Pak. j. sci. ind. res. Ser. A: phys. sci. 2025 **68A**(3) 262-270

Development of Qirbah from Goat, Cow and Buffalo Skins to Improve the Quality of Potable Water

Agus Mulyono[a] and Sigit Priatmoko[b]
[a]Department of Physics, State Islamic University of Maulana Malik Ibrahim Malang
[b]Department of Islamic Elementary School Teacher Education,
State Islamic University of Maulana Malik Ibrahim Malang

(received Feburary 13, 2023; revised April 4, 2024; accepted September 9, 2024)

Abstract. In a hadith narrated from Jabir Radliallahu anhu the Messenger of Allah visited a house belonging to the Ansar with a friend and said to the owner of the house. If you have water in your Qirbah (skin water container) left over from last night, give it to us to drink, otherwise let us drink from its direct stream (Sahih Bukhari). For this reason, it is fundamental to investigate on the quality of drinking water put away in Qirbah made of animal skin. This aims to study to determine the effect of water storage containers (goats skin Qirbah, cow skin Qirbah, buffalo skin Qirbah and plastic) on the physical properties of water (pH, conductivity, temperature, oxygen content and total dissolved solid/TDS) and on the growth of *E. coli* bacteria. The water used is raw well water and boiled water which is stored in goat skin Qirbah, cow skin Qirbah, buffalo skin Qirbah, plastic and ceramic containers for three days. Then observations and measurements were made every day. The pH, conductivity, temperature, oxygen, TDS and bacterial growth. The results of data analysis showed that the container affected pH, temperature, conductivity, TDS, oxygen level and the growth of *E. coli* bacteria in raw well water and boiled well water. The results showed that there were differences in the quality of drinking water in water stored in Qirbah and plastic and there are also differences in the quality of drinking water in water stored in goat skin Qirbah, cow skin Qirbah and buffalo skin Qirbah. Qirbah is better than plastic because it can inhibit the growth of bacteria in drinking water.

Keywords: Qirbah, animal skin, plastic, water quality

Introduction

Water is the most important element in life after air. Most of the human body consists of water (Azhar, 2021). The water needed by humans includes clean and healthy useable water for cooking, washing and bathing purposes as well as water suitable for consumption for drinking purposes (Alang, 2014). According to WHO calculations, in developed countries and each person needs between 60-120 L of water per day, while in developing countries, including Indonesia and each person needs between 30-60 L of water per day (Rumondor *et al*., 2014).

Drinking water is meets health requirements and can be drunk directly. The health requirements referred to are microbiological, physico-chemical and radioactivity (Mirza, 2014). The water requirement per person per day according to SNI 19- 6728.1-2002 concerning the preparation of the resource balance is listed as 150 L/person/day in a city with a population of 1 million people as well as based on a reference from the Ministry of Health which states that the need for clean water per person per day is 150 L (Ester, 2018).

The recommended drinking water temperature is around 3 degrees Celsius, while dissolved oxygen levels should stay below 2 ppm (Arindita *et al*., 2019). The dissolved metal content in drinking water is iron (Fe) 0.3 mg/L ~ 10 mg/L, manganese content (mn) 0.1 mg ~ 10 mg/L, copper metal content (Cu) 0.2 mg/L ~ 10 mg/L, zinc metal content (Zn) from 0.05 mg/L to 2.0 mg/L, lead (Pb) metal content from 1.0 mg/L to 20 mg/L (Afifah *et al*., 2019).

In physics, it has been known that water always follows the shape of its place or container. However, the changing physical appearance is only one property of water. More importantly, the molecular shape of water also changes along with changes in the vibrational energy of the environment (Laage *et al*., 2017).

The water container used to store water can affect the quality of the water in the container. The water storage containers used by the community are plastic bottles,

*Author for correspondence;
E-mail:gusmul@fis.uin-malang.ac.id

containers made of ceramics or composites. At this time the world can produce an average of 300 million tonnes of plastic per year, while plastic recycling in a country like the US according to the Worldwatch Institute, only recycles about 0.6% of the plastics used, the rest becomes waste. This plastic waste lasts a long time on earth because it is not able to decompose naturally (Soegoto *et al*., 2021). Currently, bottled water drinks are commonly used. Some consumers even reuse bottled drinking water over and over again. In fact, this has a bad impact on health because the plastic bottles are used often the cause of disease (Proshad *et al*., 2017).

