Study the physical properties of drinking water in the city of Kut

Faisal Idan - University of Wasit - Faculty of Science - Physics Department
Ahmed Abed Anber - University of Wasit - Faculty of Science - Physics Department
Yasir Khalaf Mohammad - Tikrit University - Dentistry College - Science basic Department
Muhammed Gomaa Taame - University of Wasit - Faculty of Science - Physics Department

Abstract

In this work, the study was studied: drinking water and salts, (electrical and turbidity). The quality of drinking water withdrawn from the distribution networks of drinking water was examined in several areas of Kut city: (ALHORA, ALKHAAT, ALKHACHIA, AIZAHRAA, DHAMUK, ALMASHROW, ALSHARQIA, ANWAR ALSADR, TAMWZ and ALJAMEA DISTRICT), and the Locations were selected for sampling, from December 2015 to April 2016. The results of the study showed that it exceeded most of the studied values of the global and Iraqi standard determinants.

Keywords: Turbidity - Electrical Conductivity - Laboratory conductivity meter - Nevillemetric - Formazine
changes in water quality. A sudden change in turbidity can indicate an additional source of contamination problems (organic, organic or inorganic) or signal in the water treatment process.

**Introduction**

In this study, the importance of the subject chosen which it seems to have a peaceful and long human existence, even with everything to make life easier. One of the main problems is water quality, very necessary for our existence, the existence of the human race. It is difficult to overestimate the importance of clean water to humans. There are different ways to purify the water to get it to normal. It affects our daily lives, and affects the health of our bodies, so definitely deserves our attention from this study.

**The Nephelometric turbidity :-**

The nephelometric turbidity is monitored to obtain the degree of light reflection of the suspended alien particles in the water. Photocolorimeters and nephelometers used to determine the concentration of substances in solutions, and to determine the density of a number of micro-microbes in solutions. The photocolorimeter acts on the basis of the change in light flux density when passing through the solution by thickness of the layer, the degree of coloring and concentration. An important indicator of water quality used for almost any purpose is the presence of mechanical impurities - suspended solids, slime particles, mud, algae, other microorganisms and other fine particles. The permissible amount of outstanding material varies as wide as possible maintenance. The suspended solids in the water interfere with the transmission of light through
7027 standard. According to this standard, the unit of turbidity measurement is FNU. The US Environmental Protection Agency (EPA) and the World Health Organization (WHO), NTU turbidity measurement unit.(7)

The relationship between the basic units of disturbance follows:

1 FTU (EMF) = 1 = 1 FNU NTU

WHO recommends turbidity less than (5 NTU).

Most modern turbidity measures a 90 degree scattering angle. These devices are called a nephelometric scale or a nephelometer, to show the difference between each of the traditional turbidity measurement that determines the ratio between the amount of light transmitted and its absorption. Due to the sensitivity, accuracy and applicability of a wide range of sizes and particle concentrations the nephelometer has been demonstrated in the standard method as the preferred instrument for determining water turbidity. The modern turbid scale must determine the turbidity of very high very low values in a wide range of samples with different particle size and composition. The ability to determine the device turbidity is widely based on the sample water and water creates a quantitative characteristic called turbid. The turbidity can be seen as an attribute of relative clarity of water.

Measurement of turbidity - Measurement of light scattering of suspended particles. Increased turbidity as rain, floods and snow melt usually, the level of winter turbidity in reservoirs, the lowest level, the highest level in the spring and during the summer rainy season.(7)

The turbidity is measured by light measurement (turbidity measurement - to lighten the transmitted light or nephelometrically - light dispersion in reflected light), and visually - through a 10-12 cm turbidity column in the laboratory mutnomernoy length. The measurement result is expressed in amalgam / cream 3 using the primary standard clay of kaolin or EM / cream 3 (turbidity units in cream 3) while using the primary formazine suspension standard. The latter unit is also called the Turbine Formazine Units (FTU) or FTU Western Terminology (Formazine Turbidity Unit).

1 ME1 1 EMF == FTU / 3 dcm

In recent years, the method of measuring light has been established around the world main to measure the turbidity formazine, as shown in ISO
suspended in water will scatter the beam of light focused on them. The scattered light is then measured at different angles of the incident light path. This is now accepted as a more accurate measure of turbidity. To measure the turbidity in this way use a nevelometer scale, such as the 2020we Lamot. Neville is the Greek word "cloud"; Thus, I mean Nevelllemetric "Measuring Clouds". Most of the remote measurements measure the scattered light at 90 degrees. If more light is able to reach the detector, there are many small particles that diffuse the source beam, the detector means fewer particles, Nevelllemetric turbidity units (NTU) are the measurement units used by the Nevelometer measurement.(1)

The measurement method is based on comparing the light intensity dispersed by the sample under known conditions with the intensity of light dispersed by the standard solution

• The greater the dissipation of light, the higher the turbidity.

