

Article

Determine Phesochemical Properties of Some Bottled Drinking Water Brands

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Abstract: The current study was conducted in Al-Hilla city on 10 factories that produce bottled water. Physical and chemical tests were conducted on the studied samples. the PH values ranged between (7.2-8). The electrical conductivity was (99-153) $\mu\text{S}/\text{cm}$ and the nitrate values were (0.1-0.9) ppm. The values of Total hardness ranged between (20-84) ppm, while the elements of potassium and sodium ranged between (0.2-2.9) ppm, (1.2-13) ppm, respectively. The turbidity values ranged between (0.52-1.5) NTU and The TDS values ranged between (75-102) ppm, All physical and chemical tests were within the parameters recommended by the World Health Organization (WQI) and the Iraqi Ministry of Health.

Keywords: bottled drinking water, Hilla city, Al-Waha, Aquafina.

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1. Introduction

Water is the most valuable resource of all, because it is essential for the existence of all living things. Water is a natural resource that has been adapted for economic growth and social well-being, whether as a drink, food, cleanliness, or transportation. Energy sources and basic materials [1]. Drinking water pollution has been a worldwide issue, and it demands particular attention since it is very fragile and significantly endangered through human activity. Fresh water is a beneficial and vital resource that is required for home, industrial, and agricultural operations [2]. Fresh water resources are becoming an increasingly restricting concern, with around one billion people globally suffering from a shortage of clean drinking water [3]. Drinking water may be polluted at the source, distribution line, or home level, and contaminated water causes a variety of water-borne disorders. According to statistics from the World Health Organization, waterborne and water-related diseases cause 80% of all illnesses and disorders globally [4]. Consumer awareness of bottled water as a healthier alternative to drinking water has recently resulted in a major growth in its usage across the globe [5]. Given the widespread use of bottled water, it is reasonable to question the long-term influence of water with varied chemical compositions on human health [6]. According to the World Health Organization, 89% of the global population receives drinking water from improved sources [7]. Bottled drinking water It has shown consistent global expansion over the last 30 years and is today the most dynamic sector in the whole food and beverage industry. (Globally, consumption rose by 12%(8) worldwide. As the population grows, so does the need for drinking water. Drinking water must be free of chemicals and microbiological pollutants, which are harmful to human health. Everyone's well-being depends on having access to safe drinking water [9]. In the interest of public health, it is necessary to examine the physical and chemical qualities, including trace element levels, of natural waterways [10].

Prepare silver nanoparticle by using *Lantana camara* leaf extract, and characterization by Uv-Spectro photometer and confirmed by FTIR and nanoparticle size software.

2. Materials and Methods

2.1 Study Area

Hilla city was chosen as a model for studying bottled water, as it is located in central Iraq and 100 km south of Baghdad. In the middle of the city of Hilla is the Shatt al-Hilla, which is one of the branches of the Euphrates River. It is considered the main water resource for various uses. 7 Iraqi commercial companies for bottled water were selected: sawa, Rawad Al-Mueen, Al-yasamin, Tishrin, Crystal, Seha, Aquafina, zina, alhulwa, alluluuh.

2.2 Collection of Samples

Water samples were collected from ten selected water factories in different locations in Hilla Governorate, starting from October 2023 to December 2023, for the purpose of conducting physical and chemical tests. The water temperature was measured directly with a mercury thermometer. The pH was measured using a pH meter. Electrical conductivity ($\mu\text{S}/\text{cm}$) and water total dissolved solids in water (mg/L) were measured using an electrical conductivity meter. [9]. Total hardness was also measured and the results were expressed in mg/L . Turbidity was measured and the results were expressed in NTU. Chlorides, potassium and sodium were measured and the results were expressed in mg/L . Nitrate concentration was also measured using an optical absorption spectrophotometer with a wavelength of 543 nm (10).

