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Investigation of Cr and Ni Concentration in the Soil around of Kheir Abad Industrial Complex

***S. Ghiyasi [1], A. Godari[2] and A .Nourani[3]**

[1]Department of Environment, Faculty of Agriculture, Arak Branch, Islamic Azad University, Arak, Iran
[2,3]Department of Environment, Faculty of Agriculture, Bandarabbas Branch, Islamic Azad University, Bandarabbas, Iran

ABSTRACT

To achieve information about the contamination the sampling was done on land soil of 11 regions and each 2-3 samples were mixed together. According to result, the average of concentration of Ni, Cr are 0.226 and 0.552 mg/kg . according to the average concentration of elements in crust, and result, we can approximately state agricultural lands around kheir Abad industrial complex, were not contaminated.

KEYWORDS: heavy metals, Kheir Abad, soil, contamination

INTRODUCTION

Environmental pollution with heavy metals is a global disaster that is related to human activities such as mining, smelting, electroplating, energy and fuel production, power transmission, intensive agriculture, sludge dumping, and melting operations [17]. All the heavy metals at high concentrations have strong toxic effects and are regarded as environmental pollutants [26]. Sawidis (2008) showed that heavy metals have toxic effect on the pollen growth and pollen tube growth and cause to be a range of strong morphological abnormalities, characterized by uneven or aberrant growth, including apical branching or swelling at the tip of the pollen tube.

In recent times, the statistical methods (univariate or multivariate) have been applied widely to investigate heavy metal concentration, accumulation and distribution in soils. The accumulation of heavy metals in agricultural soils is of increasing concern due to the food safety issues and potential health risks as well as its detrimental effects on soil ecosystems(1) They can be necessary or beneficial to plants at certain levels but can be toxic when exceeding specific thresholds, (3) they are always present at a background level of non-anthropogenic origin, their input in soils being related to weathering of parent rocks and pedogenesis and (4) they often occur as cations which strongly interact with the soil matrix, consequently, heavy metals in soils can become mobile as a result of changing environmental conditions.

These metals have peculiar characteristics including that (1) they do not decay with time (2) They can be necessary or beneficial to plants at certain levels but can be toxic when exceeding specific thresholds, (3)

The Knowledge of the heavy metal accumulation in soil, the origin of these metals and their possible interactions with soil properties are priority objectives in many environmental monitorings. Statistical analysis procedures, as powerful tools, can provide such knowledge and assist the interpretation of environmental data(7-9)

METHOD AND MATERIALS

Arak industrial city is famous as Kheirabad comllex awing to the fact that it is next to Kheirabad complex. It is located in Arak which is about 30^{Km} away – with 389 hector and its using level of industrial lands is about 169 hectar.

In sampling from soil in lands of Kheirabad, all the samples were excavated from 0-25 depth. For this reason one stainless steel tube with entrance diameter about 4m and length of 1m equipped with piston was used to extract soil. To achieve global information about the contamination the sampling was done on land soil of 11 region and each 2 -3 samples were mixed together. Then their humidity, electric conduction, and pH scaled in the laboratory. All the samples were dried in 70°C and after isolation about 5 gr from particles smaller than 63 micron powdered in agate mortar. HClO4, HF, HCl, HNO3 in sand bath were used to assimilate in 125°C .(31,32,33,34,39)

* **Corresponding Author:** S. Ghiyasi, Department of Environment, Faculty of Agriculture, Arak Branch, Islamic Azad University, Arak, Iran. Email:s-ghiyasi@iau-arak.ac.ir

Acid ascetics, hydroxylamine, H2O2 were used to assign the loosely, sulfides, and organio-metalic bonded ions respectively. To study the bioavailability we use NaOH and Acid Ascetic. Then heavy element in soil samples analyzed with Atomic Absorption. (35)

RESULT

After studying the result of experiment – as seen in table 3, the majority of concentration of Cr (1.11 Mg/Kg) and the least concentration is approximately 0.336 Mg/Kg.

Most of concentration of Nikle is about 0.578 Mg/Kg and the least concentration of this element is 0.138 Mg/Kg.

To study the string amount of pollution in land around Kheirabad industrial city complex by standard, the permitted concentration of this element is shown in the table.

Also, the permitted concentration of the elements by standard studied already according to EPA and UNPA (Tables 1, 2).

Table 1: standard of Amounts of heavy metals in soil according to EPA (mglkg)

concentration	element
260	Cr
20/9	Ni

Table 2: standard of Amounts of heavy metals in soil according to UNPA (mglkg)

concentration	element
100	Cr
50	Ni

As seen from the table, the mean concentration of Cr ,Ni (Table 3) in the region studied is as follows:, 0.552, 0.266 Mg/Kg which is less than of it by standard.

Table3 : Concentration of heavy metals in case study (mg/kg)

Ni	Cr	station
0.502	1.06	1
0.186	0.483	2
0.151	0.326	3
0.224	0.436	4
0.221	0.467	5
0.253	0.525	6
0.196	0.39	7
0.578	1.11	8
0.138	0.288	9
0.214	0.441	10
0.266	0.552	average

So, It should be noted that the region studied is not polluted to these elements (Possibly a minor amount of these elements had already been penetrated in to soil by anthropogenic activities

In order to compare the elements concentration and the amount of elements in natural phases and assurance from the result of the study of amount of concentration of these elements with their mean on the layer of land is being observed in table 4.

Table4: The result of research with average concentration and severity of the shell element in soils of Kheirbad

element	average	Lee&yao1970 (mg/kg)	Taylor 1964 (mg/kg)	AlinaKabata 2007 (mg/kg)
Cr	0.552	110	100	100
Ni	0.266	89	75	20

As stated from the table, the mean of these two elements is even less than the amount of concentration in the shell.

And it is not possible to say that the region polluted to these elements. Satastics show that the mean amount of concentration of all heavy metals in comparison with the mean amount of shell is different.

CONCLUSION

According to the results of study and comparison of the concentration of elements by standard and also the mean of lager, it should be stated that soils around the city are not polluted to these elements and we can not imagine that this region is not polluted to these to heavy metals.

Apart from this fact that all of hard metals are existed naturally in rocks and soil by erosion and can go in to water by contact with environment and soil and send to live creatures and plants. As seen

from the results of study, the presence of these metals in anthropogenic portion is more than lithogenous portions and it can't give a very important role to agricultural soil around industrial complex.

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