# The analysis of drinking water in some spots in AI-Dywaniah city and its effect on human health

By

Sura awad tiyh

**to the college of science –department of chemistry- which is part of their requirement to obtain a bachelor of science/chemistry science**

Supervised

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(( وَجَعَلْنَا مِنَ الْمَاءِ كُلَّ شَيْءٍ حَيٍّ أَفَلَا يُؤْمِنُونَ ))

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## الاهداء

اهدي هذا البحث لامرأة صنعت مني طموحة تعشق التحديات كما عشقتها هي.…... لتلك التي منها تعرفت على القوه والثقة بالنفس .

لمن رضاها يخلق لي التوفيق ... لجنتي .. امي

ولرجل علمني الحياة بأجمل شكل .... والدي

## الشكر والتقدير

(من لا يشكر الناس ..... لا يشكر الله)

اتقدم بالشكر اولا لله سبحانه وتعالى..

ل استاذتي – حتى وان كانت هذه الكلمات قليله في حقها ، ولكن انتم السبب المهم ليكون هذا البحث واقع ملموس وليس حلم من احلامي البسيطة ...

شكرا لكل احساس صادق التمسته بعيونكم وقلوبكم طوال فترة دراستي ،،

وبأشد الكلمات الطيبة اقدم شكري وامتناني لمن كانت السبب في استكمال هذا البحث لتحفيزهم على المثابرة والاستمرار وعدم الياس لأستاذتي ... مشرفه البحث الدكتورة زينا محمد كاظم ...


شكرا خاص الى (دائرة الماء مشروع 7) لمساعدتهم الي لاستكمال هذا البحث

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# Chapter One

# Introduction

## Chapter One

### Introduction

#### 1-1-Water

Water is an essential source of sources and causes of life on the surface of the earth. Water is needed by all beings and creatures to live and continue to live. It is an important element in the formation of these bodies. In addition, many organisms live a full life, In terms of breathing, vision and movement within the water. The human is dependent on water to drink. The human body is composed of water and needs to drink adequate amounts of water daily so that it can continue in its life. Human and disorders in the function of its members. Water is also used for other

purposes such as agriculture, industry, bathing, washing tools, washing houses, streets and sidewalks. It also uses water in the process of generating electricity, Which convert light energy into electrical energy.[1]

## 1-2-The importance of water

In this study, we see the importance of water for all that is on the surface of the earth, and the magnitude of its many benefits that are innumerable and impossibility of life without it. The human, and plant. It is important to maintain the earth's thermal balance. Despite the man's need for water [2], its sources remain permanently exposed to pollution. This water pollution is reflected in the changes in the composition of some of the component elements, which in turn may be direct changes or indirectly, as this contamination often occurs due to industrial waste, animal, and human being thrown in it or pour into a branch of its

source. [3]

## 1-3-Water abundance

Water availability varies from country to country. In some countries there are seas and oceans with rivers, lakes and different aquifers on their territory, unlike other countries experiencing severe drought due to lack of water on their land and lack of rainwater. Thus, the main sources of rainwater that rely on human resources for water supply are rainwater, groundwater, sea water, oceans, river water, lakes and well water. Man uses all these resources to provide for his needs, but because of his misconduct, human resources may contaminate these water sources with multiple pollutants, which have corrupted, destroyed and rendered unusable,[4]To use animals or plants. These sources of pollution include the dumping of solid waste as well as the disposal of wastewater in non-contaminated water. By dumping chemical pollutants and radioactive sources, making these pollutants a threat to public health and health. The leakage of contaminants into groundwater

causes the destruction and destruction of these water. Finally, the accumulation of effluents resulting from daily uses is also caused. To destruction and destruction

and causing serious damage to this water

# 1-4-Water Pollution

Water is the most important component of life, and its interruption leads to the interruption of life and the impossibility of its continuity. The legitimacy of the importance of water is reflected in the verse: "We made of water everything living," so it must be preserved and avoid exposure to pollution.[5]

## 1-4-1-Types of water pollution

For water pollution many species are divided into:

Natural pollution: It is a pollution that changes the natural characteristics of water, making it unpopular for human use, by changing its temperature or salinity, or by increasing its suspended matter, both organic and inorganic. Increasing salinity is often due to increased evaporation of lake or river water, especially in dry areas without renewing it, which also leads to bad smell, color change or taste.