3. Result and Discussion

3.1. PH

The pH values ranged between (7.2-8), As in Figure1, with the highest value at Rawad Al-Mueen, while the lowest value was at the Seha and Wadi Mona Factory. All values of the tested samples did not exceed the Iraqi and international limits for drinking water.

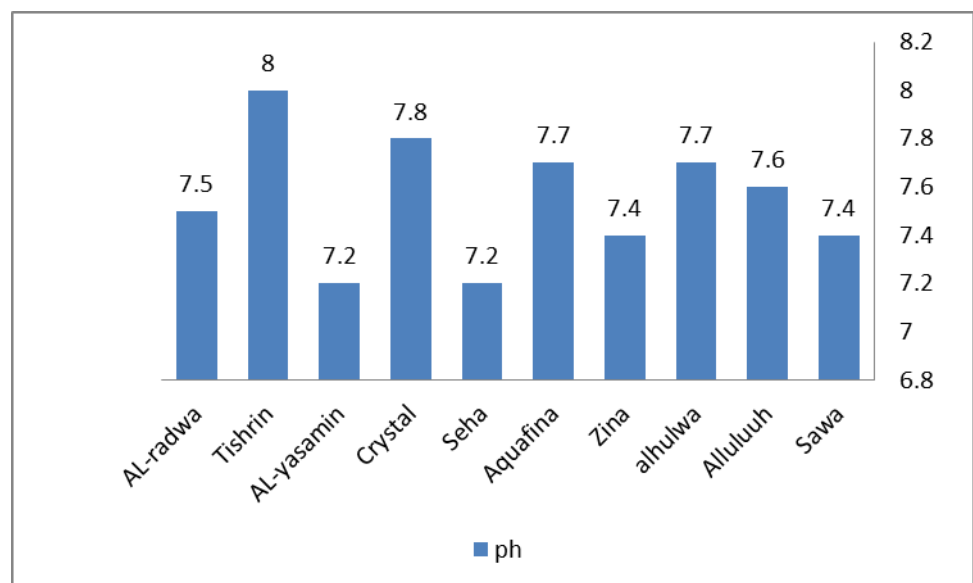


Figure1: pH values.

3.2. Total dissolved solids (TDS)

The TDS values at the tested Water samples ranged between (75-102) ppm, As shown in Figure 2, with the highest value reaching 102 ppm in the durrat AL-khaleej Factory, and the lowest value was 75 ppm in the oyoun Al-basra Factory. All TDS values for the tested samples were within the Iraqi and international limits allowed for drinking water.

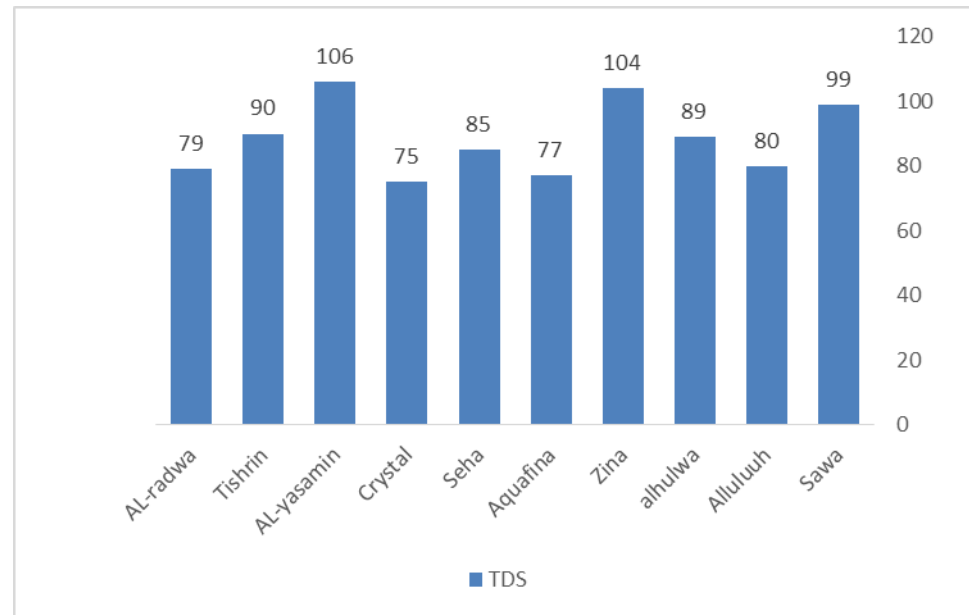


Figure (2). TDS values (ppm).

