



Research Article

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Health Effect of Heavy Elements Produced by Solid Residues and Dust Accumulated Inside the Factories

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Abstract

The study was conducted to estimate concentrations of heavy elements in solid residues and accumulated dust from the floor of some factories in the industrial district in Najaf. Samples Information of the place and specific occupations and trades in the industrial neighborhood and samples were taken from the dust accumulated on the floor of the factories as well as dust from the sidewalks of the streets of the industrial district and the following operations were carried out: Separation of large-scale particles using soil sieves; Digest and analyze samples to determine concentrations of heavy elements expected to exist in solid residues and accumulated dust; The degree of soil reaction or acidity (pH) and electrical conductivity (soil salinity), as well as total dissolved salts (TDS), were recorded. Four elements that have been detected are lead, cadmium, cobalt, and zinc. The highest concentration of the lead element was recorded in the radiator repair workshops 398 ppm. The lowest value was recorded in welding factories and welding of metals at 6.0492 ppm. The cadmium component was the highest value recorded in the smelting plant at 2.2848 ppm. The lowest value was found in the aluminum smelters 0.0000 ppm, while the cobalt was the highest value in the aluminum smelter factory 0.2535 ppm. The lowest value was recorded in the polishing factories and the cleaning of the car lights 0.0512 ppm. The zinc element was the highest value recorded in the Aluminum smelter of 2.7781 ppm and lowest value in plumber of organic and inorganic substances whether molecular or ionic. The sample is of high value from 800-1500 mg/l. Electrical conductivity was also detected at 2.19 sm/cm. travelers to Najaf must endure more conventional health risks. In addition to the usual vaccinations, such as booster shots for measles, mumps, and rubella, the Centers for Disease Control endorses a battery of precautions for travel to Iraq. This includes hepatitis A and B, typhoid, and rabies shots. However, despite its location in southern Me

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Introduction

The urban environment is an important field in applied environmental studies and the environment because the large percentage of the population is present in this environment. Most of these cities are either built directly beside the water sources or in proximity to them or were chosen for the best environment in the plain and mountain or desert oasis to provide better requirements for its residents [1]. But what resulted from the destruction of the environment by the population and the factors of technology used and the accumulation of municipal waste resulting from these activities and caused by levels of pollution so that it became the most serious problems to humanity and other forms of life of these cities and neighboring environments in various forms in the environment of the environment of water, air, and soil [2]. The air pollution in these environments the diversity of its sources and the increasing rates of solid waste, especially in quantities beyond the limits of the environmental system. Environmentalists and environmental pollution experts consider the waste to be highly hazardous because it is a heterogeneous mix of various organic and inorganic substances, toxic elements, preservatives, metals, plastics, building materials, etc. [3]. The environmental and health effects of environmental pollution are not only caused by polluting substances, but also by many factors that interact with environmental toxins and to revive different disease levels. Therefore, they believe that one of the most important environmental problems is the problem Air pollution is characterized by solid residues and pavement dust because they form mixtures of different sources. It becomes more dangerous if these pollutants are left in the streets and subjected to factors crushing the mechanic and turned into particles of different sizes, which are very accurate can rise and distributed with the air that is exposed to most cities of Iraq and the region, especially during the hot summer because of its geographical location and the nature of the changing climate daily and separately [4]. Therefore, the accumulated dust in the industrial area is a real problem in the work environment due to the neglect of the conditions of environmental sanitation and the bad process of solid waste management and the weakness of environmental services. The result is the accumulation of hundreds of tons of dust loaded with various chemical, industrial and agricultural pollutants. In the emission and increase of dust suspended and accumulated in