Chemical contamination: Water pollution is one of the most serious and serious problems faced by modern humans. Water is a toxic effect because of the existence of hazardous chemicals such as lead compounds, mercury, cadmium, arsenic, and pesticides. Which can be divided into a decomposable species, and another species that can be accumulated and collected in living organisms living in water, posing a

high risk to them, as well as to fish because of contamination[6]

# 1-5-Causes of water pollution

There are many reasons that lead to water exposure to pollution: Sewage Water has a major role in water pollution through toxic microbes, which have a negative

effect, as well as many species that follow the bacteria. This pollution is caused by man and his irregular behavior. Many countries that discharge sewage in the lakes and rivers or in the vicinity of the groundwater which seeps and mingles with the groundwater of the underground wells, thus causing contamination of the water and making it unsuitable for human use.

Industrial waste: Industrial waste is a direct cause of water pollution, which includes the residues of foodstuffs, industrial fibers, and chemical residues from modern factories. This leads to pollution in the water due to its mixing with blood, alkalis, various dyes, fats, Vehicles from petroleum and other harmful and polluting water

Radioactive materials: These materials are the most dangerous and harmful materials, which are produced from the waste from atomic stations, and nuclear reactors of different forms, when exposed to water of these wastes lead to serious pollution, and this pollution is caused by the lack of strict laws that limit these Contaminants.

Agricultural fertilizers: The gravity of agricultural fertilizers is that they have access to groundwater, and exposure to pollution resulting from these fertilizers, in addition to their ability to move through the floods and drainage channels to where the water is usable. Pesticides: These pesticides lead to pollution in the water, through the entry into the wastewater and banks[7].

# 1-6-Sources of water pollution

Industrial waste industries cause huge water pollution with their activities. These come mainly from: sulfur - this is a non-metallic substance that is harmful to marine life.

Industrial pollution Asbestos - these contaminants may cause cancer properties. When inhaled, it can cause diseases such as many types of cancer.

Phosphates, these nitrates are found in fertilizers and are often washed from soil to nearby water bodies. They can cause food saturation, which can be very problematic to marine environments.

Oils form a thick layer on the water surface because they do not dissolve in water. These marine plants can stop receiving enough light for photosynthesis. It is also harmful to fish and seabirds. A classic example is the oil spill in 2012 with thousands killed from animal species.[8]

Sewage tanks every local toilet (home) is connected to a sewage tank usually located outside the home. Each time tube is flushed in the toilet, it goes into this tank, where the hard part of the liquid part is separated. Biological processes are used to break down solids and liquid is usually discharged into the ground drainage system. From this stage, it can escape to the soil and water bodies almost

# 1-7-Natural characteristics of drinking water

1-Color: Color  must be acceptable not exceeding 50 units of platinum cobalt.

2-Taste: Be acceptable and palatable.

3-Odor: Healthy water intended for drinking does not smell it has no odor.

4-The turbidity must be net. The maximum limit for the turbidity in the treated water is 5 units, and in the ground water 52 units measured by the Jackson apparatus.

5-Dissolved oxygen at 25 ° C 5-8 mg / l

6-Dissolved carbon dioxide at 25 ° C and 2-3 mg / l

7-Electrical conductivity at 18 m 0.0004 μm / cm 2.

8-Density at 4 m 1.00 g / cm 3.

9-The degree of freezing is 0 ° C. The boiling point is 100 ° C.

10-Water must be free from toxic elements and chemicals, but if it appears with the test, it should not exceed the permissible limit.