3.3. Electrical conductivity (EC)

All EC values were within the limits permitted by Iraqi Health and the World Health Organization, where EC values ranged between (99-153) $\mu\text{S}/\text{cm}$ as in Figure 3. The highest value was in the afiyat Factory and the lowest value was in the Al-waha Factory.

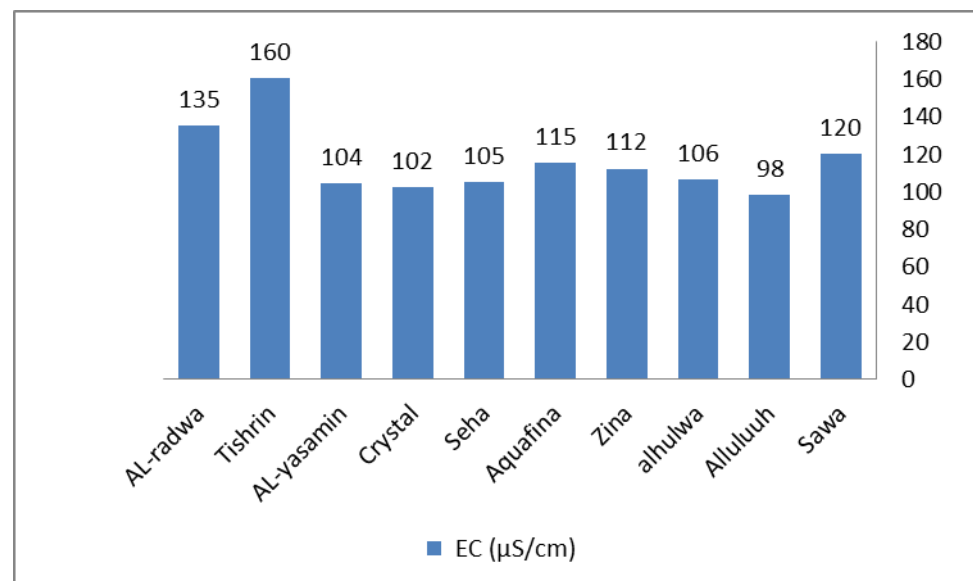


Figure (3). EC values ($\mu\text{S}/\text{cm}$).

3.4. Turbidity

The turbidity values ranged between (0.52-1.5) NTU, as shown in Figure 4. The lowest turbidity value was in the seha Factory and the highest value was in the Granada and durrat Al-khaleej Factory. All values were within the standard parameters for drinking water.

