جامعة
بنغازي الحديثة

مجلة جامعة بنغازي الحديثة للعلوم والدراسات الإنسانية

مجلة علمية الكترونية محكمة

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شروط كتابة البحث العلمي في مجلة جامعة بنغازي الحديثة للعلوم والدراسات الإنسانية

1- الملخص باللغة العربية وباللغة الانجليزية (150 كلمة).
2- المقدمة، وتشمل التالي:
- ❖ نبذة عن موضوع الدراسة (مدخل).
- ❖ مشكلة الدراسة.
- ❖ أهمية الدراسة.
- ❖ أهداف الدراسة.
- ❖ المنهج العلمي المتبع في الدراسة.

3- الخاتمة. (أهم نتائج البحث - التوصيات).
4- قائمة المصادر والمراجع.
5- عدد صفحات البحث لا تزيد عن (25) صفحة متضمنة الملاحق وقائمة المصادر والمراجع.

القواعد العامة لقبول النشر

1. تقبل المجلة نشر البحوث باللغتين العربية والانجليزية؛ والتي تتوافر فيها الشروط الآتية:

- أن يكون البحث أصيلاً، وتتوافر فيه شروط البحث العلمي المعتمد على الأصول العلمية والمنهجية المتعارف عليها من حيث الإحاطة والاستقصاء والإضافة المعرفية (النتائج) والمنهجية والتوثيق وسلامة اللغة ودقة التعبير.
- ألا يكون البحث قد سبق نشرة أو قُدم للنشر في أي جهة أخرى أو مستل من رسالة أو اطروحة علمية.
- أن يكون البحث مراعياً لقواعد الضبط ودقة الرسوم والأشكال - إن وجدت - ومطبوعاً على ملف وورد، حجم الخط (14) وبخط (Arial 'Body') للغة العربية. وحجم الخط (12) بخط (Times New Roman) للغة الإنجليزية.
- أن تكون الجداول والأشكال مدرجة في أماكنها الصحيحة، وأن تشمل العناوين والبيانات الإيضاحية.
- أن يكون البحث ملتزما بدقة التوثيق حسب دليل جمعية علم النفس الأمريكية (APA) وتثبيت هوامش البحث في نفس الصفحة والمصادر والمراجع في نهاية البحث على النحو الآتي:
- أن تُثبت المراجع بذكر اسم المؤلف، ثم يوضع تاريخ نشرة بين حاصرتين، ويلي ذلك عنوان المصدر، متبوعاً باسم المحقق أو المترجم، ودار النشر، ومكان النشر، ورقم الجزء، ورقم الصفحة.
- عند استخدام الدوريات (المجلات، المؤتمرات العلمية، الندوات) بوصفها مراجع للبحث: يُذكر اسم صاحب المقالة كاملاً، ثم تاريخ النشر بين حاصرتين، ثم عنوان المقالة، ثم ذكر اسم المجلة، ثم رقم المجلد، ثم رقم العدد، ودار النشر، ومكان النشر، ورقم الصفحة.

2. يقدم الباحث ملخص باللغتين العربية والانجليزية في حدود (150 كلمة) بحيث يتضمن مشكلة الدراسة، والهدف الرئيسي للدراسة، ومنهجية الدراسة، ونتائج الدراسة. ووضع الكلمات الرئيسية في نهاية الملخص (خمس كلمات).

3. تحتفظ مجلة جامعة بنغازي الحديثة بحقها في أسلوب إخراج البحث النهائي عند النشر.

إجراءات النشر

ترسل جميع المواد عبر البريد الالكتروني الخاص بالمجلة جامعة بنغازي الحديثة وهو كالتالي:

- ✓ يرسل البحث الكترونياً (Word + Pdf) إلى عنوان المجلة info.jmbush@bmu.edu.ly او نسخة على CD بحيث يظهر في البحث اسم الباحث ولقبة العلمي، ومكان عملة، ومجاله.
- ✓ يرفق مع البحث نموذج تقديم ورقة بحثية للنشر (موجود على موقع المجلة) وكذلك ارفاق موجز للسيرة الذاتية للباحث إلكترونياً.
- ✓ لا يقبل استلام الورقة العلمية الا بشروط وفورمات مجلة جامعة بنغازي الحديثة.
- ✓ في حالة قبول البحث مبدئياً يتم عرضة على مُحكَمين من ذوي الاختصاص في مجال البحث، ويتم اختيارهم بسرية تامة، ولا يُعرض عليهم اسم الباحث أو بياناته، وذلك لإبداء آرائهم حول مدى أصالة البحث، وقيمته العلمية، ومدى التزام الباحث بالمنهجية المتعارف عليها، ويطلب من المحكم تحديد مدى صلاحية البحث للنشر في المجلة من عدمها.
- ✓ يُخطر الباحث بقرار صلاحية بحثه للنشر من عدمها خلال شهرين من تاريخ الاستلام للبحث، وبموعد النشر، ورقم العدد الذي سينشر فيه البحث.
- ✓ في حالة ورود ملاحظات من المحكُمين، تُرسل تلك الملاحظات إلى الباحث لإجراء التعديلات اللازمة بموجبها، على أن تعاد للمجلة خلال مدة أقصاها عشرة أيام.
- ✓ الأبحاث التي لم تتم الموافقة على نشرها لا تعاد إلى الباحثين.
- ✓ الأفكار الواردة فيما ينشر من دراسات وبحوث وعروض تعبر عن أراء أصحابها.
- ✓ لا يجوز نشر إي من المواد المنشورة في المجلة مرة أخرى.
- ✓ يدفع الراغب في نشر بحثه مبلغ قدره (400 د.ل) دينار ليبي إذا كان الباحث من داخل ليبيا، و (200 $) دولار أمريكي إذا كان الباحث من خارج ليبيا. علماً بأن حسابنا القابل للتحويل هو: **(بنغازي – ليبيا - مصرف التجارة والتنمية، الفرع الرئيسي - بنغازي، رقم 001-225540-0011. الاسم (صلاح الأمين عبدالله محمد)**.
- ✓ جميع المواد المنشورة في المجلة تخضع لقانون حقوق الملكية الفكرية للمجلة.

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Determination of Heavy Toxic Metals (Pb, Cr, Co, and Cd) and total Dissolved Solids in Purified Drinking Water Plants in AL-Marj City in 2020

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Abstract

The purpose of this study was to determine the levels of heavy metals and total dissolved solids in purified drinking water plants in AL-Marj City. The studied water samples were randomly collected from different plants. The levels of heavy metals were that determined by flame atomic absorption spectroscopy (Flam AAS) instrument, at the same time, the total dissolved solids (TDS) were also detected by TDS meter. The obtained results showed the appearance and contamination of the most tested samples by toxic heavy elements via Pb, Cr, Co, and Cd. Additionally, the results showed that most of the samples suffer from losing total dissolved solids, which are important to human health. The results showed that most samples of water had greater levels of toxic heavy metals and lower content of total dissolved solids (TDS) than the standard values mentioned by the World Health Organization (WHO) and Libya Health Organization (LHO). Therefore, the study recommended that decision-makers in the city should be taken more care about purifying drinking water plants with monitoring and checking, comparing with the standard level of the Libyan Health Organization.

Keywords: Heavy elements, purified drinking water, Flame AAS, Libyan Health Organization. Total dissolved solids.

تقدير العناصر الثقيلة (الرصاص، الكروم، الكوبلت والكاديوم) والمواد الصلبة الذائبة الكلية في مياه الشرب المنقاه بواسطة محطات التنقية في مدينة المرج خلال سنة 2020م

حمدي عبدالكريم خطاب[1]، محمد يونس محمد[2]، رجاء سليمان محمود[3]

الملخص:

الغرض من هذه الدراسة تقدير العناصر الثقيلة والمواد الصلبة الذائبة الكلية الموجودة في مياه الشرب المنقاه بواسطة محطات في مدينة المرج. جمعت عينات المياه عشوائيا من محطات التنقية في المدينة. العناصر الثقيلة تم تقديرها باستخدام جهاز طيف الامتصاص الذري، كما قدر محتوى المياه من المواد الصلبة الذائبة الكلية باستخدام TDS mete النتائج أوضحت ان جميع العينات تحتوي على العناصر الثقيلة الأتية الرصاص، الكوبلت، الكاديوم والكروم. النتائج بينت ان جميع العينات تعاني من نقص كبير في محتوى المواد الصلبة الذائبة الكلية التي تعتبر مهمة لصحة الأنسان. وبينت النتائج ان معظم العينات تمتلك مستويات عالية من العناصر الثقيلة السامة ومستويات منخفضة من المواد الصلبة الذائبة الكلية غير متطابقة مع مواصفات مياه الشرب حسب منظمة الصحة العالمية ومنظمة الصحة الليبية. وتوصي الدراسة الفحص والتحليل الدوري لمياه الشرب المنقاه بواسطة محطات التنقية في المدينة.

الكلمات المفتاحية: العناصر الثقيلة، مياه الشرب المنقاه، المواد الصلبة الذائبة الكلية، منظمة الصحة العالمية، محطات التنقية.

Introduction.