# 1-8-WHO Specification for Drinking Water

| Property / component | Global standard (mg / l) |
|---|---|
| Degree of turbidity | UNT 1-10 |
| Sulfates | Between 25 and 250 mg / l |
| PH value | 6.5-8.5 |
| Water shortage | 500 |
| Ec | 0.0004 μm / cm |
| Suspended solids | 0 |
| Chloride | 2.5-3 |

# Chapter II



Practical part

# 2-1- The Instruments:

2-1-1- Turbidity meter HI88703 (wagtech international)

PH meter (EUTECH INSTRUMENTS PH 510) 2-1-2-

2-1-3- Conductivity meter (CON 1500, wagtech)

## 2-2- The Chemicals

2-2-1- The pills are used to check the Chlorine (DPD NO 1)

## 2-3- The Tools and Glasses

2-3-1- Test tube

2-3-2-Gloves

2-3-3- Glass rod or stirring

2-3-4- Beaker

2-3-5-Balance

2-3-6- pipete

2-3-7- Geaduated Cylinder

2-3-8- funnel

## 2-4-Physical examination

## 2-4-1- Temperature

Temperature affects the life of living organisms living in water if it depends on the degree of concentration of the sun and the source of fresh water. Temperature affects the dissolved oxygen, which is lower in the summer, resulting in a decrease in the process of decomposition of organic matter and breathing organisms, which causes air to suffocate organisms[9]. Natural range-From 13 to 35 degrees Celsius

## 2-4-2- The color

Color in drinking water is due to the presence of organic substances or metals such as iron, manganese or industrial wastes with severe coloring and increasing color intensity in polluted water with increasing pH of the model[10].

## 2-4-3-Taste and smell

Both taste and odor originate from natural sources or processes, contamination by chemicals or from a byproduct of water treatment such as chlorination. The taste and aroma can develop during the period of storage and distribution. The taste and smell of drinking water can be indicative of some form of pollution or poor performance during the treatment or distribution of water. The reasons for taste and smell should be investigated. The competent health authorities should be consulted especially when a sudden change occurs[11]. Or a large taste and unusual smell can signal the presence of other possible substances

## 2-4-4-PH

Although,  pH does not have a direct impact on consumers. It is considered one of the most important operational water quality stabilizers. The importance of pH - control is necessary in all water treatment stages to ensure that the water is well spun and sterilized. For effective chlorination, the pH should be less than 8 and the pH in the water entering the network, In order to reduce the erosion of the main lines of water and pipes in the water systems of the house there are different types of electrical devices to set the pH of water using electrodes and when using such devices carefully follow the instructions attached to it to get the correct results (12) the device name- pH meter.  As in Figure (2-1). Natural range =6.5-8.5

Figure (2- 1):  The pH meter

## 2-4-4-1-The Calibration of the pH meter

You will generally need more than one structured solution to calibrate the pH scale. The first will be a structured solution that is "equivalent" to alkaline 7 and the second must be close to the expected pH of the sample, whether 4 or 9.21. It is recommended to calibrate the high pH solution (9, 21) for alkali measurement, while the low pH solution (4) is preferred to measure the acid samples. Leave the structured solutions up to the same temperature after they are selected because pH readings depend on heat. Pour dissolved solutions into separate glass containers for calibration.[13]

## 2-4-4-2-The method of work-

1- Wash the electrode with distilled water and then dry it.

2-  Normally use ml 05 in a clean, dry beaker with pH capacity to put the amount of known solution • Regulated pH solutions (9,7,4).

3-  Place the device electrode in the solution (avoid electrode contact with the alkaline  base)

4- Connect the power supply to the device, then move the solution carefully to avoid electrolyte breakage, and then observe

5-• Read the device • Read the device with the regulator to be equal to the real value of the regulated solution

6- After disconnecting the power supply Repeat the steps

7- Read the device each time until the reading is stable

8- Cut the power off the device and then lift the solution and wash the electrode well with distilled water

8- Several times and then dry it thoroughly with the drying paper Take the amount of solution to estimate the reading.

9- Dry the electrode by putting the electrode into the solution and brought the power supply for a few minutes and without reading the device after the stability index

## 2-4-5-Electrical conductivity

The electrical connection is defined as the ability of water to transfer electricity and is based on two factors,(14)The first factor is the total concentration or total dissolved ions in water.The second factor is the temperature of the solution being tested.While the third factor is the movement of each ion is dissolved and the equivalence and real concentration of the ion. The acids, bases and dissolved organic salts in the water are good conductors of the electric current while the salts and organic acids are poor electrical conductivity because they are; few less ionizing in water. Electrical conductivity is measured using an instrument of

A condvetivity meter. As in Figure (2-2). [14]

Figure (2-2):  Shows the electrical conductivity measurements

## 2-4-5-1-The method of the conductivity measurements .

1-Wash the electrode very well in distilled water.

