Determine the Concentration of Some Saltsand Elements of Ground water In Tarhouna area

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Abstract :

The salts and elements may be present in the surface water and ground water as aresult to natural resources or the human activities . High concentration of those substances may cause degredation of water quality and health problem of human , animals and plants. So we collectthe samples of eleven surface and deep well in the Trahouna area and limitation of the concentration of the salts ions and elements ions.The results showed thataverage carbonateion is 318.54 ppm, which is acceptable for drinking water according Libyan specifications and (WHO)specifications except 18% of all well water samples exceeds acceptable range for drinking water specifications in samplesand the results of chloride ion shows that the average concentration is 677.73 ppm,which is didn't acceptable for drinking water according to Libyan specifications and (WHO) specifications in the most samples.The concentration of sulphate ion in the most samples exceed limits recommendation of Libyan standard specifications and (WHO) specifications and shows that the average is 1243.45ppm, and the results of sodium ion , potassium ion shows that

the average are 7 ppm and 1.385 ppm and all water samples didn't exceed the permissible limit recommended by all specified standards Libyan and (WHO).

Keywords : back titration :gravimetric method : titration

تحديد تركيز بعض الأملاح والعناصر في المياه الجوفية بمنطقة ترهونة

الملخَّص:

يمكن أنْ تتواجد الأملاح والعناصر في المياه السطحية والجوفية، إمَّا من مصادر طبيعية أو بفعل النشاطات البشرية، إذ يسبِّب التركيز العالي لهذه المواد في قلة جودة المياه ومشاكل صحية للإنسان والحيوان والنبات، لذلك قمنا بجمع عينات من إحدى عشر بئراً سطحياً وجوفياً بمنقطة ترهونة، وتحديد تركيز هذه الأملاح والعناصر وأظهرت النتيجة أنَّ متوسط تركيز أيون الكربونات كان 318.55 ppm وهذا أقل من الحد المسموح به حسب المواصفات القياسية الليبية والعالمية ماعدا 18% من هذه العينات ذات تركيز أعلى من الحد المسموح به، أمَّا بالنسبة لمتوسط تركيز أيون الكلوريد كان 677.73 ppm وهو أعلى من الحد المسموح به لمياه الشرب، والذي يتراوح تركيز الكلوريد فيه من 250 ppm–500 حسب المواصفات القياسية وكان تركيز أيون الكبريتات حوالي 1343.45 ppm و هو أعلى بكثير من الحدود المسموح بها حسب المواصفات القياسية الليبية، ومنظمة الصحة العالمية والتي لا يزيد تركيز الكبريتات فيها عن 400 ppm أمَّا متوسط تركيز أيوني الصوديوم و البوتاسيوم كان على التوالي 7 ppm و 1.385 ppm و كان مطابقاً و ضمن الحد المسموح به في كل العينات.

Introduction:

Water is essential component to all organisms, with water being one of the most important chemical compounds for human, animal and plant. It has received many studies in it's characteristics and uses[1]. when the concentration of salts and elements increses it cauese degredation water quality and it becomes polluted water. This

way lead to increasing diseases forhuman[2]Apollution of water can be caused by several sources, including human Agriculture and industrial activities which is releases salts, heavy elements and fertilizers and pesticides and sewage weaste to the water system, [3,4] The nature of the rock structure canbe another source for water pollutionwhich increase the concentration of total dissolved salts and Hardness salts [1,6], such water maybe unfit therefore for human use to evalute ground water validity several elements and salts have to be messured . This study aims to determine Na^{+} , K^{+} , Cl^{-} , CO_3^{-2} ,SO_4^{-2} Ions in ground water samples according to the World Health Organization (WHO) [5]. Table (1) shows some natural characteristics for pure water.

	characteristic	value
1	Color / raw / taste	Completely empty
2	Lingering impurities	Completely empty
3	Salts snd organic compounds and inorganic compounds	Completely empty
4	Dissolved Oxygen O_2 at 25 C^0	8.5 mg / l
5	Dissolved carbon di oxide CO_2 at 25 C^0	3.2 mg / l
6	Photo refractive factor at 20.8 C^0	1.33
7	Density at 20 C^0	0.99823 g / cm^3
8	Freezing point	0 C^0
9	Boiling point	100 C^0
10	PH value	7
11	Specific heat	0.99 kj /kg