the atmosphere of cities, which increases the risk of containing this dust on particles of microscopic size and at the same time contain different concentrations of heavy elements harmful to the system and the demographic. Therefore, this study has identified the shape of the molecules and their general components, which showed that the metal part occupies the largest part of the dust components. This requires the detection of the presence of heavy metals, especially the industrial ones, which have a direct impact on human health. The current site of the industrial district within the basic design of the city and near the important educational centers such as the University of Kufa and residential neighborhoods surrounded by three parties environmental violation by any measure of what results from the work that takes place in these factories from the melting of metals to the dyeing of cars to clear and softening and resulting from fine and hazardous atoms to welding processes, metals and others all directly or indirectly affects the workers in the factories and the surrounding residential areas as well as the air, soil and water system as well as its effect on the plant. The main objective of the research is to detect the heavy elements contaminated in the accumulated dust and the solid residues in the industrial district and compare the concentration of these pollutants with national and international standards to reach an environmental assessment of the impact of these pollutants on the workers in the industrial factories and other elements of the ecosystem. Which will contribute to reducing the pollution levels of this city's environment. The spatial boundaries of the industrial area are full of Kufa-Najaf Street, down to the food stores. The limits of the temporal search included collection of samples at a close time after the factories started working in the morning until 3 pm of March 2017. The objective limits are the detection of the concentration of heavy toxic elements and some chemical properties of industrial residues and accumulated dust in the study area. The sampling locations of the industrial district were determined according to the type of industrial activity (aluminum smelter, radiator repair, plumber and metal casting, dyeing factories, salts repair factories, metalworking factories, vehicle glass repair factories, and factories of Budget and auto format.

Material and Methods

Najaf's weather is extremely hot, with daytime summer temperatures routinely over 105°F. Even as late as October, daytime highs in the upper 90s are normal. November to March sees milder weather, with temperatures in the 60s and 70s. November is also the rainiest time in Najaf, but even so average precipitation is roughly 1/4 of an inch. Visitors should expect clear skies year-round. To travel to places off the track, there are few places above Najaf. On the one hand, the city is a religious pilgrimage destination with important Islamic monuments. On the other hand, it is in war-torn Iraq and has seen major violence. Traveling to Najaf is certainly risky, but for that fact, it makes it an adventurous destination where a few tourists dare to walk. The dust of sidewalks in the industrial neighborhood where the accumulated soil and pavement dust by 1 kg collected from each position using a shovel and brush and plastic bags from inside and in front of factories and transferred samples to a laboratory at the University of Kufa. 10 ml of nitric acid was added to 1 g of each sample and then placed in the Heating Digester. Where the sample was heated until the dissolution and then filtered using a filter size of 0.45 microns for purification of the sample and then completed the size to 50 ml ion water. After completion of this step, the solution is ready for detecting the heavy elements by the atomic absorption spectrum FAAS (Flame Atomic Absorption). In order to detect the acidic function, salinity and total dissolved salts, a 1:5 extract was prepared. 5 gm of each sample was mixed, and 5 gm taken from the mixture and placed in shaker water bath for 30 min and then filtered.

Results and Discussion

Concentration of four heavy elements (lead, cadmium, cobalt, zinc) resulted from different industrial residues and accumulated dust were measured as shown in the table (Table 1).

Location	Pb	Cd	Со	Zn
Metal melting plants	188.9361	0.1497	0.0884	2.7781
Repair factories	398.6787	0.0755	2.2848	2.5888
Foundry and casting of metals	28.8344	0.178	0.2516	1.9097
Painting factories	117.8246	0.0566	0.227	2.2217
Factories Exhaust	102.5672	0.1146	0.8687	2.3227
Aluminum smelting	145.4492	0.2684	0.0383	2.5544
Factories of mourning	29.5738	0.0701	0	2.3487
Glass repair factories	39.4541	0.0728	0.0059	2.2264
pavements Dust	33.8754	0.058	0.2201	2.2414
welding of metals	6.0492	0.2535	0.1779	1.9572
Polishing Light Factories	79.3115	0.0512	0.2565	1.982
Budget and auto format.	114.8672	0.0809	0.2221	2.332
Plumbing	91.8803	0.0958	0.1386	2.5567
Fitter	16.9377	0.0674	0.9768	2.3914
Average	99.58853	0.1137	0.4111	2.315