2-The temperature of the solution and its electrical conductivity are measured

3-The temperature of the model and its electrical conductivity are measured

4-If the temperature is equal to the temperature of the standard solution, the electrical conductivity shall be at 25 °C

If the solution is different, the temperature of the model is not equal to 25 °C. The results indicate the value of the electrical conductivity equivalent to the value at 25 ° C by multiplying its electrical conductivity value by the value indicated in the diagram that resonates with the device- Figure  (2-3)



Figure ( 2-3): The general table of the temperature for the  Conductivity meter

## 2-4-6-Turbidity Test.

The turbidity test, (which is important in determining the safety and efficiency of sterilization as well as determining the level of trust and acceptability by users). turbidity is known as the non-soluble substances found in the water and the permeability of the passing light, which leads to the dispersion of light and absorption instead of moving in a straight line in the water.[15]The turbidity in the drinking water is caused by the bodies that can result from insufficient treatment or the return of sediments to source or the presence of organic matter in some groundwater. High turbidity levels can protect the microbes from the effect of

sterilization and stimulate bacterial growth.

The Turbidity measurements is measured using an instrument of A  Turbidity meter As in Figure (2-4).



Figure (2-4):  The Turbidity meter

## 2-4-6-1-The method of work-
1-  A light source that sends a straight line ray through the model

2- A photovoltaic detector whose function is to capture the rays that collide with the attached minutes and are reflected at a current angle of the direction of the falling rays

3 - The model cell consisting of transparent colorless glass

Measurement method: Comparison of the light intensity diffused by the model under certain conditions with the intensity of light diffused by standard solutions suspended under the same conditions.

## 2-4-7-Check the chlorine

The chlorine test is designed to ensure the continued effectiveness of chlorination Namely residual chlorine " Residual chlorine "which continues to be activated in water to eliminate the bacteria following the chlorination process carried out in the maria by the Kapron dipole oxide or the chlorohydriase. This analysis using the DPD compound.The chlorine test is used to verify the chlorine added to the water[16].

Advantages: Simple, inexpensive and dependable technique. It Kills bacteria and viruses effectively. Residual chlorine provides some protection against re-pollution. Widely used in various countries and easy to use.

### 2-4-7-1-The method of work-
1- Take 5 ml of water

2- Put it in a special tube

3- We add a special capsule to check the chlorine called (DPD NO 1) as iv Figure (2-5)

Figure (2-5) shows the type of capsule chlorine screening

## 8-Total hardness-4-2

It Is the multi-charged ions in the solution, especially the calcium and magnesium ions and the addition of aluminum ions, zinc and iron. It is formed on the body of salts of carbonates, bicarbonates, sulfates and chlorides, and the discharge of waste water to the rivers leads to increasing acidity and increasing its hard ratio in the water, making it unsuitable for human use, causing poisoning.

### 2-4-8-1-The method of work-

The total hardness was estimated by following the above method by correcting 50 ml of the diluted sample from standard ( 0.01) after adding 1 ml of the solution and using its formula (EriochroeBlackT) as a guide and expressing the results in mg /CaCO$_3$ L

# Chapter III

Results and discussion

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### 3-1-Results obtained when measuring the value of PH

| Sample number | PH |
|---|---|
| 1 | 6.8 |
| 2 | 6.1 |
| 3 | 5.8 |
| 4 | 7.5 |

When a PH test was conducted for a number of Diwaniya areas, we found that model 1 was taken from a region Umm al-Khalil - and the test was within normal range

When the second model was obtained from the area Al-Fruit - the test was outside the range of PH because of the presence of the gas power station.

, And when the third model was taken from the area Al-Iskan - the examination outside the scope of the PH as a result of the reason for the existence of the rubber laboratory.