It is recorded in history that at the time of the Prophet, the container for storing water was called Qirbah made of animal skin (camel, cow or sheep skin). In modern times, Qirbah is very rare in Indonesia. Even people in general are not familiar with Qirbah.

Narrated O from Jabir Radhiallahu 'Anhu, Rasulullah SAW visited a house belonging to the oansor with a friend of his O and said to the housekeeper "if you have water in a container of skin left over from last night give it to us to drink otherwise let us drink from its direct stream" (Sahih Bukhari Muslims) (*Kitab Hadits Pegangan: 642 Hadits Sahih Pilihan Beserta Tafsir Untuk Pedoman ... - Maulana Muhammad Ali - Google Buku, n.d.*).

From the hadith it is explained that Rasulullah SAW drank the water stored in the Qirbah for one night. This shows that there is a privilege to drink water stored in Qirbah. For this reason, it is necessary to conduct research related to the quality of drinking water stored in the Qirbah.

Qirbah is a place for drinking water made from animal skins. According to some literature the standard size of the ancient Qirbah could accommodate about 38 L of water. Fiqh scholars use the size of 5 Qirbah which is equivalent to 2 Kullahs of water or the equivalent of 190 L. The size of 5 Qirbah or 2 kullah is the limit for water that is not polluted by najis. For practical purposes, Qirbah can be made in small sizes that can be carried anywhere (Mulyono and Muthmainnah, 2023).

The use of Qirbah is expected to reduce the use of plastic, because plastic pollutes the environment a lot. Plastic is flammable, thus increasing the threat of fire. The smoke from burning plastic materials is very dangerous because it contains toxic gases such as hydrogen cyanide (HCN) and carbon monoxide (CO). Hydrogen cyanide comes from acrylonitrile-based polymers, while carbon monoxide is the result of incomplete combustion (HRINKO, 2020). This is what makes plastic waste one of the causes of air pollution and causes long-term effects in the form of global warming in the earth's atmosphere (Purwaningrum, 2016).

Plastic waste that is in the soil that cannot be broken down by microorganisms causes the minerals in the soil both organic and inorganic to decrease, this causes the rarity of soil fauna, such as worms and soil micro-organisms, that live in the soil, because it is difficult for them to obtain food and take refuge (Blöcker *et al*., 2020). In addition, the level of O_2 in the soil decreases, so that soil fauna is difficult to breathe and eventually dies. This has a direct impact on the plants that live in the area. Plants need soil microorganisms as inter-mediaries in life (Sigler, 2014; Pandey *et al*., 2014).

From the hadith, it shows that there is a great wisdom related to the use of Qirbah, that the prophet chose to drink from the direct flow of water, if no water was stored one night in Qirbah. What is the wisdom? One of which is related to the quality of drinking water, that the quality of drinking water will increase if the water is in the Qirbah.

Another lesson from Qirbah is that using Qirbah might be able to overcome the problem of plastic waste that is piling up because it is very difficult to decompose. By using Qirbah (perhaps it can be used for a lifetime), even if it is damaged, the Qirbah will quickly decompose by the soil, because Qirbah is made of organic materials. On the implementation of Eid al-Adha, many thousands of animals are slaughtered (cows, goats, buffaloes) so that a lot of skins are still not utilized properly. Therefore, in this study, drinking water containers made from animal skins will be developed to improve drinking water quality.

There are millions of sheep, goats and cows slaughtered every day to meet the needs of human consumption, this means there are millions of skins part of which can be made Qirbah to meet the entire population of the world. And this also motivates to continue to develop livestock, not only to meet the needs of meat but also to meet the needs of skin for various human needs. So there will never be a shortage of skin, if there is continuous global development of animal husbandry. So the use of Qirbah, in addition to improving the quality of drinking water, is also expected to reduce the use of plastic.

Materials and Methods

Qirbah making. Qirbah is made using animal skins (buffalo skin, cow skin and goat skin) which are tanned by vegetable. The first step in making a Qirbah is to choose an animal skin, then form a pattern as needed. After that, the two leather patterns are united by applying glue to the edges of the leather. Then sewn using nylon thread. After the Qirbah is sewn, soaked in warm water and gently rubbed, the Qirbah is filled with grain to the brim, then dried. then the seeds are removed from the dry Qirbah, so that the Qirbah forms a container. The final process of making Qirbah is by coating beeswax on the inside.

