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Abstract

This work included measuring the concentrations of uranium element in 32 locations of sediments samples were collected from the bottom of the central and southern of shatt al-Arab in Basrah Governorate by using ICP-MS technology, which are found that the uranium concentrations ranged between 1ppm In front of Salhia River and 2ppm in Abu Flous Port located on the shores of Shatt Al-Arab. Measured samples of sediments taken from several locations in central and southern Shatt al-Arab indicate that the uranium concentration is less than 100 ppm, a concentration that characterizes the quality of waste and burdens, rather than mining reserves. This study reveals 32 samples containing uranium concentration within internationally permitted limits. The present results have shown that the uranium concentrations in the studied sediments samples are less than the allowed value (11.7 ppm) recommended by UNSCEAR, 1993.

Keywords: Uranium, sediment samples, ICP-MS, Basrah Governorates

1. INTRODUCTION

Uranium in the Earth's crust is widely distributed element, and it can be obtained naturally in various places in soil, rocks and sand, but with a concentration that varies from place to place. The uranium represented by the symbol (U) is a chemical and radioactive element, which is a heavy metal with a very high density 18.95g/cm3, 1.7 times higher than the density of lead 11.35g /cm3. The melting point of metallic uranium is high (1132 ° C) while the boiling point (4131 ° C) is similar to most steel in tensile strength and is a very chemically reactive substance [1]. The mass concentrations of uranium are 99.276% for ^{238}U , 0.718% for ^{235}U and 0.0056% for ^{234}U [2-4].

The presence of natural uranium in the earth's crust constitutes about 2 mg Per kilogram (range 0.1 to 20 mg per kilogram). Uranium has harmful effects on humans the health. The main health effect of uranium includes not only radioactive danger but rather its chemical toxicity [5-8]. Chemical toxicity is believed to resemble lead. Abundance of uranium and its isotopes It has been widely used to explore geochemical and physical processes in various fields of the Earth Science [9]. Low concentrations of uranium ([U]) and low

abundance 234 In most natural samples, However, many applications are restricted due to measurement restrictions. Its alpha spectroscopy methods Used to measure uranium radionuclides for five decades [10,11], But the requirements for large sample size are the emergence of significantly improved production techniques and analytical accuracy that have driven alpha computation techniques toward aging.

2. EXPERIMENTAL TECHNIQUE

In the central and southern part of the Shatt al-Arab river, sediment samples were collected from 32 sites. Then measurements of sediment samples were made using ICP-MS method [12].ICP-MS is an analytical technique that are used for elemental determinations. This technology was introduced commercially in 1983 and was able to obtain general acceptance in many types of laboratories. Geochemical analytical laboratories are among the first to use ICP-MS and the reason for this is that this technology has superior detection capabilities, especially for rare earth elements (REEs). Currently, multiple trace elements can be simultaneously detected using ICP-MS[13]. Although it has powerful devices, the use of inductively coupled plasma mass spectrometry to the induction is constrained by the lack of inherent coverage of all elements in a single analysis. In general, current methods using ICP-MS only evaluated only a limited number of seven items[14] to 20 [15]. This is frequently attributable to abundance of different elements in the human body and the dynamic range of isotopes[16].

3. Collection of soil samples

Soil samples are taken from the sediments of the central and southern part of the Shatt al-Arab River in Basra Governorate. The study included 32 different sites. And then the samples were dried in an oven with a temperature of 70 degrees Celsius and then the samples were ground and sifted with a diameter of 75 micrometer.

This research aims to assess the risks of uranium in sediments in the central and southern parts of the Shatt al-Arab River, southern Basrah indicated by this map in the Fig. 1.

Fig.1*. The Shatt al-Arab pathway in Basrah Governorate, station number (s) indicates sampling locations*

4. RESULTS AND DISCUSSION

Table1 includes the results obtained for the concentration of uranium in sediments of the central and southern part of the Shatt al-Arab in Basrah Governorate, southern Iraq. Results are categorized for 32 sites from S1 to S32. It is clear from the table that the lowest concentration of uranium is In front of Salhia River, where it reaches 1ppm, while the highest concentration obtained was 2ppm near the Abu flus port on the banks of the Shatt al-Arab. It was also noted that 14 of the samples contain uranium concentrations ranging from 1ppm to 1.7ppm while 18 samples contain a concentration between 1.75ppm and 2ppm. The maximum level for pollutants (MCL) for uranium is set at about 30 mg/L by the US Environmental Protection Agency (EPA) [1]. It is important to monitor uranium concentrations in different parts of the environment. Normally, uranium values are detected in environmental samples using inductive coupled plasma atomic emission spectroscopy (ICP-AES) technology and the alpha. However, Based on the relatively low sensitivity of these technologies to uranium, obtaining reliable results requires long measurement times and a large number of samples in general. Also, the accuracy of the alpha spectrometer allows only a rough estimate of uranium levels. Therefore, it can be said that one of the best alternatives to these methods mentioned above is the mass spectrometer, which is characterized by accuracy as well as high sensitivity[12,17]. Fig. 2 shows a comparison of uranium concentrations between stations.

