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Study and evaluating the quality of some local drinking water that present in Libyan market

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الملخص:-

الغرض من هذه الدراسة هو جمع عينات من المياه المعبأة في عبوات بلاستيكية من السوق الليبي وعينات غير معالجة من المياه الجوفية ونقلها إلى المختبر ذي الصلة وإجراء التحاليل الكيميائية التي توضح جودة وكفاءة المياه المستخدمة للشرب في ليبيا. سوقها ومقارنتها بالمعايير الليبية والدولية لمياه الشرب ، أي منظمة الصحة العالمية. أظهرت النتائج أن الرقم الهيدروجيني لعينة مياه الآبار غير المعالجة كان ضمن الحدود المسموح بها في المواصفة القياسية الليبية ، كما أن (75٪) من عينات المياه المعبأة كانت ضمن الحدود المسموح بها ، بالإضافة إلى ذلك أظهرت النتائج أن إجمالي الأملاح الذائبة (TDS) في عينة مياه الآبار غير المعالجة ، كانت أعلى من المستوى المسموح به في المواصفة القياسية الليبية ، بينما أظهرت عينات المياه المعبأة بعد الدراسة أن مستوى المواد الصلبة الذائبة كان أقل من المستوى المحدود المسموح به في المعيار الليبي. المواصفة القياسية الليبية بنسبة (100٪) من العينات قيد الدراسة ، وفيما يتعلق بتركيز العناصر الكيميائية لمياه الآبار أظهرت النتائج أن معظم التركيزات كانت أعلى من المستويات المسموح بها في المواصفة القياسية الليبية باستثناء النترات بينما في المياه المعبأة كانت معظم تركيزات العناصر الكيميائية عند المستوى المطلوب حسب المواصفة القياسية الليبية باستثناء النترات التي كانت أعلى في العينة رقم (2) من المعيار المحدد . كما أظهرت النتائج أن عينة مياه الآبار غير المعالجة غير صالحة للشرب. هذا يعني أن قياساته لا تتطابق مع المعايير العالمية والمحلية. أظهرت النتائج من خلال هذا البحث أن عينات المياه المعبأة من خلال محطات التحلية ومعالجة المياه مقبولة إلى حد ما كمياه شرب ، لكنها ليست مثالية على الإطلاق ، لأن المواد الصلبة الذائبة أقل من المستوى المطلوب حسب المواصفات الليبية للشرب. وهذا الامر يحتاج اكثر من دراسة لما لها من تأثير على حياة الإنسان سواء أثناء استخدامها في الشرب أو في الصناعات الغذائية والدوائية التي نحتاجها في مراحل الحياة المختلفة.

Abstract:

The purpose of this study is to collect samples of bottled water in plastic containers from the Libyan market and untreated samples of groundwater and transfer them to the relevant laboratory and to conduct chemical analyzes that show the quality and efficiency of water used for drinking in the Libyan market and compare it with the Libyan and international standards for drinking water, i.e. the World Health Organization . The results

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showed that the pH of the untreated well water sample was within the permissible limits in the Libyan standard, as well as (75%) of the bottled water samples was also within the permissible limits, in addition to this the results showed that the total dissolved salts (TDS) in the well water sample Untreated, it was higher than the permissible level in the Libyan standard, while the bottled water samples showed after the study that the level of TDS was less than the level and the limits allowed in the Libyan standard by (100%) of the samples under study, and regarding the concentration of chemical elements for well water showed

The results are that most of the concentrations were higher than the levels permitted in the Libyan standard with the exception of nitrates, while in bottled water most of the chemical element concentrations were at the required level according to the Libyan standard with the exception of nitrates, which was higher in sample No. (2) than the standard level . The results show us that the sample of untreated well water is not suitable for drinking. This means that its measurements do not match the standard with local and international. The results showed through this research that water samples packed through the desalination and water treatment plants are acceptable to some extent as drinking water, but they are not ideal at all, because the TDS is less than the required level according to the Libyan standard for drinking water, and this matter needs more. From the study because of its impact on human life, whether during its use in drinking or in the food and pharmaceutical industries that we needs in different stages of life.

Introduction:-

The Libyan state relies heavily on groundwater, which represents more than 98% of the total per capita consumption. This water is used in all parts of Libya in all aspects of life, whether in drinking, industry, agriculture and other various purposes. It is necessary and necessary to monitor the purity of this only source of water Avoiding environmental, industrial and even natural pollutants, because pollution it directly affects the quality and quality of this water in terms of bacterial, chemical and physical, so that it spoils this water and affects the quality of its use, and this will lead to many problems in benefiting from the use of this water, as well as the emergence of various diseases that directly affect the health of individuals in this society (Ghasab, 2015). One of the recognized facts is the daily and necessary human need to drink large quantities of fresh water suitable for human use, which, according to specialists, average about 3 litters per day (Tamim, 2014) including the percentage of necessary mineral salts according to the Libyan and international standards for the quality of drinking water (Abu Gleida, 2015). Likewise, it is not possible to neglect the rest of the basic parameters such as colour, smell, and taste. What is noticeable today is the spread of drinking water bottling factories, whether licensed or unlicensed, in various parts of Libya and the world, where their packaging, shapes, and labels vary, and people accept them widely, believing that it is pure water of high quality and is better than Public water (Al-Moussawi, 2010). Today, the follower of the Libyan market notices that there are many types of small and large water factories, which produce many types of plastic containers of different shapes and sizes, which are supposed and necessary to be evaluated and followed up by the competent authorities due to the damage and risks they pose in the event that they do not confirm to the required standard specifications. (Al-Azzawi, 2011). It is worth nothing that the studies that have been conducted in this regard are many and varied, whether in Libya or in other countries in the world, all of which are looking at determining the degree of purity of drinking water and