Bacterial colony calculation. To carry out the bacterial colony calculation process, the tools must be sterilized using an autoclave at a temperature of 121 °C. If a nutrient agar (NA) media is 10 g, 500 mL of distilled water is required to make it (Wati, 2018). After the media is destroyed, it is kept in the refrigerator to avoid contamination. After that, dilute by preparing 9 test tubes filled with 9 mL of distilled water. The sample collected using a micropipette is poured into 1 mL from the first dilution tube, 1 mL is taken from the second dilution tube and so on until the tenth dilution. After diluting the sample, it was poured into a petri dish with 200 µL of medium at the same time. The sample and medium were then mixed together. After incubating the sample for 24 h, the last process was counting the number of bacterial colonies in the petri dish (Ledoh *et al*., 2013; Kumala *et al*., 2009).

Water physical properties testing process (pH, conductivity, temperature, oxygen content and TDS as well as bacterial test). Water samples were taken from the well after which it was placed in a container made of buffalo skin goat skin or plastic. The product was stored for three days and observed and measured on each day. Each treatment with five repetitions. measuring pH using a pH meter, measuring conductivity with a multimeter, measuring oxygen levels with an oxygen meter and measuring TDS using a TDS meter.

Result and Discussion

The measurement data for pH, temperature, conductivity, TDS, oxygen level and the growth of *E. coli* bacteria in boiled well water and raw source water from Qirbah, plastic and ceramic containers as mentional in Fig. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11.

From this data, the Anova test was then carried out to see the effect of using the container on the measurement results of pH, temperature, conductivity, TDS and oxygen level as listed in Table 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10.

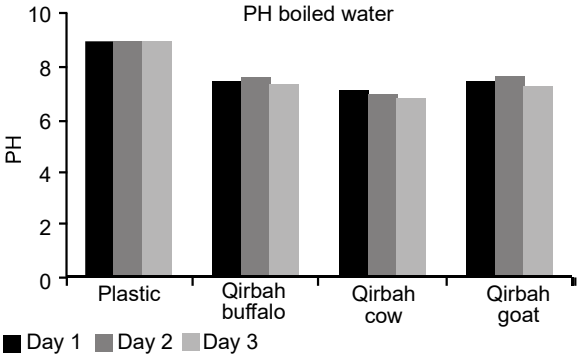

Fig. 1. Average pH graph of boiled water.

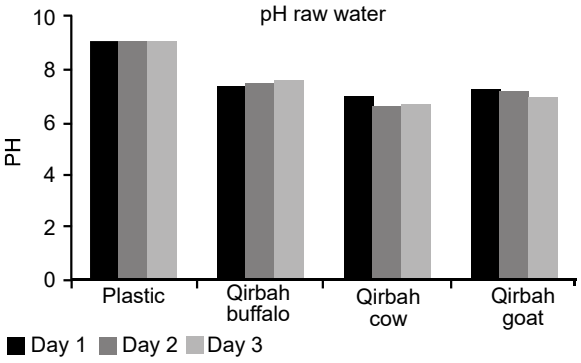

Fig. 2. Average pH graph of raw water.

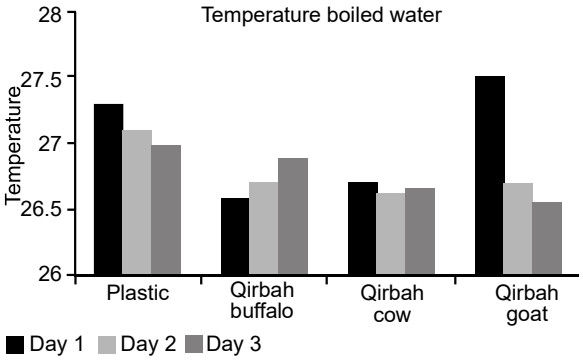

Fig. 3. Average temperature graph of boiled water.

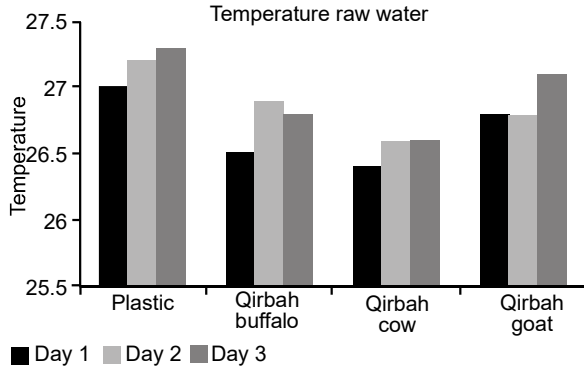

Fig. 4. Average temperature graph of raw water.