When the fourth model was obtained from the area Al - Arroba - the test was good and within the specified range of PH

### 3-2-Results obtained when measuring conductivity

| Sample number | EC |
|---|---|
| 1 | 1335 |
| 2 | 1326 |
| 3 | 1378 |
| 4 | 1436 |

The results obtained from the electrical conductivity of drinking water in some areas of Diwaniya  that results within the specified range or approximation

### 3-3-Results obtained when measuring turbidity

| Sample number | Turbidity |
|---|---|
| 1 | 6.06 |
| 2 | 7 |
| 3 | 8.7 |
| 4 | 6.9 |

For checking the turbidity of some areas of Diwaniyah we show each of the area Umm al-Khail - ; Al-Furat  ; Al - Arouba  The test was within the specified range while in the area of Al-Iskan    was the examination of the specific range

### 3-4-Results obtained when measuring Check the chlorine

| Sample number | Chlorine |
|---|---|
| 1 | 3 |
| 2 | 1.5 |
| 3 | 2.2 |
| 4 | 2.9 |

For the inspection of chlorine for some areas of Diwaniyah shows us each of the region Umm al-Khail; Al – Arouba. The test was within the specified range while in the area of Al-Furat ; Al-Iskan was the examination of the specific range The reason is to increase the quantity of more than the specified chlorine to be filtered

### 3-5-Results obtained when measuring Total hardness

| Sample number | Total hardness |
|---|---|
| 1 | 448 |
| 2 | 482 |
| 3 | 512 |
| 4 | 500 |

The results showed that the values of acidity ranged from (448.482.512.500). Therefore, water is classified as very good quality. Studies have shown that increasing the waste disposal will increase the values of total hardness

# 3-6-Conclusions

| Sample number | PH | EC | Tur | Chlorine | Total hardness |
|---|---|---|---|---|---|
| 1 | 6.8 | 1335 | 6.06 | 3 | 448 |
| 2 | 6.1 | 1326 | 7 | 1.5 | 482 |
| 3 | 5.8 | 1378 | 8.7 | 2.2 | 512 |
| 4 | 7.5 | 1436 | 6.9 | 2.9 | 500 |

Note1: These measurements allow distinguishing the components of water within the quality of health and the taste of formality as well as follow trends and changes and discover express problems related to the quality of drinking water in order to maintain the health of organisms.

Note2: Four samples were taken from different areas of Diwaniyah. Umm al-Khail, area Al-Fruit, area Al-Iskan , and area Al - Arroba By sequence 1234

1- In Form 1 of child Umm al-Khail,The results of the tests of temperature, taste, smell, pH, electrical conductivity, chlorine, and chlorine level were within the specified range and in accordance with the specifications of the World Health Organization.

2- In the model 2 region Al-Fruit pH decreased due to the possibility of sedimentation in the water, which causes erosion in the main water lines and pipes in the water network of homes and a decrease in the value of chlorine added after liquidation, and that the electrical conductivity, temperature and acuity within the acceptable level.

3- As well as in model number 3 region Al-Iskan.  This is due to the presence of microbes and bacteria. This increase in value leads to the protection of the microbes from the effect of sterilization and the stimulation of bacteria on the nucleus. The rest of the results were close within the specified range.

4- As for the model 4 of the area Al - Arroba when the chlorine values were examined, the value of chlorine increased within the added value of the filter. The rest of the results were within the prescribed range and conform to the international health standards. The reason for the purity of the water of this region is the lack of accumulations and deposits in water as well as the lack of factories and laboratories near the water distribution station.

# Recommendations: 3-7-

1-Establishing a number of primary sewage and agricultural wastewater treatment plants before transferring them directly to the river

2- Development of sewage collection and treatment systems and giving them the priority they deserve as they are an important source of pollution of surface and underground water, especially rivers.

3- To oblige public and private sector institutions to establish units to process or sustain the existing units to treat their waste before discharge to the Shatt.

4- Work on the construction of a treatment plant with specifications and design capacity to ensure efficient treatment of sewage waste discharged from the city before being put into the river.

5- Increase environmental awareness in order to take care of water systems and avoid using or swimming in water near the points of discharge of wastewater to the coast.

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