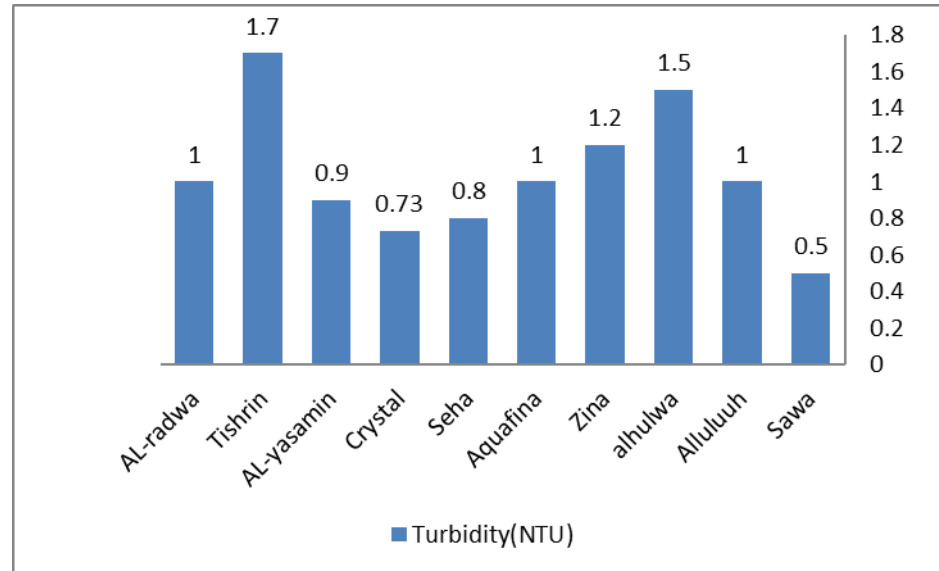


Figure (4). Turbidity values (NTU).

3.5. Potassium (K)

Figure 5 indicates that the values of potassium in the tested water samples ranged between (0.2-2.9) ppm, with the highest value reaching 2.9 ppm in the rawd al-mueen factory and the lowest value at 0.2 ppm in the Afiyat and wadi mona factory. All potassium concentrations in the samples were within the permissible limits for drinking water.

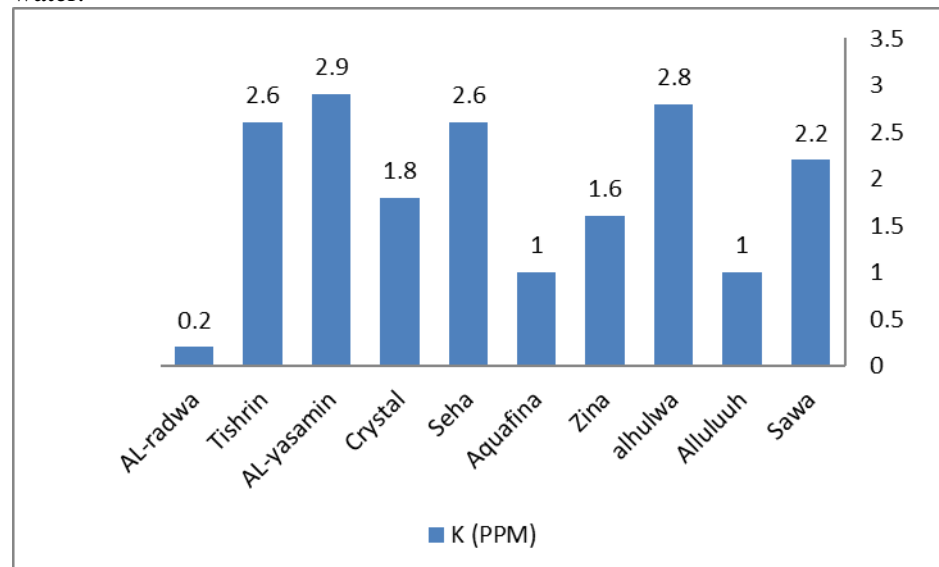


Figure (5). Potassium values (ppm).

3.6. Total hardness (TH)

The total hardness values in the tested water samples ranged between (20-84) ppm as in Figure 6, where the highest value was 84ppm in the seha factory and the lowest value was 20ppm in the aquafina factory. All total hardness values of the tested samples were within the Iraqi and international limits allowed for drinking water.