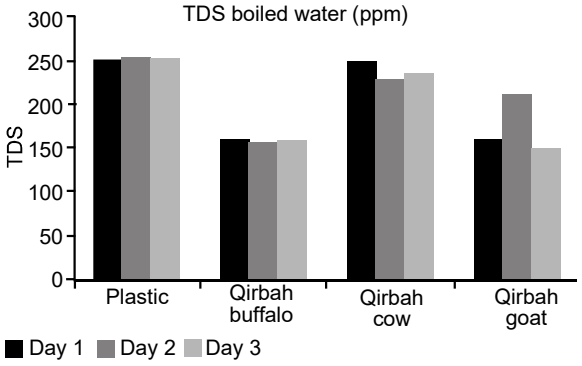

Fig. 7. Average TDS graph of boiled water.

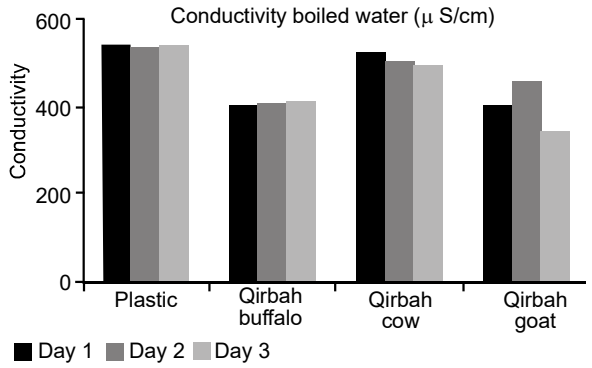

Fig. 5. Average conductivity graph of boiled water.

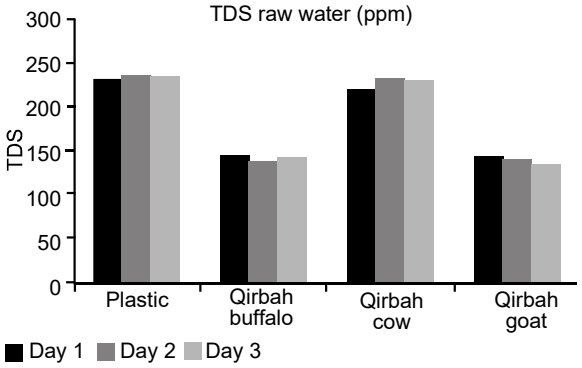

Fig. 8. Average TDS graph of raw water.

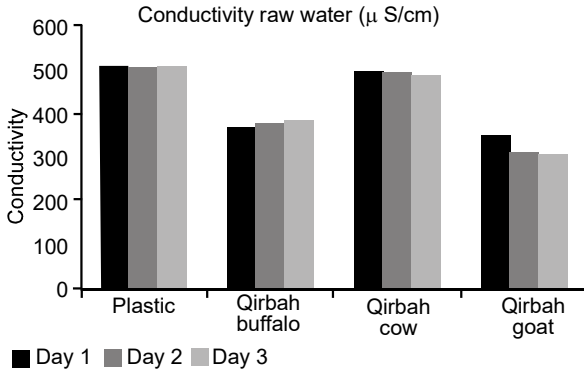

Fig. 6. Average conductivity graph of raw water.

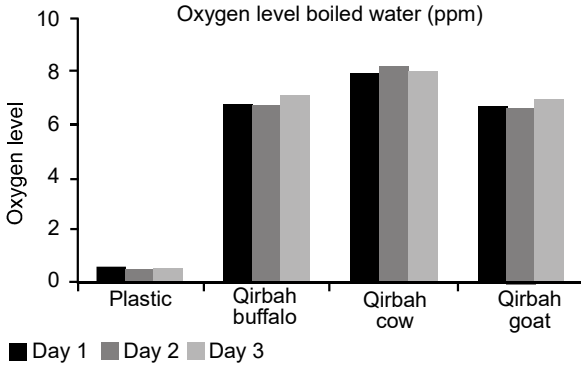

Fig. 9. Average oxygen level graph of boiled water.