We would like to point out that pure water is completely free of salts, such as distilled water, is not suitable for humans as drinking water, since water in this case has a great ability to dissolve anything that gets in its way, and it causes to corrosion of iron and copper water pipes quickiy so added calcium carbonate to protect it [10]and in some cases which depend to provide of drinking water on thermal

desalination for sea water and which produces semi-distilled water, it is necessary to compensate for the deficiency of dissolved salts by adding 100ppm of sodium hydroxide[7]

Materialsand methods:

All reagents uesd in this research were purchased form sigma Aldrich without further purification .Eleven water samples were collected from various water bodies in and around Trahouna area and was determined the concentration of carbonate ions (CO_3^{-2}) in the collected water samples by titration the volumtric method was used to estimate the concentration of carbonate by titrating 50ml of water samples with a solution (EDTA) with a concentration of 0.1 M in the presence ofEroichrom blak T as indicator and drops of buffer solution [11,12]. The concentration of cabonate salts has been calculated in each sample using the following law

(CO_3^{-2}) mg/l = M (EDTA)* V (EDTA) * F.W (CO_3) / V (H_2O).

And was measured concentration of chloride ions in samples of drinking water by back titration of 0.1M of silver nitrate with 50 ml from each water sample to calculate the concentration of chloride in it to estimate the increase asolution was used potassium thio cynate in presence ofammonia ferric sulphate as indicator [13]. And were calculated concentration of chloride in

(CL) ppm = mg (CL) / V (H_2O) L

Number of mmole of CL^- =number of mmole of$AgNO_3$- number of mmole of KSCN.

And number of mg of CL^- = number of mmole of CL^- * W (CL).

And was determind the concentration of sulphate (SO_4^{-2}) ions in the collected water samples of drinking water by the weight method was used to calculate sulphate concentration by adding an increase in saturated barium chloride solution to 200ml water samples and separation the sediment formed by the filtration and then drying and

the weihgt ofthe sediment that isin form of barium sulphate [15]. The concentration of sulphateions has been calculated in each sample using the following law.

$W(SO_4^{-2})$ mg/l =W ($BaSO_4$) * F. W (SO_4) / F. W ($BaCL_2$).

The concentration of both sodium and potassium been calculated automatically using adevice for this purpose it is called (Na, KAnalyzer BMB, UK) it's adevice used to determine the concentration of sodium and potassium ions using standard electrodes for these two elements.

Results and discussion:

Thetable (2) shows the location of samples and concentration of salts and elements calculated in aunit (ppm) as well as the standard limitsfor the concentration of these salts and elements.

Potassium K^+	Sodium Na^+	Sulphate SO_4^{-2}	Chloride CL^-	Carbonate CO_3^{-2}	location	Source of water	Number of sample
83.1	2.4	1677	497	360	Tarhuna	deep	1
69.1	4.7	323	276	360	ALdkheela	deep	2
09.2	6.12	569	859	636	ALkhadra	deep	3
*	*	758	1427	456	Alghawat	deep	4
*	*	No ppt	71	168	A house	surface	5
98.1	8.8	245	720	360	Masallata	deep	6
81.1	4.10	5438	376	No result	Dugaa	deep	7
77.1	1.4	No ppt	617	132	Dawon	deep	8
98.1	3.20	585	994	600	Alkhoms	deep	9
08.2	2.9	3606	305	No result	Al Suwaidi	deep	10
*	*	477	1313	432	Saidi alseed	deep	11
12	200	400	500	500	The permitted limits in WHO		
40	200	400	250	400	The permitted limits in Libyan		

Note: (*) this value is lesser than senstivity of instrument

Statiscal analysis of wells samples:

