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Elemental analysis of rivers, marshes and ground water in Thi Qar region, Iraq

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The elemental analysis of the samples collected from marshes water, river water and ground water in Thi Qar region of Iraq are done using the Energy-dispersive X-ray fluorescence technique (EDXRF). The water samples are collected from Al-Hammar marshes, Central marshes, Tigris river and Euphrates river. The residues obtained after drying ground water are analyzed using the EDXRF spectrometer is consisting of 42Mo-anode X-ray tube equipped with selective absorbers as an excitation source and a Si (Li) detector. The elements observed in various samples are 20Ca, 26Fe, 29Cu, 30Zn, 33As, 35Br, 38Sr, 82Pb and 92U. The pH value of water samples from various locations of marshes, rivers and ground waters are in general exceeding ~ 7.9 value, which indicate the general alkaline nature of waters. The average value of leftover residue obtained after drying the water samples from Al-Hammar marshes is ~ 4.8 g/L, which is about twice of that of Central marshes. The average value of total residue obtained after drying the water samples from Euphrates river is ~ 3 g/L, which is about four times of that obtained from Tigris river water. The Electrical Conductivity (EC) values measurements for these samples also infer the similar conclusions. The 20Ca concentration in Tigris and Euphrates river waters is similar to that observed in Central marshes and is about half of the value in Al-Hammar marshes. The 20Ca concentration in Tigris river water constitutes $\sim 6\%$ of the leftover residue and that in Euphrates river water constitutes $\sim 2.3\%$ of the total residue, a value similar to that observed in water from the marshes. The 38Sr concentrations in the Tigris and Euphrates river waters are in the range 1390–1863 $\mu\text{g/L}$ and 2519–5691 $\mu\text{g/L}$, respectively. The 38Sr concentration in Euphrates river is similar to that observed in the marshes water and that in Tigris river is lower by a factor of 8. In Al-Hammar marshes, 82Pb is observed with concentration $\sim 60\mu\text{g/L}$ and the concentration of 34As is estimated to be in general below 5 $\mu\text{g/L}$. In Central marshes, 28Ni and 29Cu are also observed with average concentration of 40 and 28 $\mu\text{g/L}$, respectively. Average value of concentration of the trace element 92U in both the marshes is below 10 $\mu\text{g/L}$. The 35Br concentration in various samples collected from Al-Hammar marshes (average value = 1108 $\mu\text{g/L}$) are in general higher compared to those from Central marshes (average value = 328 $\mu\text{g/L}$). The 35Br concentration in various samples collected from Euphrates river (average value = 676 $\mu\text{g/L}$) are considerably higher compared to those from Tigris river (average value = 47 $\mu\text{g/L}$). The presence of significantly high 35Br concentration in the river water is a matter of concern in case it is used for drinking purpose after treatment. The normally present bromide anions can generate bromate anions in the water purification based on ozonation or chlorination or ultra violet radiation. In case the Br concentration of water is very high, it is likely that bromate ions will also be formed to significant extent. The water from Tigris river is safe for drinking water supply schemes after treatment and Euphrates river is not safe this purpose due to high bromine content.

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