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ICP/OES techniques to measure boron concentrations in water samples collected in northern Basrah governorate, Iraq

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Abstract

For both vegetation and human beings, boron is not a uniformly scattered, all-embracing essential micronutrient. The reason for this study is to determine Boron concentrations, 10B5, in Iraq in northern Basrah. The measurements were carried out using ICP-OES methods by analysis of the water samples collected in 41 different locations. This study showed that the concentration of 0.26 mg/L (Al -Alwa Al Qurnah) to 1.7 mg/L (Al Huwair Al Sagher). The findings of the study will be given, and they will be compared to other papers. These results might be used to introduce a novel concept additional

contribution to the preservation of radioactive contaminant-free water samples required by people if an event of pollution occurs and to implement requirements for water quality for associated organizations. In addition, the survey found that 41 samples of water had more boron than levels detected. This is because of increased surface-water fluidity outside the root level via monsoon rain. There will therefore be a chance of acute boron contamination soon.

Keywords: Northern Basrah Governorate; Element of boron; Water Samples; ICP-OES Technique.

1. Introduction

Element of boron is a not metallic ingredient in the group IIIA periodic table. There was +3 oxidation. There is a 5 nuclear number and 10.81 nuclear weight. It consists of two continuous isotopes: 10B (19.8%) and 11B (80.2%)[1]. It's an element that is natural in rocks, water, and soil. The crust of the Earth's content is evaluated by about <10 ppm, and by about 100 ppm in boron-rich parts[2]. It does not exist on Earth in a basic form but is united in borax, boric acid, turmaline, colemanite, kernite, borate, and unexcited [3-6]. The environment used for moderately disinfection products, make-up, and pharmaceuticals may contain boric acid, borates, and per borate[8]. Boric acid and borate are used in the production of glass, soap, and cleaning powder, flame retardants and nuclear neutron absorbers can result in environmental toxicity. In agriculture, pesticides, and herbicides, fertilizers are used because their use is not carcinogenic to mammals and they are resistant to insects in comparison with organic pesticides[9,10]. In metamorphic, and sedimentary rocks, boron is found as borosilicate, which is resistant to but not vegetation available. Fig. 1 contains certain boron-based chemical compounds.

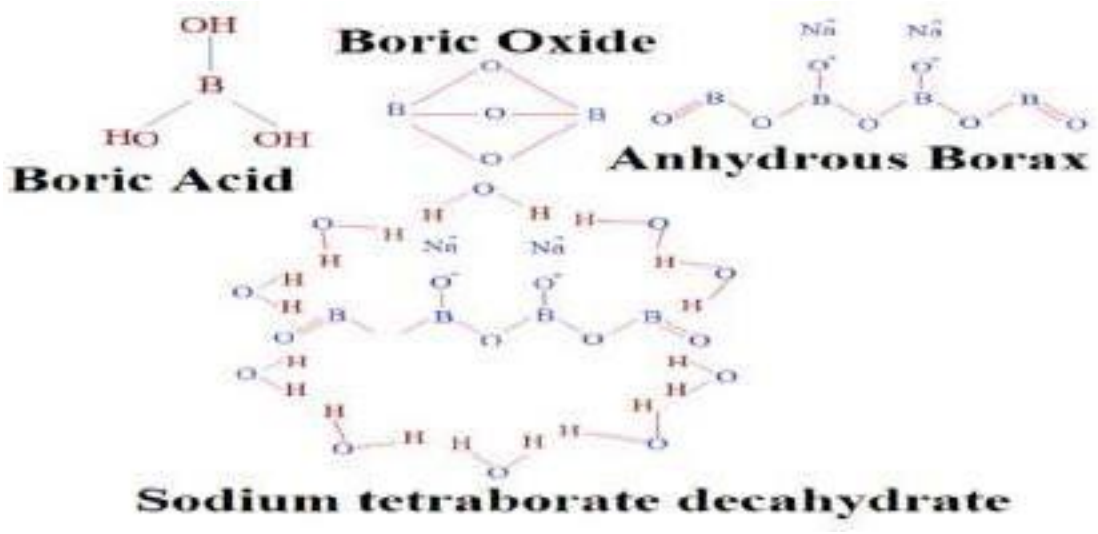

Fig. 1 certain boron-based chemical compounds [20].

