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# Examinations of Heavy Metals Pollution in Al-Nahrawan City

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## ABSTRACT

Pollution has become a global problem and the results are implied in high levels of contaminations reported for soil, water, air, plants and animals. In the present study, Al-Nahrawan is one of the most known industrial regions in Iraq. Samples of soil, water and air were taken for study. These samples were contaminated by different heavy metals like Pb, Cr, Cu, Fe and Zn that were characterized with low pH when compared with normal non industrial regions. The present results indicate that Al-Nahrawan region is affected widely by heavy metals contamination in soil, water and air as a result of industrial activities.

**Keywords:** Heavy metals, Al-Nahrawan, Pollution, industrial activity.

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# INTRODUCTION

Today, one of the most important goals in the world is to find safe industries and to for live in healthy environments. Heavy metals are non-biodegradable environmental pollutants, and their levels in different environmental compartments (air, water and food) are gradually increasing due to industrial and agricultural activities. Soil is a good medium acting as a sink for natural and anthropogenic pollutants[1]. Humans are responsible for introducing heavy metals into the environment. Heavy metals are no longer restricted to local area but also distributed over a wide area by means of air, water and soil .When the heavy metals are carried into the soil, they will accumulate there with time and enter into the food chain causing harm to human health[2]. The growth of the environmental pollution caused by metals contributes to various disorders, including cancer, hematotoxicity, allergic diseases, and immunotoxicity. Anemia is a common disorder in animals caused by exposure to certain heavy metals, such as lead[3], cadmium[4], arsenic[5] and mercury[6, 7]. Conflicting results, mainly immune suppression have been published on the effects of metals on the immune responses. Arsenic[8], mercury[9], cadmium[10, 11], lead[12, 13], chromium[14], nikel[15, 16], manganese[17], and iron[18] are reported to produce immunosuppressive effects in animals and humans

# MATERIALS AND METHOD

## Field description

One of the very important tests in the present study is the determination of heavy metals concentration in both regions in Baghdad, Al-Nahrawan region (that contains large number of factories), and Philistine street region(as a control non industrial region).

## Soil samples

Soil samples were taken from 20-30 cm depth and prepared for necessary analysis (19). The soil acidity was determined by PH meter[20]. Heavy metals were determined in each sample by using acid dilutions procedure[21].

## Water samples

Water samples were also taken (10 ml). The heavy metals were determined in each sample by using flameless atomic absorption[21].

## Air samples

Air samples were also taken and heavy metals were determined in each sample by using the low volume air sampler (Sniffer)[21].

## RESULTS AND DISCUSSION

**Table 1: Shows the pH in soil samples**

| Sample no | Sample Depth | Studied Sample pH | Control Sample pH |
|---|---|---|---|
| 1 | 10 cm | 4.4 | 4.8 |
| 2 | 20 cm | 4.9 | 5.0 |
| 3 | 30 cm | 5.2 | 5.5 |
| 4 | 40 cm | 5.5 | 5.5 |

These results mean that and according to ph values-, the particles of toxic Heavy metals exist in or near the surface of earth because contamination came by air or water, and also low depth of earth means more acidity due to more heavy metals contaminations and pollution.

**Heavy metals in Soil**

Many soil samples were taken from both regions (in different depth), then concentration of heavy metals were measured as shown in table (2).

**Table 2: Heavy metal concentration in soil**

| Heavy Metal | Al-Nahrawan | Philistinest |
|---|---|---|
| Fe | 0.0674 | 0.0381 |
| Pb | 0.1846 | 0.1551 |
| Cu | 0.0384 | 0.0125 |
| Cr | 0.1945 | 0.1319 |
| Zn | 0.1875 | 0.0630 |

According to these results, many heavy metals are found in the samples of both regions, but the concentration is higher in Al-Nahrawan samples, and the accumulation of these toxic elements in soil samples is found to be in this order of increasing( Cr >Pb> Zn > Fe > Cu). The highest heavy metal concentration was reported for Cr (0.1945) mg/L in Al-Nahrawan region, and the lowest concentration for Cu (0.0125) mg/L in Philistine street region. These data agree with many local studies[22]. It was shown that the presence of certain heavy metals (Pb, Zn and Fe) is related to the industrial activities in this region[23, 24]. There is no significant between both groups, but still increasing for Pb and Zn in both samples, because these heavy metals are produced as a result of fuels incinerations and the use of cars and machines.

**Heavy metals in Water**

In water also, the difference between the two regions (al-Nahrawan and Philistine St.) has been studied. The table 3 shows heavy metal concentration in water. According to the below table, water in both samples is still not highly polluted and still safe for human, animals and plants[22]. But a low increasing in the concentration of heavy metals in water was observed with respect to WHO

data[25]. The present data agree with the ATSDR[26, 27]. Table 4 shows the heavy metal concentration in air.

**Table 3: Heavy metals in water**

| Heavy Metal | Sample | Control |
|---|---|---|
| Fe | - | - |
| Pb | 0.1351 | 0.0545 |
| Cu | - | - |
| Cr | 0.917 | 0.616 |
| Zn | - | - |

**Table 4: Heavy metals in air**

| Heavy Metal | Sample | Control |
|---|---|---|
| Fe | 165.25 | 30.65 |
| Pb | 32.19 | 21.01 |
| Cu | 1.95 | 0.49 |
| Cr | - | - |
| Zn | 411.82 | 349.6 |

Air contaminations occur generally in the environment of Iraq. It is contaminated with these metal gases due to many reasons, like wars, weak governmental controls and laws[28].

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