The lead was the highest concentration in the radiator repair factories (398.6787 ppm), and the lowest value was in the samples of welding factories 6.0492 ppm. Lead is a toxic element and has been widely used in environmental pollution extensively. Lead is a toxic substance that affects many organs of the human body and is harmful to it. Many diseases are caused by exposure to high concentration of lead, which inhibits many enzymes in the human body, resulting in inhibiting the production of hemoglobin and affecting the tissues of the kidneys and red blood cells. When a pregnant woman is exposed to lead, it damages the fetal nervous system. Zinc was the highest in aluminum smelters and was 2.7781 ppm. The lowest value was in plumbing and metal casting 1.9097 ppm. Zinc from transition metals Although it is a key element in good health it is potentially harmful. This prevents absorption of iron and copper free of it, causing poisoning plants, invertebrates and even fish. It causes gastric damage due to high pH and more than 500 ppm in soil that interferes with the ability of plants to absorb other essential metals such as copper and magnesium. Cobalt was the highest value in the aluminum smelter and was 0.2684 ppm, or the lowest value was in light polishing factories and was 0.0512 ppm. Cobalt is a solid metal, gray metallic, which is used in the preparation of alloys resistant to magnetic corrosion and hard alloys and is used in the manufacture of dyes. Increases in cobalt lead to heart damage, sensitive skin inflammation, hyperthyroidism, and high red blood cells [5]. Cadmium was the highest value in the radiator repair factories (2.2848) ppm and the lowest value was in the aluminum smelter (0.0000) ppm. It is a chemical element and a soft metal between silver and white. It has been used in industry. It has entered the environment through the soil because it is discovered in pesticides and fertilizer. When a person is exposed to cadmium, the lungs are severely destroyed leading to human death. Cadmium combines with proteins to be complex compounds that interact with the liver. Cadmium leads to diarrhea, stomach pain, severe vomiting, bone fractures, disorders of the reproductive system in the central nervous system and psychological disorders [6]. Solid residues and dust of factories and sidewalks indicate a risk to the health of workers and the population by comparing the overall rate



of concentrations with environmental determinants. Where there is a difference in Pb in nine positions.

The overall lead rate was outside the allowable limit of 40 ppm. Other elements are within the permissible limits. These pollutants cause serious damage to the size and type of the molecule and its chemical composition. This means that there are other heavy toxic elements and even if we have only revealed the four elements, there are many studies that confirm that most of these elements have a negative impact on the human being is infected with many diseases of allergies in the skin and eye and nose and respiratory system to asthma and disease Lungs next to their negative impact on the components of the environment [3]. In addition, pH has been measured (7.93). This measurement determines acidity, alkaline or neutral. The composite sample is a base sample and the value of the pH affects the plants. When the earth is alkaline or neutral, the iron hydroxide salts which are not absorbed by the plant. If acidity increases NH4 ions and according to the pH value, their potential for nutrient absorption is different [6]. Total soluble salts TDS (1311 mg/l) is the amount of organic and inorganic matter whether molecular or ionic. The studied composite sample is elevated by the total soluble salts according to the environmental determinants as the sample is considered high (800-1500 mg/l). The electrical conductivity (2.19) ms/cm is the load capacity of the electricity and depends on the type of ions and the degree of concentration of ions and the equivalence of ions and the temperature of the solution was at room temperature where it was 24.7°C. Some literatures reviews have studies about contaminations by heavy metals in different countries of many samples such as air, soil, food, water, tissues, blood, bone, teeth [7-14].

Conclusions

The study showed that the area is contaminated by toxic heavy metals, especially lead and cadmium. The highest lead was recorded in the radiator repair factories (398 ppm). The lowest value was recorded in metal welding factories (6.0492 ppm). Cadmium recorded the highest value in the various smelting plant such as iron and lead (2.2848 ppm) and the minimum value in the smelting factories (0.0000 ppm). While cobalt had the highest value in the aluminum smelting coefficient (0.2535 ppm) and the lowest value was in the light cleaning workshop (0.0512 ppm). The highest value of zinc in the aluminum smelters (2.7781 ppm) and the lowest value in the factories of casting

and molding (1.9097 ppm). It was found that the composite sample is high in total soluble salts according to the environmental determinants (800-1500) mg/l.

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