No dissolution of the primary boron in water can occur [12]. In borax, there isn't a boiling point (dehydrate). At 75°C Borax falls. 5H2O is missing at 100°C and 9H2O is missing at 150°C. At 320°C it becomes anhydrous. The melting point is greater than 700°C for anhydrous borax and is decreased to 1575°C[11]. This research aims to analyze assess the hazards of water samples and to understand the intricate responses and interactions with water motions. Samples for water from northern Basrah Governorate regions in southern Iraq have been taken under this study, see Fig. 2.

Fig. 2 The figure showed the locations samples taken from Northern Basrah Governorate.

2. Material and Method

Water samples were taken from 41 stations in the Northern Basrah Governorate and were collected in April 2021. The measurement of Boron concentration in water samples by the (ICP/OES) method[13] was performed: The (ICP-OES) is an effective instrument to determine how various samples contain metals. Samples will then be injected in radiofrequency induced argon plasma using several nebulation devices or methods for injecting samples.

The sample nebula which reaches the plasma is swiftly dried, evaporated, and driven by high temperatures. The radial or axial configuration of the plasma atomic emission is collected by a wavelength selection tool with a mirror or lens and photographed on the inside slit. A simple combination of monochromator /photomultiplier (PMT) can be cost-effectively measured for one element and simultaneous multifactor detections of up to 30 elements can be carried out with the combination of polychrome and a panel detector. In terms of sample volume and sensitivity, the analytical performances of those systems are competitive with most inorganic analyses techniques. The water samples were sampled by ICP/OES method and estimated.

3. Results and Discussions

Table 1 shows water samples of Boron concentration from some areas south of Iraq in northern Basrah. Water samples are described in this study. In addition to Figure 3, Table 1 showed that boron concentrations in water were somewhat higher than most of the public tap water and surface water washer in the governorate for measuring boron concentrations in water. The results of 41 samples of water are classified into 36 locations and are shown in Figure 3 in the North Basrah governorate region from W1 to W41. The results indicated the maximum boron concentration (1.7 mg /L) in the (Al Huwair Al Sagher) town and the lowest boron concentration in (Al Alwa Al Qurnah) region (0.26 mg /L). Boron values (0.3-0.5) mg/L were managed by WHO in 1993 and ranked first in 1998. Moreover, the 0.5 mg/L parameters are agreed on in 2000 until information from further studies which may change the current view of the toxicity of boron or boron-treatment technology can be obtained [14,15]. For the quality of the water used for drinking the European Union stated in 1998 that boron should be 1.0 mg/L [16,17].

In water samples, a higher amount of boron may be due to the water-boron leaching, as in the places with acidic water understudy the maximum mobile boron level is present [18,19]. In addition, wastewater irrigation is available through the regular use of boron compounds as fertilizers, insecticides, and herbicides. Therefore, boron leaching is possible underwater.

Table 1 Boron water sample concentration in northern Basrah Governorate water by ICP -OES.

No of site	Location of samples	The concentration of boron in water in mg /L
W1	Al Traba	**1.02**
W2	Saleh River	**0.77**
W3	Center Al Madina	**0.9**
W4	Anter River	**0.86**
W5	Al Huwair	**0.73**
W6	Al Ahwar	**1.49**
W7	Al Sura	**0.91**
W8	Al Neherat	**0.28**
W9	Al Khas	**0.74**
W10	AL Housh	**0.93**
W11	Abu Ghraib	**0.77**
W12	Majnon	**0.54**
W13	Al Alwa Al Qurnah	**0.26**
W14	Al Awjan	**0.75**
W15	Mzieraa	**0.27**
W16	Al Basha River	**0.86**
W17	Al Sharish	**0.37**
W18	Ahmed bin Ali	**0.75**
W19	Al Alwa Al Huwair	**0.76**
W20	Al Aghmieg	**0.36**
W21	Talhah	**0.55**
W22	Um Al Shuwayj	**0.99**
W23	Al Shafi Seid Saleh	**0.43**
W24	Al Ez River	**0.69**
W25	Al Naem	**0.38**
W26	Adam’s tree	**0.27**
W27	Al Huwair Al Sagher	**1.7**

W28	**Al Awja**	**0.67**
W29	Huwair Al Sada	**0.77**
W30	Al Seda	**0.89**
W31	Al Fatheia	**0.92**
W32	Al Samaid	**1.53**
W33	Al Ardhania	**0.91**
W34	Oil Street	**1.51**
W35	Khmesa	**0.93**
W36	Al Fesla	**0.91**
W37	AL Housh (tap water)	**0.6**
W38	AlAlwa AlQurnah (tap water)	**0.26**
W39	Al Huwair (tap water)	**0.6**
W40	Al Sharish (tap water)	**0.39**
W41	AlShafi Seid Saleh(tap water)	**0.41**