• The turbidity meter consists of a light source and an electric probe with a reading is a numerical expression of aqueous solution capacity to conduct an electrical current. The electrical conductivity of natural water depends on the design of the device. Three main elements turbidity meter (light source, detector, diffused in light photovoltaic engineering), the differences in these sites affect the unit's turbidity report. Most measurements are made at (1NTU) and under range. This requires a stable turbidity function meter, a small amount of stray light and excellent sensitivity. Currently, the turbid scale use different light sources, but the most common - incandescent lamp. These bulbs have a wide range, they are simple, inexpensive and reliable. The light from the lamp is quantified by color temperature - temperature, which should be completely black body of light in the same color. The color temperature of the white heat, so the emission spectrum of the lamp depends on the voltage applied to the lamp.(1)

There are many ways in which you can check the turbidity in water, and the most direct measurement of attenuation is done, the light source as it passes through the water sample. The oldest system was called the Jackson Candle Method, the GTO Units or the Jackson Nuisance. A candle flame was used to be seen through a clear column filled with water. The length of water that the candle can be seen through is related to turbidity in the water sample. Particles...
place it in the designated space and record the reading. (1)

**Electrical Conductivity (EC)**

It is a numerical expression of aqueous solution capacity to conduct an electrical current. The electrical conductivity of natural water depends largely on the degree of mineralization (concentration of dissolved mineral salts) and temperature. As a result of this, depending on the value of water conductivity it can be a certain degree of error to judge the water salinity. This measurement principle is used in particular in surgical instruments commonly measured as total salt content (the so-called TDS meter). • Prepare standard formazine solutions and proceed with calibrating the device while ensuring that distilled water is free from turbidity and follow the operator's instructions on the device's operating manual. It is a numerical expression of aqueous solution capacity to conduct an electrical current. The electrical conductivity of natural water depends largely on the degree of mineralization (concentration of dissolved mineral salts) and temperature. As a result of this, depending on the value of water conductivity it can be a certain degree of error to judge the water salinity. This measurement principle is used in particular in surgical instruments commonly measured as total salt content (the so-called TDS meter).

- Mix the sample well and wait a little until the air bubbles come out, then pour it into the special packaging and

Electrical conductivity (conductivity): - Is the ability of the solution to pass the current of electricity. The solution resistance is proportional to the distance between the electrodes and is inversely proportional to the S electrode region,

\[ R = \rho \left( \frac{L}{S} \right) \]

The coefficient of proportionality is called in \( \rho \) Resistance When \( L = 1 \) cm, \( S = 1 \) cm\(^2\) Basic unit of resistance measurement - ohm. Electrical conduction (EC) - Inverted resistance,
measured in Siemens (cm) or MS - microsiemens (.μ.S).

Conductivity - Another conductivity (cc) of the solution measured between the electrodes of the CM2 region, located at a distance of 1 cm from each other. The unit of this kind of measurement is Siemens / cm. In the measurement of specific conductivity of water used / cm (microsiemens / cm) or / cm (millisiemens / cm).

Units of resistance (or resistance) - ohm / cm, megan / cm kg / cm. When measuring high purity water is often used mega / cm, because it gives more accurate results. Resistance to pure water is less like tap water, measured in kg / cm. Increased conductivity increases the amount of impurities in water. The ion movement rate is directly proportional to the temperature. The optimum temperature for measuring electrical conductivity of water – 25 C° . In many electrical devices such as the circuit adjustment element is a temperature sensor and the value of the plug is automatically reduced to a value equal to 25C °.(4)

To measure the electrical conductivity of water used by special devices - conductivity. The device name is derived from English conductivity, which means electrical conductivity. The process principle is based on direct
cm × 0.75 = TDS (solids solids) per mg / l as such. Increased conductivity increases the amount of impurities in water.(5)

**Material and Method**

Sampling area including ten districts were selected in Kut as follows:
(Alhorh, Cuffs ,khajah ,alzahra ,damok . Almarshua ,alsherqah ,onoar Alsdr ,tamoz and aljamaih )  