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evaluating the total physical, chemical and biological pollutants of factory water packed in plastic containers of different sizes, and we mention some of them, but not limited to: In the Libyan city of Misurata, a study was conducted that is concerned with estimating the percentage of dissolved solids in some types of samples of drinking water present in the Libyan market to show and measure the concentration of TDS in these samples and another sample from the Mediterranean Sea and a sample from Lake Qabroun. The water was collected as samples from the Libyan market with the Libyan standard specifications, where it was between 40 - 305 mg / litter (Al-Asawy, 2007). (Al-Toumi, 2008). In the Libyan city of Al-Ajeilat, a study was also conducted concerned with estimating the percentage of TDS in some samples of drinking water in the city of Al-Ajeilat. With Libyan standards and the world, where it was high 17.3 mg / litter (Khudair, 2013). In the Iraqi city of Baghdad, 47 samples of drinking water packed in plastic containers were taken. The study proved that 27 samples out of 47 samples taken from the market were microbiologically contaminated (Al-Mousawi, 2010). In the city of Riyadh, Saudi Arabia, 23 local samples and 7 imported samples were taken from drinking water packed in plastic containers, and the results showed no difference in most of the specifications with the standards, and the concentration of TDS when compared with the Saudi standard specifications was (52 – 154 mg/L). (Zahed, 2002). This study aims to research and evaluate the quality of water used in the Libyan market and packed in plastic containers, as well as groundwater to conform to the Libyan and international standard specifications for the quality of water suitable for human use in drinking as well as in the food industries and others so that it does not cause them health problems.

Materials and methods:-

All samples that were used in this study were collected from different areas of the Libyan market, and they are packed samples In plastic containers, in addition to samples from desalination and treatment plants for groundwater, randomly, such as determining the pH and the percentage of TDS in the samples, as well as determining the percentage of positive and negative elements. All sterilization and hygiene conditions were observed in taking and preserving samples from wearing sterile gloves to giving a time period to the open water source of no less than five minutes before taking the sample (Mahmoud, 1988), taking into account that all the required data should be written on these samples such as the name and number, and then the samples were kept in containers with a temperature of $4^{o}C$, and then all samples were transferred to the analysis laboratory Chemical Competent at the Oil Research Centre in Tripoli, to conduct the required chemical analyzes and measure the pH, known as HANNA HI 8314, using an advanced device. To measure the total floating salts and the HACH HQ 40D device and use it is equipped with precise and advanced devices such as to measure sodium and potassium with flam photometer. For carbonate and bicarbonate measurement with spectrophotometer plain test 8000.

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Results and discussion:-

Table (1): Results of (pH) for wells untreated water and desalinated water. Libyan standards for drinking water (6.5-8.5).

Sample no.	Sample	pH
1	Wells untreated water	6.73
2	Desalinated water	6.08
3	Desalinated water	8.7
4	Desalinated water	6.15
5	Desalinated water	6.86

Table no. (1) shows the results of the pH and through these results, which were obtained in this research It turned out that the pH of untreated well water, which represents sample No. (1), is (6.73), that is within the permissible limits according to the Libyan standard specification for drinking water, which are (6.5-8.5), and with regard to the bottled drinking water samples, it became clear to us through this research that the pH of sample No. (2) is (6.08) and sample No. (4) is (6.15), so the two mentioned samples are less than the minimum limit of the Libyan Standard. While sample No. (3) of bottled water recorded a pH of (8.7) which is higher than the permissible limit according to the Libyan Standard Specification, and sample No. (5) of bottled water recorded a pH of (6.86), which is within the permissible limits according to the Libyan Standard Specification . Interpretation and expectations regarding the results of samples that showed an increase or decrease in pH according to the Libyan Standard Specifications and the World Health Organization. We summarize them in the following reasons:

1- Absence of follow-up and periodic monitoring to check this water, whether from the owner or the regulatory authorities.
2- The materials used in the purification processes may be ineffective as they need to be monitored and renewed and affect the water quality accordingly.
3- The occurrence of interactions or changes that may affect the water quality.
4- There may be other reasons that are still being studied.

Table (2). Results of total dissolved salts concentration (TDS) for wells untreated water and desalinated water (mg/L) Libyan standards for drinking water (500- 1000mg/L).