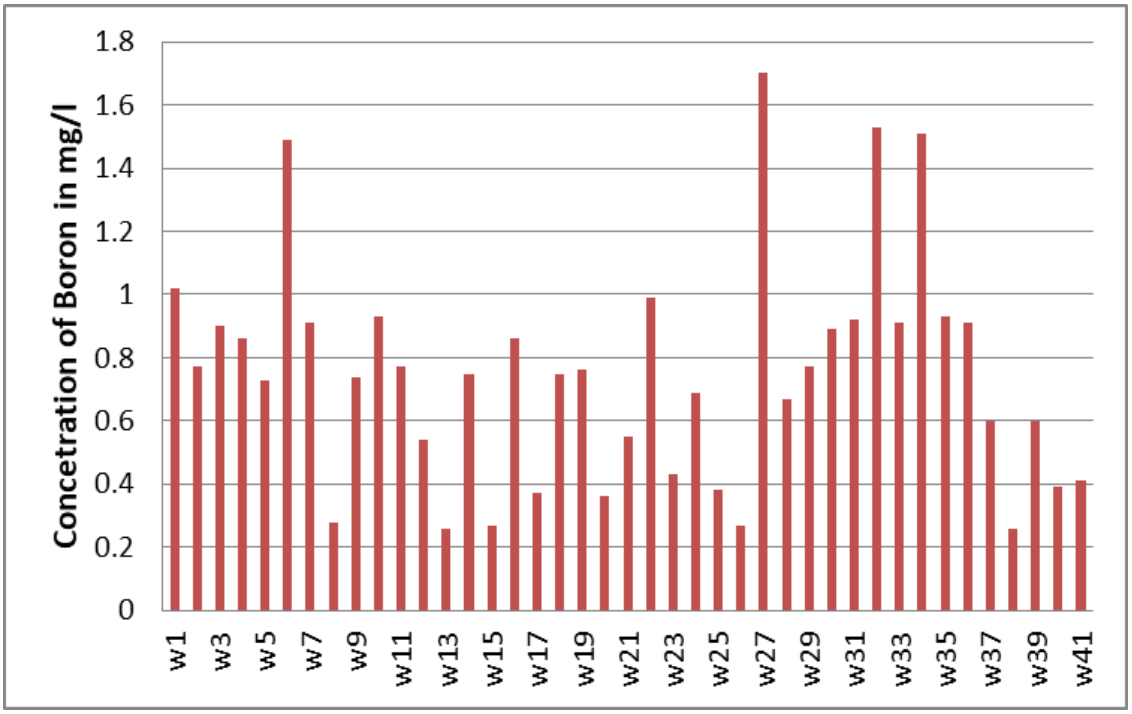

Figure 3 Boron Water sample concentration in northern Basrah Governorate by ICP -OES.

4. Conclusions

This document is the first one for boron concentration measurement of water sources in the area of the Northern Basrah Governorate. The study generally found that samples of water are highly mineralized in the areas examined. The right to use samples of safe water is essential to human health and is essential to public health. Good quality water samples have been maintained with the suspended isolation Water-sedimented soil and then treating the water. Raw water resources are likely to be maintained through control of pollution measures that prevent harmful substances from entering the water inflow and good organizational practices at the water bottom. There is a lot of information on the problem of the integrity of municipal water in recent years. People, especially those who use water, water from their faucets should be more careful. Accordingly, almost 20% of private pollutants are included in a U.S. Geological Survey (USGS), with 23% having a high level of potential health concerns. Private water samples are excluded from potable water regulations of the Environmental Protection Agency (EPA),

which apply more than 90 contaminants are legally restricted. (Potable water restrictions exist in certain states and local government entities). It is the responsibility to ensure safety and water quality before the water reaches the tap. It is the responsibility of the water owner. The Centers for Disease Control and Prevention (CDC) welcome the fact that owners check water once a year. Lastly, the boron concentration of water samples examined was between 0.26 mg/l and 1.7 mg/l. The current value studied for other countries in the world is less than most of the values indicated. The estimates perceived are below the recommended 5 mg/l IMAC limit. Health risks related to boron, therefore, are rather negligible in water samples from the Northern Basrah Governorates. Boron may exist in many nations worldwide, with studies from 0.5 to 1.5 mg/l in Italy and Spain. Other countries of the EU, such as the Netherlands and the UK, are 0.6 mg/l. The character of the soil, particularly those that have been mineralized or have been exposed to carbonated water, is due to the high concentration of boron.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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