		Carbonate CO_3^-	Chloride CL^-	Sulphate $SO4^{-2}$	Sodium Na^+	Potassium K^+
N	Valid	11	11	11	11	11
	Missing	0	0	0	0	0
Mean		318.5455	677.7273	1243.4545	7.0000	1.3845
Mode		360.00	71.00	.00	.00	.00
Std. Deviation		218.47671	[a]435.370	1732.3934	6.2554	.8979
Minimum		.00	71.00	.00	.00	.00
Maximum		636.00	1427.00	5438.00	20.30	2.09
Sum		3504.00	7455.00	13678.00	77.00	15.23
a. Multiple modes exist. The smallest value is shown						

Carbonate Ion:

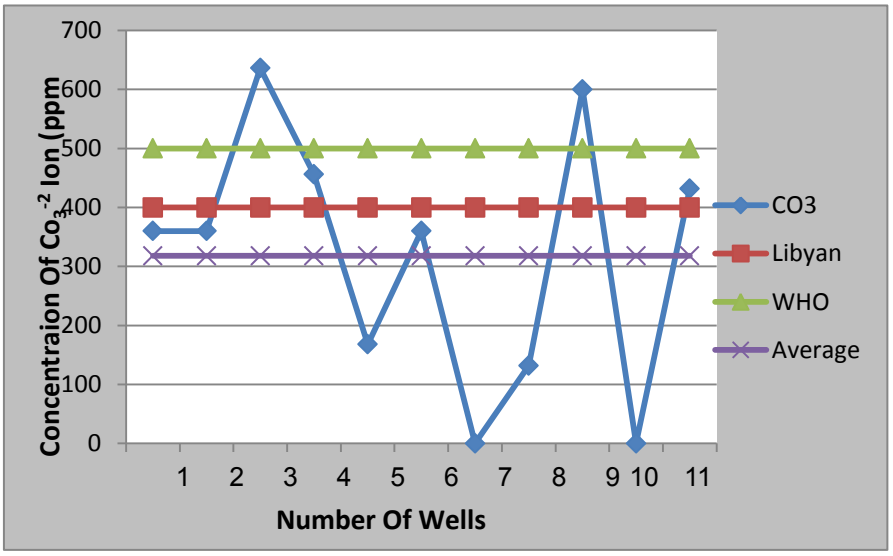

Fig (1) : carbonate ion concentration for all water samples

The fig (1) shows that average carbonate ion is 318.55 ppm, which is acceptable for drinking water according to Libyan specifications and (WHO) specifications. The figure also shows that 18% of all well water samples have carbonate ion exceeds acceptable rang for drinking water specifications.

Chloride Ion:

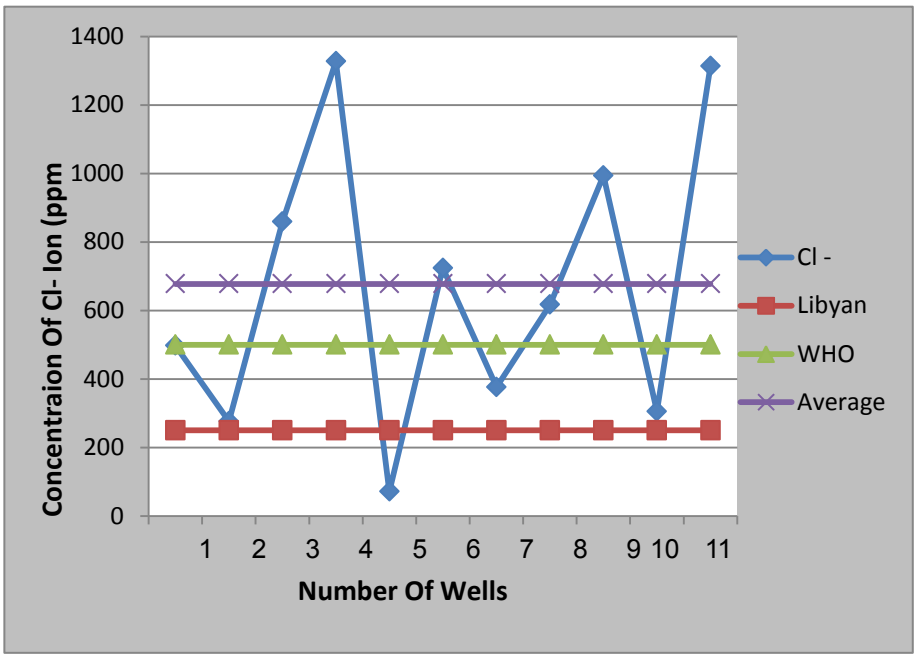

Fig (2) :chloride ion concentration for all water samples

The fig (2) shows that the average chloride ion concentration is 677.73 ppm, which is didn't acceptable for drinking water according to Libyan specifications and (WHO) specification. The figure also shows that is the most of well water samples have chloride ion concentrations exceeds the acceptable range for drinking water specifications

Sulphate Ion:

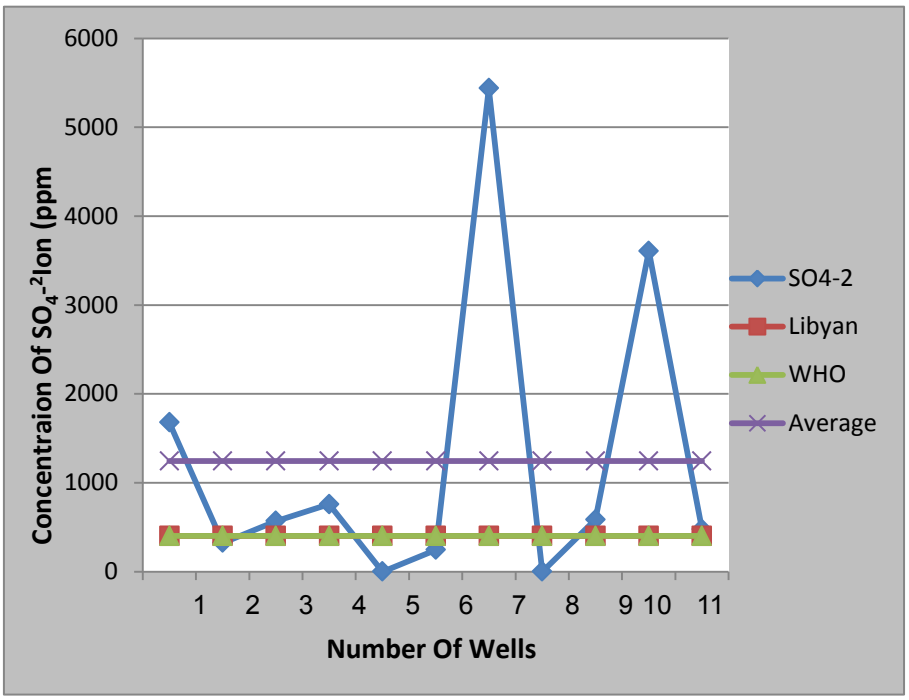

Fig (3) : sulphate ion concentration for all water samples

The results sulphate as shown in fig (3) has an average of 1243.45 ppm, the water samples for the wells exceeds limits recommendation of Libyan standard specifications and World Health Organization specifications.

Sodium Ion :