From the consequences of the investigation with Anova, obviously the drinking water tank influences the pH, temperature, conductivity, TDS and oxygen content of bubbled and crude well water. The information likewise shows that the Qirbah holder is very much utilized as a compartment for drinking water. Bacterial development information shows that the Qirbah holder has the least bacterial development contrasted with different compartments. This shows that the Qirbah is more sterile. Electrical conductivity and all out broke up

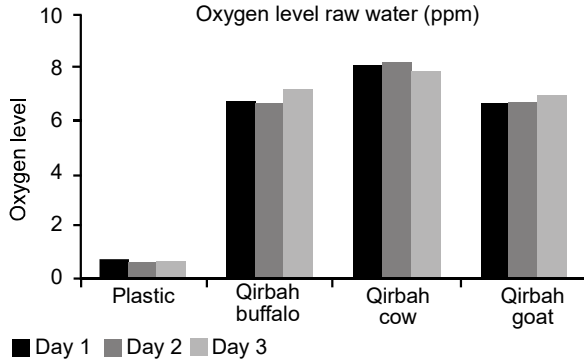

Fig. 10. Average oxygen level graph of raw water.

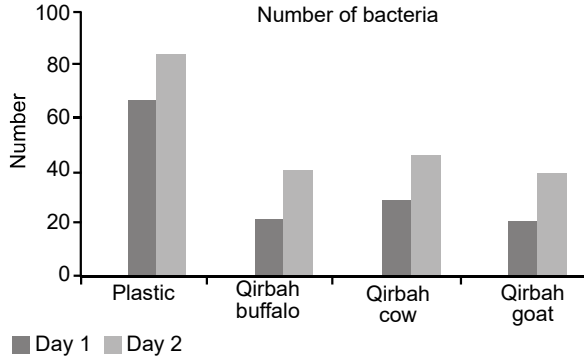

Fig. 11. Graph of the number of bacteria *E. coli* in raw water.

solids (TDS) are regularly utilized water quality boundaries (Han *et al*., 2011). Electrical conductivity is a proportion of a fluid's capacity to direct an electrical charge (Krishna *et al*., 2015) . Its ability relies upon the grouping of broken up particles, ionic strength and temperature (Hem, 1985). The convergence of broken up particles is generally estimated in TDS.

Water quality incorporates physical, synthetic and microbiological boundaries that meet sterile pre-requisites. As indicated by regulation of the minister of health of the republic of Indonesia No. 416/Menkes/ per/IX/1990 on water quality requirements and supervision. As far as actual boundaries, great water will be water that has no taste, scent, variety and isn't unsafe to wellbeing, including pH, smell, taste, variety, turbidity, temperature and measure of broken up solids (Marpaung and Marsono, 2013). The pH of the water should not be acidic or soluble to forestall the disintegration of weighty metals and consumption of the water circulation organization. The suggested pH for clean water is 6.5-8.5. For clean water principles, the colour ought to be 50 TCU and for drinking water guidelines, the greatest color content is 15 TCU. By turbidity, water is called shady on the off chance that it contains such countless particles of suspended material that it gives a sloppy, grimy variety or appearance.

Table 1. Anova boiled water pH data

	Sum of square	df	Mean square	F	Sig.
Between groups	12.874	3	4.222	326.175	0.000
within groups	0.207	16	0.013		
Total	12.667	19			

Table 2. Anova raw water pH data

	Sum of square	df	Mean square	F	Sig.
Between groups	16.289	3	5,430	364.409	0.000
within groups	0.238	16	0.015		
Total	16.527	19			

Table 3. Anova data temperature boiled water

	Sum of square	df	Mean square	F	Sig.
Between groups	0.473	3	0.158	3.073	0.058
within groups	0.820	16	0.051		
Total	1.293	195			

Table 4. Anova data temperature raw water

	Sum of square	df	Mean square	F	Sig.
Between groups	1.2123	3	0.404	21.547	0.000
within groups	0.300	16	0.019		
Total	1.512	19			

Table 5. Anova data conductivity boiled water

	Sum of Square	df	Mean Square	F	Sig.
Between Groups	92025.334	3	30675.111	41.363	0.000
Within Groups	11865.808	16	741.613		
Total	103891.142	19			

Table 6. Anova data conductivity raw water

	Sum of square	df	Mean square	F	Sig.
Between groups	125990.374	3	41996.791	378.787	0.000
within groups	1773.948	16	110.872		
Total	127764.322	19			

Table 7. Anova data TDS boiled water

	Sum of square	df	Mean square	F	Sig.
Between groups	35525.308	3	11841.769	59.946	0.000
within groups	3160.652	16	197.541		
Total	38685.960	19			

Table 8. Anova TDS raw water data

	Sum of square	df	Mean square	F	Sig.
Between groups	43175.088	3	14391.696	884.880	0.000
within groups	260.224	16	16.264		
Total	43435.312	19			

The turbidity of the water still up in the air by research center tests utilizing the turbid meter technique. For clean water guidelines, the most extreme admissible turbidity is 25 NTU and 5 NTU for drinking water norms. Temperature, the water temperature ought to be 10-250 °C (cold) so no synthetic substances break up in the channel or line that can jeopardize human wellbeing. The amount of broken down solids (TDS) typically comprises of natural substances, inorganic salts and disintegrated gases. As the TDS expands, the hardness likewise increments. Additionally, the impact of TDS or cruelty on wellbeing relies upon the synthetic that is causing the issue (Gusril, 2010).