Clean water is one of humanity's most precious gifts from nature. No other public or medical innovation comes close to having the importance of a safe, clean supply of drinking water [5]. Water quality is important in the health and sustenance of aquatic ecosystems and hydrology. Freshwater is used for drinking, irrigation, industrial uses, and production of fish, recreation, transportation, and waste disposal [14]. Besides, water plays a major role in the cycling of materials and can be a vector if it becomes [23]. Water is classified as ground or surface water depending on its source. Apart from sustaining life, water is used in industries and pharmaceutical plants, mines, food processing, coolant, paper manufacturing, and so on. It is also used for agricultural irrigation and recreational purposes [10].

The term "heavy metals" refers to any metallic element that has a relatively high density and is toxic or poisonous even at low concentrations [1]. The presence of heavy metals and organic matter can cause various short term and long term diseases [27,32,33]. The removal of these pollutants can be carried out by various physical, chemical and biological and advanced methods [2,31,15,30]. They have harmful effects. Examples of the commonly encountered ones in producing water are lead, cadmium, mercury, copper, zinc, Chromium, cobalt, etc.

Groundwater pollution due to heavy metals where it is used as a source of drinking water [35,28,17] and the possible risk to human health has been studied widely [4,11].

Copper, iron, chromium, and nickel are essential metals since they play an important role in biological systems, whereas cadmium and lead are non-essential metals, as they are toxic, even in trace amounts [7], [9]. Which generally exist in low levels in water and attain considerable concentration in sediments and biota [19]. These essential metals can produce toxic effects when the metal intake is excessively elevated [18].

Lead is a cumulative toxin that affects the central nervous system and can trigger the dysfunction of renal and cardiovascular systems [21,25,12]. Lead can also affect brain development and impact on the human intellectual quotient (IQ) [16]. Cadmium accumulates in the human body affecting negatively several organs: liver, kidney, lung, bones, placenta, brain, and the central nervous system [6]. Other damages that have been observing include reproductive, and development toxicity, hepatic, hematological, and immunological effects [3].

At high intake, copper is classified Group 3 human carcinogen [13]. In drinking water, copper gives the water an unpleasant taste at 3 mg/L and, in susceptible people, illness incidents can occur from a concentration of 2 mg/L [22].

Chromium toxicity in humans varies depending on the form of the compound, its oxidation state, and the route of exposure. Chromium (III) compounds are much less toxic and do not appear to cause these problems. Some people are extremely sensitive to chromium (VI) or chromium (III); with allergic reactions, involving severe redness and swelling of the skin that have been observed. An increase in stomach tumors was observed in humans and animals exposed to chromium (VI) in drinking water.

Zinc is less hazardous to human health and zinc deficiency has the potential to impact human growth, neuronal development, and the immune system [26]. In drinking water, however, zinc can cause a metallic taste to water at concentrations above 3.0 mg/L [22].

Various research has recommended that zinc inhalation and drinking polluted water may origin signs of gastrointestinal diseases or modifications in gastrointestinal soft tissue. One example of a person who consumed around 3 grains of zinc chloride defined critical signs that happened nearly instantly after interaction with the complex, containing scorching, mouth, and esophagus were vomiting and paining [8].

Arsenic occurs in natural waters in oxidation states III and V, in the form of arsenous acid (H_3AsO_3) and its salts, and arsenic acid (H_3AsO_5) and its salts, respectively [29]. Drinking water is one of the primary routes of exposure of inorganic arsenic [20]. Ingestion of groundwater with elevated arsenic concentrations and the associated human health effects are prevalent in several regions across the world. Chronic arsenic ingestion from drinking water has been found to cause carcinogenic and no carcinogenic health effects in humans.

Exposure to very high levels of cobalt can cause health effects. Some people who drank large quantities of the beer experienced nausea, vomiting, and serious effects on the heart. The International Agency for Research on Cancer has determined that cobalt is a possible carcinogen to humans. [24]

Table (1): Drinking water guidelines for the Libyan Health Organization (LHO) and the World Health Organization (WHO):

Heavy element	**Max. Acceptable .Conc.(LHO) (mg/L)**	**Max. Acceptable. Conc.(WHO) (mg/L)**
Lead	0.05	0.01
Zinc	5	5
Chromium	0.05	0.05
Cobalt	Less than 1	Less than 1
Cadmium	0.005	0.005
Copper	1	1
Iron	0.3	0.3

Total dissolved solids (TDS) is the term used to describe the inorganic salts and small amounts of organic matter present in solution in water. The principal constituent is usually calcium, magnesium, sodium, and potassium cations and carbonate, hydrogen carbonate, chloride, sulfate, and nitrate anions. The presence of dissolved solids in water may affect its taste. The palatability of drinking water has been rated by panels of tasters concerning. Its TDS level as follows: excellent, less than 300mg/ liter, good, between 300 and 600mg/L: fair: between 600 and 900 mg/L, poor between 900 and 1200mg/L, and unacceptable, greater than 1200mg/L. Water with extremely low concentrations of TDS may also be unacceptable because of its flat, insipid taste[34].