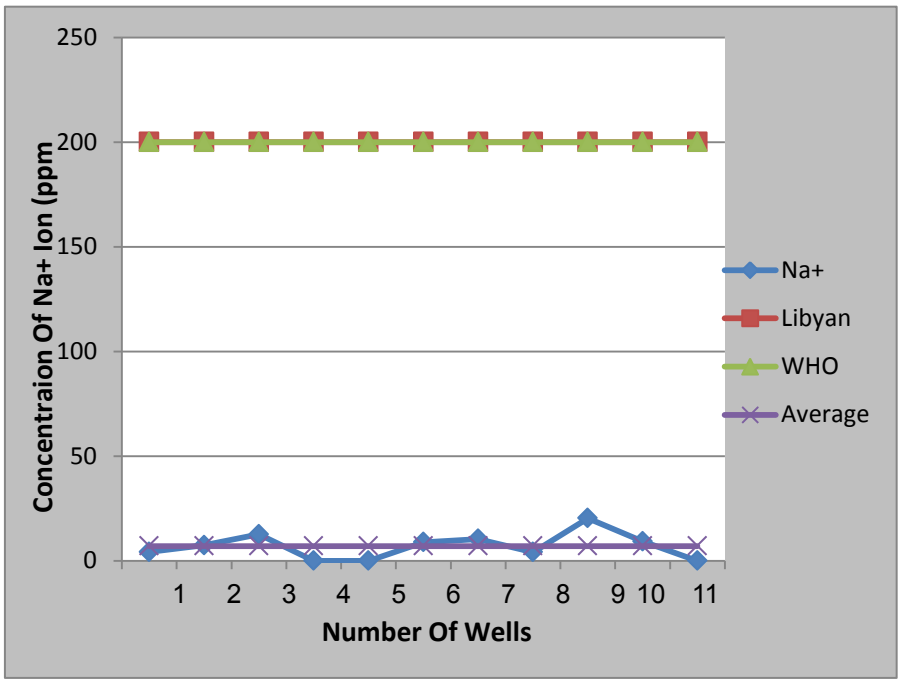

Fig (4) : sodium ion values for all water samples

Sodium ion concentration for water samples is shown in figure (4) with an average amount of 7 ppm, the results shows that all samples didn't exceed the permissible limit recommended by all specified standards Libyan and(WHO)

Potassium Ion:

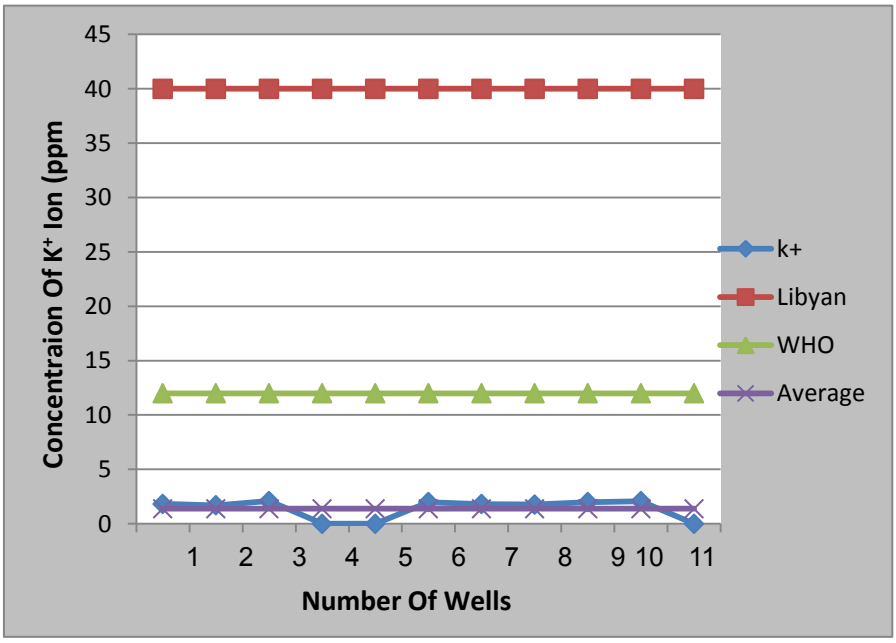

Fig (5) : concentration potassium ion for all water samples

Potassium ion concentration for water samples is shown in figure (5) with an average amount of 1.385 ppm, the results shows that all water samples didnot exceed the permissible limit recommended by all specified standards Libyan and (WHO)

Conclusion:

Through our study of the results of samples we noticed that, the concentration of carbonate ion wasacceptable for drinking water according to Libyan specifications and (WHO) specifications in the most samples while the chloride ion concentration in the most of wells was an exceed the acceptable range for drinking water spcifications. The results of sulphate ionin the most samples shows that the wells exceed limits recommended of Libyan standard specifications and World Health Organization specifications and the concentration of sodium ion ,potassium ion of all water samples didn't exceed the permissible limits recommended by all specified standards Libyan and (WHO)

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