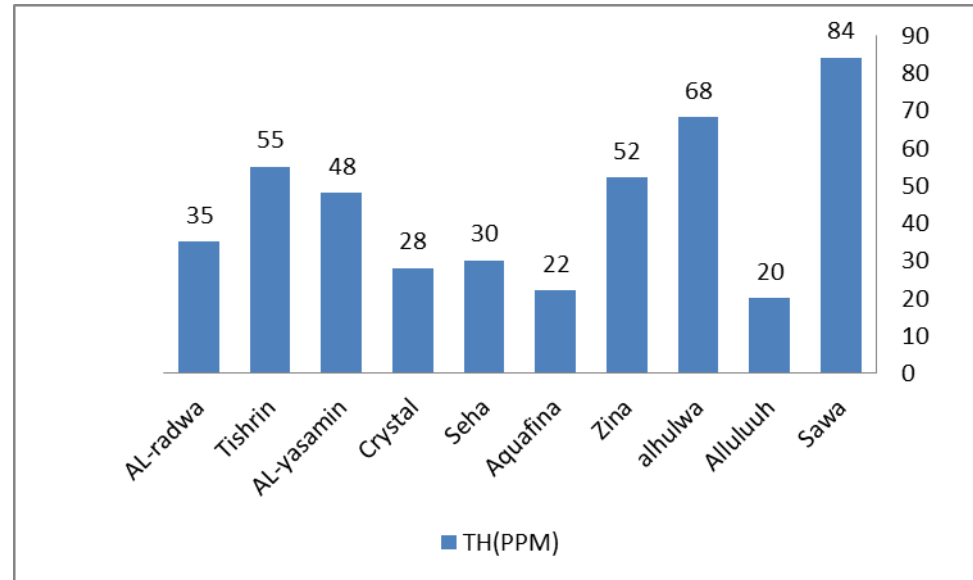


Figure (6). TH values (ppm).

3.7. Nitrate(NO₃)

All nitrate values were within the limits permitted by Iraqi Health and the World Health Organization, where nitrate values ranged between (0.1-0.9) ppm as in Figure 7. The highest value was in the durrat AL-khaleej factory and the lowest value was in the AL- waha factory.

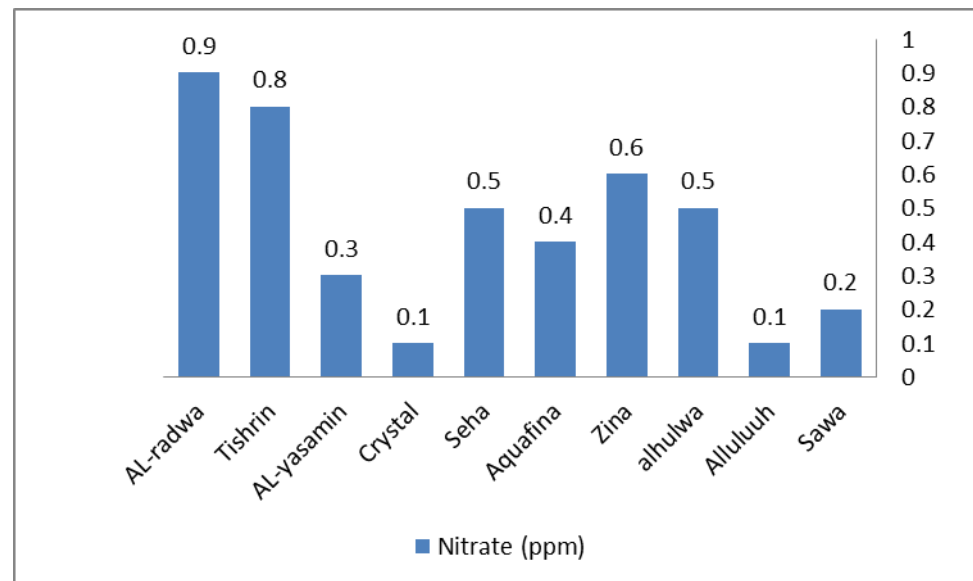


Figure (7). No₃ values (ppm)

4. Conclusions

The current study showed that all physical and chemical tests conducted on the study samples did not exceed international specifications for drinking water. The difference in the results of most of the chemical tests for the water studied is due to the storage, transportation process, the difference in methods and techniques used in the water treatment process and the source of treated water.

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