Table 1. *Uranium concentration in sediments at various locations in central and southern Shatt al-Arab using ICP-MS*

No	No of site	Location of samples	Concentration of uranium in sediment of Shatt-AL-Arab in(ppm)
1	S1	Raas al-Besha	1.8
2	S2	Faw 1	1.8
3	S3	Faw 2	1.75
4	S4	Alnaghaa Al-oula	1.7
5	S5	Al-naghaa AL- thanea	1.8
6	S6	Coast Guard Command	1.8
7	S7	meghraq	1.6
8	S8	Maamer1	1.7
9	S9	Maamer2	1.8
10	S10	Al-dora1	1.52
11	S11	Al-dora 2	1.8
12	S12	Al-fadaghea	1.8
13	S13	Al-dwaser	1.7
14	S14	Kout bander	1.7
15	S15	Al-doweb	1.8
16	S16	Al-waslea	1.8
17	S17	Near the Abadan refinery 1	1.8
18	S18	Near the Abadan refinery 2	1.8
19	S19	Sehan1	1.6
20	S20	Sehan 2	1.8
21	S21	Near the Shaheeniyeh River	1.7
22	S22	South of Umm Al-Rasas Island	1.8
23	S23	The middle of Umm Al-Rasas Island	1.8

24	S24	North of Umm Al-Rasas Island	1.4
25	S25	Between om al resas and abofloos	1.8
26	S26	Fertilizer factory	1.3
27	S27	Abu Flus Port	2
28	S28	Near Al-Hawamid River	1.8
29	S29	Near Al-Khora River	1.5
30	S30	In front of Salhia River	1
31	S31	In front of Alfie	1.7
32	S32	Al-maqal port	1.5

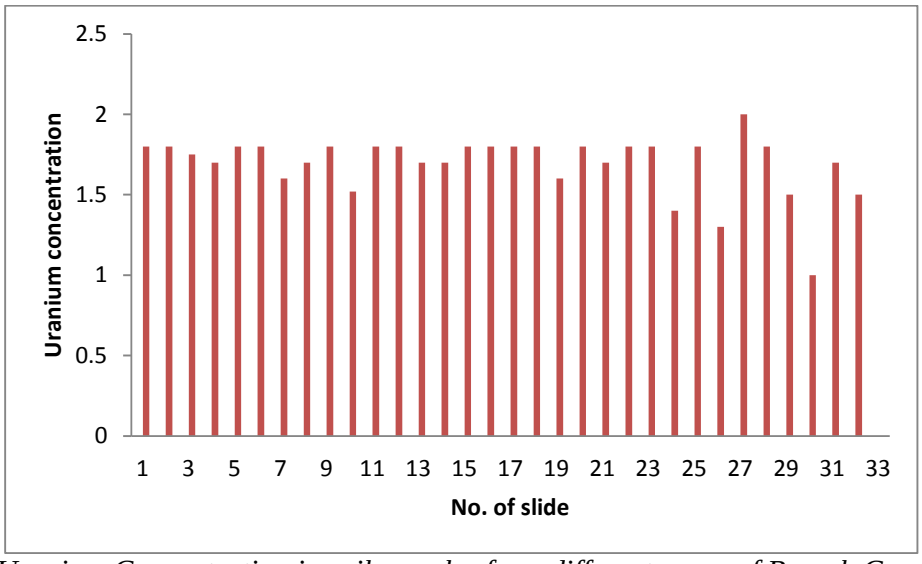

Fig. 2. *Uranium Concentration in soil samples from different areas of Basrah Governorate analysis by ICP- MS*

5. CONCLUSION

This study focused on measuring the concentration of uranium in sediments in the waters of the central and southern part of the Shatt al-Arab. . It is important to know the concentrations of radioactive elements or possessing toxicity that may be present in the Shatt al-Arab, because it passes through Basrah Governorate, which many of its residents depend on for domestic and agricultural uses, and sometimes filtered drinking water on the water sources coming from the Shatt al-Arab, as well as fishing from the Shatt The Arabs. Therefore, the presence of high concentrations of uranium may pose a danger to humans and the environment close to them. Thus, the concerned authorities should work

continuously to evaluate the concentrations of various elements, including uranium, in the waters and sediments of the Shatt al-Arab.

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