**Table (1)**  
Quarterly rates of turbidity of drinking water (NTU)

<table>
<thead>
<tr>
<th>Month</th>
<th>Alhora</th>
<th>Alkafa'at</th>
<th>Alkhachia</th>
<th>Alzahraa</th>
<th>Dhamouk</th>
<th>Almarshua</th>
<th>Alsharqia</th>
<th>Anwar Alsader</th>
<th>Tamwz</th>
<th>Aljama'a</th>
</tr>
</thead>
<tbody>
<tr>
<td>October</td>
<td>Max:6.48 Min:5.98</td>
<td>Max:7.11 Min:4.87</td>
<td>Max:6.11 Min:6.00</td>
<td>Max:4.89 Min:4.43</td>
<td>Max:5.31 Min:5.11</td>
<td>Max:5.34 Min:4.32</td>
<td>Max:5.21 Min:5.00</td>
<td>Max:5.34 Min:4.53</td>
<td>Max:7.13 Min:6.68</td>
<td>Max:6.1 Min:5.45</td>
</tr>
<tr>
<td>December</td>
<td>Max:6.12 Min:6.01</td>
<td>Max:5.00 Min:4.10</td>
<td>Max:6.11 Min:6.01</td>
<td>Max:6.10 Min:5.11</td>
<td>Max:6.10 Min:5.00</td>
<td>Max:5.39 Min:5.18</td>
<td>Max:6.40 Min:6.10</td>
<td>Max:5.86 Min:3.98</td>
<td>Max:5.89 Min:5.17</td>
<td>Max:5.89 Min:5.52</td>
</tr>
<tr>
<td>February</td>
<td>Max:7.78 Min:5.32</td>
<td>Max:6.00 Min:5.18</td>
<td>Max:5.98 Min:5.29</td>
<td>Max:6.81 Min:6.60</td>
<td>Max:6.11 Min:5.12</td>
<td>Max:6.97 Min:4.23</td>
<td>Max:5.32 Min:7.00</td>
<td>Max:7.12 Min:4.78</td>
<td>Max:6.10 Min:5.89</td>
<td></td>
</tr>
</tbody>
</table>
Table (2) Quarterly rates of electrical conductivity values for drinking water

<table>
<thead>
<tr>
<th>April</th>
<th>March</th>
<th>February</th>
<th>January</th>
<th>December</th>
<th>November</th>
<th>October</th>
<th>September</th>
<th>Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>861</td>
<td>844</td>
<td>865</td>
<td>766</td>
<td>760</td>
<td>761</td>
<td>764</td>
<td>765</td>
<td>Alhora</td>
</tr>
<tr>
<td>855</td>
<td>845</td>
<td>844</td>
<td>832</td>
<td>749</td>
<td>798</td>
<td>800</td>
<td>790</td>
<td>Alkafa'at</td>
</tr>
<tr>
<td>848</td>
<td>859</td>
<td>801</td>
<td>700</td>
<td>712</td>
<td>790</td>
<td>743</td>
<td>765</td>
<td>Alkhachia</td>
</tr>
<tr>
<td>843</td>
<td>854</td>
<td>805</td>
<td>745</td>
<td>833</td>
<td>821</td>
<td>804</td>
<td>722</td>
<td>Alzahraa</td>
</tr>
<tr>
<td>803</td>
<td>843</td>
<td>800</td>
<td>755</td>
<td>721</td>
<td>798</td>
<td>743</td>
<td>798</td>
<td>Dhamouk</td>
</tr>
<tr>
<td>803</td>
<td>832</td>
<td>837</td>
<td>754</td>
<td>703</td>
<td>764</td>
<td>765</td>
<td>755</td>
<td>Alsharqia</td>
</tr>
<tr>
<td>846</td>
<td>804</td>
<td>801</td>
<td>800</td>
<td>798</td>
<td>742</td>
<td>689</td>
<td>698</td>
<td>Almashrua</td>
</tr>
<tr>
<td>789</td>
<td>821</td>
<td>800</td>
<td>793</td>
<td>743</td>
<td>757</td>
<td>765</td>
<td>789</td>
<td>Anwar Alsader</td>
</tr>
<tr>
<td>845</td>
<td>800</td>
<td>730</td>
<td>790</td>
<td>733</td>
<td>704</td>
<td>765</td>
<td>755</td>
<td>Aljama'a</td>
</tr>
<tr>
<td>832</td>
<td>844</td>
<td>832</td>
<td>800</td>
<td>754</td>
<td>756</td>
<td>785</td>
<td>800</td>
<td>Tamwz</td>
</tr>
</tbody>
</table>

36
Methods of data collection:
Different methods are available to collect data.
1- Field and laboratory work methods.
2- Method of the work of the joint with the departments and administrative and service units in the city of Kut and to stand on his views - M regarding the information required for our research.
3- Electronic methods and the Internet, especially with regard to information and global studies.
4- Research and previous studies dealing with the study of the same subject

Practical aspects and methods of work:
The samples were collected by 1 to 3 samples from September 2015 to January 2016 using 1 liter plastic samples, samples were collected from the areas covered

Electrical conductivity:
Device conductivity. Polarity sensitive selector. (Laboratory conductivity meter

A glass beaker with a capacity of (400) ml.
Turbidity
Turbine device. test tube. Calibration liquids (HI 93703-0), HI (93703-10).
Tube cleaning liquid (HI 93703-50)
Delicate sensitive balance (0001 g).

Conclusions
As shown in the top recorded reading of turbidity in (spring) compared to summer. The statistical analysis showed that there were significant differences between areas where the values were recorded for turbidity acceptable according to the limits of Iraqi specifications 417). High readings for turbidity in April may be due to rain fall, mud drift and suspended materials. The values of electrical conductivity values also showed an approach to electrical conductivity (1000 <) according to the environmental protection of the Agency (Ibo).
and Development Cooperation, Central Agency for Standardization and Quality Control, Republic of Iraq.


References

1- Nutrients in drinking water. Geneva, Switzerland, World Health Organization; 2005


5- Afaf Jadaan Obaid Iraqi Journal of Civil Engineering Volume 7 Issue 1