Sample N0.	Sample	TDS
1	Wells untreated water	1207
2	Desalinated water	197.6
3	Desalinated water	118.2
4	Desalinated water	78.4
5	Desalinated water	96.14

Table no. (2) shows the results of the TDS of wells and bottled water. The results showed that the TDS of wells water in sample No. (1) is (1207 mg/L), which is higher than the level allowed by the Libyan Standard Specification (500-1000 mg/l) As for samples no. 2, 3, 4, 5 for treated and bottled

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drinking water, the TDS ranged from (78.4-197.6 mg/L), which is less than the limits allowed by the Libyan Standard and the World Health Standard (500-1000 mg/litter). Litter) And the interpretation and expectations regarding these results can be as follows:

1- With regard to the rise in the TDS in the water of wells above the level allowed by the Libyan standard (500-1000 mg/L), the causes could be the increase in the percentage of salts in the groundwater naturally as a result of geological factors and erosion of the surrounding rocks and their proximity to the shores of the sea. ,2008)

2- With regard to the decrease in the TDS in the bottled water from the standard level allowed in the Libyan Standard, the reasons could be a decrease in the concentrations of the salts to low levels during the desalination and treatment due to technical and technical problems that may affect the control of the treatment process. (Fisher, 2008)

Table (3): Concentration of chemical elements for samples of wells untreated water and desalinated water (mg/L). Libyan standards for drinking water are Nitrite (0.02) , Sulphate (150), Potassium (12), Sodium(100).

Sample No.	Sample	No_2	No_3	So_4	K	Na
1	Wells untreated water	<0.04	54.9	<40	11.3	190
2	Desalinated water	0.05	14.5	<40	1.9	41.3
3	Desalinated water	<0.05	<1	<40	1.9	19.7
4	Desalinated water	<0.05	9.37	20.2	0.96	31
5	Desalinated water	<0.05	1.64	<40	0.9	20.7

Table No. (3) shows the results of the analyzes of the chemical elements of well water samples and bottled water. The results in this research showed that the concentration of sodium in the well water for sample No. (1) is (190 mg / litter), which is higher than the permissible limit for drinking water, according to the Libyan specification for drinking water, which is (> 100 mg / litter). As for the percentage of sodium in the rest of the samples (2, 3, 4, 5) for bottled water was within the limits Allowed drinking water according to the Libyan standard specification (>100 mg/L) as for the concentration of potassium in well water of in sample No. (1) were (11.3 mg/L), i.e. within the permissible limits according to the approved Libyan standard specification for drinking water (>12 mg/L) and regarding the percentage of potassium in the rest of the samples (2, 3, 4, 5) for bottled water It was also within the permissible limits of the Libyan Standard Specification for Drinking Water (12>mg/L) and regarding the sulphate concentration in well water in sample No. (1) as well as in the bottled water for samples (2,3,4,5) were all within the permissible limits in The Libyan standard specification for drinking water, which is (>150 mg/L) and the nitrates in well water in sample No. (1) was (54.9 mg/L), which is higher than the permissible limit according to the Libyan Standard Specification for drinking water, which is (10> mg/L) for the rest of the samples for bottled water, the nitrate concentration in sample No. (2) was (14.5 mg/L), which is higher than the permissible limit for drinking water according to the Libyan Standard Specification, which is (10> mg/L), while the nitrate concentrations in the rest of the samples (3, 4, 5) for bottled water came within the permissible limits for drinking water according to the Libyan Standard Specification (10> mg/L).Concerning the concentration of nitrite in all samples under

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study from (1 to 5), it was higher than the permissible limit according to the Libyan standard specification for drinking water, which is (0.02 mg/L).

these results can be as follows:

1- The pH of untreated well water, as well as treated (desalinated) water, does not conform to the Libyan and international standards.

2- The concentration of permanent salts - for untreated well water, as well as for treated (desalinated) water, does not conform to the Libyan and international standards

3- Analysis of chemical elements - for untreated well water, as well as for treated (desalinated) water, it was in conformity with the Libyan and international standards for bottled (desalinated) water, and not in conformity with the untreated well water.

Recommendations:

1- Educating consumers of bottled water about the need to ensure the quality of water, how it is transported and how to store it so that it is not exposed to the sun and moisture.

2- There must be a public body whose mission is to monitor the quality of bottled water, whether local or imported, through repeated laboratory analyzes from time to time.

3- Working on maintaining and completing the sewage network because of its impact on the pollution of groundwater, especially surface water.

4- There must be periodic monitoring committees of specialists and experts to monitor desalination and water bottling plants and to ensure the accuracy of the written data on packages according to the Libyan standard specification for drinking water for the year (2008).

5- Anyone who violates the health safety conditions for filling water must be punished, and there must be a deterrent and a law to limit negligence because of its harm to human health.

6- In case the possibilities are available, there will be studies on a larger scale and a larger number of samples in Tripoli. We do not forget to thank the Oil Research Centre laboratory for their cooperation with us in conducting all the required analyzes.

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