The present study was carry out to verify the quality of pure drinking water plants used in Al-Marj city, eastern Libya in specially to detect the toxic elements and heavy metals, and to determine the total dissolved solids (TDS).

Experimental.

Sample Collection.

Samples of purified drinking water that collected from Al-Marj city in Libyan. At the time of sample collection, bottles used for the samples that previously rinsed with double distilled water. 5 different brands of bottled water samples were bought from the purification plants of the city for Lead, Cadmium, Cobalt, and Chromium determination. Samples that brought to the laboratory and kept in the fridge before analysis.

Determination of Heavy elements.

The heavy elements were determined by atomic absorption spectrophotometry (Thermo scientific Ice 3300AAS) instrument, (U.S.A).

Determination of Total dissolved solids (T.D.S).

The total dissolved solids were detected by the TDS meter (TDS-3HM Digital). The TDS that detected according to the following methodology:

1- Calibrate the TDS Meter by standard solution (distilled water)
2- Immerse the meter into the sample of water and wait up to one minute for steady reading.
3- The reading is observed after the indicated value becomes constant.

Results and discussion.

The TDS content in water samples that are show in table (2). The results indicated that most of the samples are suffering and had a low quantity of total dissolved solids. Moreover, the results explained that sample S2, S3, S4 had the lowest value of total dissolved solids with values 13, 18, and 15 mg/L respectively.

Table (2): Total dissolved solids (TDS) content (mg/L) in water samples.

Samples	TDS
S1	42
S2	13
S3	18
S4	15
S5	42

The concentration of heavy metals in samples of bottled drinking water that shown in table below (3). The results of the fourth heavy elements showed that high levels of lead that recorded in those samples, which belonged to samples S2, S3 with values of 0.0577, 0.0908 mg/L respectively. These concentrations of lead are higher than recommendations by LHO and WHO. However, the concentration of lead in the rest of the three samples S1= less 0.001, S4=0.0395, and S5=0.0448 mg/L have not exceeded the range recommended by LHO.

The results in table (3) indicated that the obtained concentrations of cobalt in bottled drinking water in all samples were 0.0091, 0.0122, 0.0082, 0.017, and 0.0102

mg/l for S1, S2, S3, S4, and S5 respectively were lesser than 1 mg/L as recommended concentration.

Cadmium is a highly toxic metal that does not exceed 0.005mg/L in the drinking water. Its concentration in all samples was very high comparing with the allowed values there is no doubt that all samples studied that contaminated by cadmium.

The results in table (3) indicated that the obtained concentrations of chromium in bottled drinking water in all samples were 0.0038, 0.0049, 0.0025, 0.0069, and 0.0052 mg/L for S1, S2, S3, S4, and S5 respectively were lesser than 0.05 mg/L as recommended concentration.

Table (3): The Concentrations of heavy metals in water samples:

Samples	**Concentrations of metal (mg/L)**			
	Lead	**Cobalt**	**Cadmium**	**Chromium**
S1	Less0.001	0.0091	0.0457	0.0038
S2	0.0577	0.0122	0.0539	0.0049
S3	0.0908	0.0082	0.0497	0.0025
S4	0.0395	0.017	0.0514	0.0069
S5	0.0448	0.0102	0.0424	0.0052

Conclusion.

The results showed that the water are unfit for drinking because it contains heavy elements even though sample S1 contains the lowest values of heavy elements. This does not mean that it is healthy because some heavy elements exceed the permissible level. Therefore recommended the drinking water should be that monitored before drinking. In addition, the amount of total dissolved solids in the five samples studied is less than 100 ppm. As a result, it seems that drinking water should be more careful by monitoring drinking water. Obviously, sample S1 is the best at least the amount of heavy elements is less than an ideal limit.

Recommendations.

1- The study recommended that decision-makers in the city should be taken more care about purifying drinking water plants with monitoring and checking, comparing with the standard level of the Libyan Health Organization.

2- This study, therefore, recommended the decision-makers in the city and other responsible authorities to introduce relevant drinking water treatment techniques which can reduce the current level of metals (Pb, Cd, Co, Cr), to the accepted level current results indicate that their concentration are above limit guideline.

3. There is also need to create awareness among people about the dangers of toxic heavy elements and their impact on human health.

4. Finally the study recommends periodic examination and analysis of drinking water purified by purification plants in the city.

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