Extractions of metals from their ores are one of the major source of environmental pollution release and increase of metal and metalloids as Pb, Zn etc through mining and smelting process was observed [27]. Soil contamination near non-ferrous metal smelters.

Heavy Metal Contamination Hazardous Effect

Human activities have been affected globally by heavy metals resulting in a progressive rise in the flux of bioavailable chemical forms to the atmosphere [28]. Heavy metals can sufficiently create hazardous effect in living organism as they can exist prolong in different organic and inorganic complex forms [29]. They are non biodegradable and therefore do not decay with time. The intake rate of heavy metals by an organism is relatively very high than its excretion rate, therefore these become dangerous for human health [30]. Heavy metals can easily inhale, ingestion and dermal contact absorption by human body. Metal can also accumulate in soils, plants and in aquatic animal and plants. As heavy metals have a very long half life so they can accumulate and retain in living organism. The existence of heavy metals can cause various health problems for organism and is highly dangerous for some organisms if it is present in the environment alone. Increasing exposure to toxic elements in marine and terrestrial organisms can have adverse toxicological effects [3]. Heavy metal exposure is normally chronic (exposure over a longer period of time), due to food chain transfer connected the soil with human health in his review paper [31-33] studied environmental risk assessment and remediation of soils contaminated due to waste disposal from tannery industries in Tamil Nadu and Kanpur (India), [34]. The risk of heavy metal contaminated soil on crop irrigated by contaminated water in Beijing (China).

The composition of metal and traces of element through their work [35]. The accumulation risk of heavy metals in soil and vegetable crop irrigated with sewage water in a specific area of Saudi Arabia [36]. The contaminated soil effected by pollutants and toxic metals on edible plants irrigated by sewage water in their various studies [37,38]. The implement of heavy metal contamination on agricultural soil and it's prolong effect on environment and human health. Fertilizers contain some amount of N, P and K nutrients which contribute to organic matter recycling and restoring the fertility [39]. Growth of heavy metal in agricultural soil through waste water affects the quality of food [40-42]. The accumulation of metal in soil and tomatoes crop irrigated with sewage water in Mysore city, Karnataka, India [43]. Distribution and contamination of heavy metal in Red Sea Coastal areas and their effect on Benthic Foraminifera(Sea Plants) in Jeddah Saudi Arabia. The health risk to dietary intake of toxic metal from Spinacia olerancea harvested from contaminated soil around Tshwane, South Africa [44-51].

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