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Distribution of total Mercury in the water and sediments of the Shatt al Arab area.

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Abstract

The study conducted on the Shatt al-Arab area from Qurna district north of Basrah to the Faw city in the south. The region is characterized by a number of sources of pollution such as power stations and paper factory as well as Basrah, city densely populated. The Objective of the present work is to appreciate the concentration levels of mercury in water, sediment and plants in Shatt al-Arab area. Samples have been digest and analyzed to determine mercury using spectrofluorometry adopting the method of Mudakavi which modified by Al-Imarah et al [16]. The station No. 3 showed a higher pollution by mercury in the following order $St3 > St4 > St2 > St5 > St1$ Also the result in samples of sediment was high while the samples taken from the same area. The study also showed that the biggest cause of mercury pollution is paper the factory, Power plant and Sub-rivers.

Introduction

Shatt al-Arab is one of the most important sources of fresh water flowing in the Arabian Gulf, which consists of the confluence of the Tigris and Euphrates rivers in the Qurna city north of Basra and being a distance of 195 km downstream in the Gulf. Shatt al-Arab width ranges between 400 meters - 2 km, the depths are between 8 - 15 meters and it is affected by the movement of tides along its course. [1]. It water is exposed to pollution from various sources, which leads to a reduction in the validity of this water for different human uses [2]. Basra is the most polluted city in Iraq, being an industrial, agricultural, commercial and industrial, the city has vast economic and human resources, as well as



being the scene of three wars that took place during the past three decades not to mention is neglect and poor services [1,2]. This pollution has impose negative impacts on human life, living organisms and economic activities in the city in general [3]. Heavy metals are the largest contaminants in the environment, as their continued emission from their various sources (natural and industrial) increases their concentration in the atmosphere [4]. Heavy elements include a large variety of which is necessary for vital activities such as iron and copper, including what is toxic, such as mercury, lead, cadmium and nickel, which is highly toxic to the living organism [5]. Heavy metals are characterized by high density of up to 5 g/cm^3 [6]. Mercury is a toxic substance which has no known function in human biochemistry or physiology and does not occur naturally in living organisms [7]. Mercury, one of the most toxic elements in the world, represents a major toxicity to microorganism and environment even in low concentration [8]. Mercury released into the environment can change between organic and inorganic forms [9]. High levels of exposure may cause birth defects, permanent brain or kidney damage, and death [10]. It is one of the most toxic elements in the world, represents a major toxicity to microorganism and environment even in low concentration [11]. Mercury reaches humans through polluted food, whether it is fish, vegetables or fruit sprayed with pesticides and negatively affects animals and birds [12]. It has been found to prevent generations of birds eating mercury-contaminated grains, making eggs more fragile and easy to break, causing inorganic poisoning of mercury [13]. Periodontal or minor psychological changes, along with automatic abortion and congenital malformations, cause similar mercury damage to the brain and central nervous system [14]. The EPA has identified a limit to the content of drinking water from mercury and has two parts of mercury per billion parts (ppb 2) [15]. The Food and Drug Administration (FDA) has also set the maximum allowable rate of one part of methyl mercury per million parts of marine foods 1 ppm OSHA also identified organic mercury limits in air at the workplace where 0.1 mg of organic mercury per cubic meter of air [16].

Materials and Method

The study was carried out along the Shatt al-Arab area, from Al-Qarnah district to the south of Al-Faw region, where the samples were collected from five study stations. The water samples were collected at a depth of 30 cm using polyethylene containers of 1 liter, while the sediments were collected using the collector sampler (grab sampler). Were bought from fishermen and farmers from the same area and plants where fresh endings were taken by hand and washed with river water and placed in plastic bags, transported to the laboratory in a refrigerated box and placed in the refrigerator until analysis. The solubility was extracted in water (Riely & Taylor, 1968) [17]. Take 25 ml of water and be treated with 15 ml of concentrated hydrochloric acid and 5 ml of concentrated nitric acid, then heat the sample until the vapors are finished and the sample is dried. Then we cool down the Baker and its contents are dissolved by adding 5 ml of concentrated hydrochloric acid and 50 ml of distilled water and 2 ml EDTA, then add 5 ml from buffer solution then add 2 ml from (1-10 phenanthroline hydrate), 1 ml gelatin and 1 ml eosin dye with well mixed. After that complete the mixing by distilling water then take spectrofluorophotometr at 555 nm [18]. Then step 1 returned with a specific weight of the solid substance (sediments, fish and plants) after drying and grinding [19].

RESULTS AND DISCUSSION

Concentrations of total mercury in samples of water, sediment, fish and some plants

Table No. 1. Concentration of total mercury in water, sediment and some plants

No. of sample	Water ppb	Sediment ppb	Fish ppb	Plants ppb
1	0.02	0.26	0.7	0.11
2	0.22	0.56	0.14	0.16
3	0.51	0.70	0.25	0.25
4	0.34	0.54	--	0.18
5	0.13	0.65	0.13	--



Map showing the study area

Table 1 shows that the highest concentration of mercury is in station 3, probably due to the presence of a number of contaminated side rivers in this area. Sediment samples also showed a clear increase in mercury concentration while in water it was much lower. The concentration of mercury in sediment more than water, fish and plants. From table 1 All models contain mercury more than the limit and this is a threat to human health index.

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