Table 9. Anova data oxygen level boiled water

	Sum of square	df	Mean square	F	Sig.
Between groups	172.612	3	57.537	2.900E3	0.000
within groups	0.317	16	0.020		
Total	172.930	19			

Table 10. Anova data oxygen level raw water

	Sum of square	df	Mean square	F	Sig.
Between groups	170.205	3	56.735	2.621E3	0.000
within groups	0.346	16	0.020		
Total	170.550	19			

The Qirbah container is very suitable as a container for drinking water. The results of this study can be an explanation of the hadith of the Prophet Muhammad (Peace be upon him) which has been mentioned in the introduction.

Qirbah containers are very suitable as containers for drinking water. This phenomenon could be an additional explanation of the hadith of the Prophet Muhammad (Peace be upon him) It was narrated by Jabir Radliallahu 'Anhu that the messenger of Allah visited an Ansar house with a friend and said to the owner of the house: "If you have water in a water container from the skin left over from last night - give it to us to drink; otherwise let's drink to its direct current" (Sahih Bukhari).

Qirbah is not only an object for permanent drinks, but is part of a water resource management system that can have a large impact. The use of Qirbah will slightly reduce the use of plastic. Plastic waste is becoming more and more a world problem that must be immediately found a solution (Chow *et al*., 2017; Gross, 2015). So we can use Qirbah as a place to keep drinking water.

Conclusion

Drinking water tanks affect pH, temperature, conductivity, TDS, oxygen levels and the growth of *E. coli* bacteria in raw well water and boiled well water. The results showed that the Qirbah made from goat skin, cow skin and buffalo skin was practical and hygienic as a container for drinking water.

Acknowledgment

The author would like to thank the state Islamic University of Maulana Malik Ibrahim Malang for providing support for the completion of this research.

Conflicts of Interest. The authors declare that they have no conflict of interest.

References

Afifah, I.N., Kesumaningrum, F., Studi, P., Kimia, P. 2019. Analisis kadar logam Fe, Cr, Cd dan Pb dalam air minum isi ulang di lingkungan sekitar kampus universitas Islam Indonesia yogyakarta menggunakan spektrofotometer serapan atom (SSA). *Indonesian Journal of Chemical Analysis (IJCA)*, **2:** 41-46. https://doi.org/10.20885/ IJCA. VOL2.ISS1.ART6

Alang, H. 2014. Analisis coliform kualitas air galon berdasarkan lama penyimpanannya. *Biotek*, **2:** 43-50.

Arindita, U.P.D., Hudiono, H., Soelistianto, F.A. 2019. Rancang bangun sistem filterisasi untuk monitoring kualitas air minum rumah tangga. *Journal Jartel: Journal Jaringan Telekomunikasi*, **8:** 7.

Azhar, A. 2021. Uji bakteri coliform dan *Escherichia coli* pada air minum isi ulang di desa pahlawan kecamatan karang baru kabupaten aceh tamiang tahun 2021. *Penelitian Edukasi Kesehatan*, **4:** 130-137. https://e-jurnal.stikesydb.ac.id/index.php/edukes/article/download/131/114

Blöcker, L., Watson, C., Wichern, F. 2020. Living in the plastic age-different short-term microbial

response to microplastics addition to arable soils with contrasting soil organic matter content and farm management legacy. *Environmental Pollution*, **267:** https://doi.org/10.1016/j.envpol.2020.115468

Chow, C.F., So, W.M.W., Cheung, T.Y., Yeung, S.K.D. 2017. Plastic waste problem and education for plastic waste management. *Emerging Practices in Scholarship of Learning and Teaching in a Digital Era*, 125-140. https://doi.org/10.1007/978-981-10-3344-5_8

Ester, S.A. 2018. Pola konsumsi air pada perumahan teratur: studi kasus konsumsi air di perumahan griya serpong tangerang selatan. *Journal Ecolab*, **12:** 62-70. https://doi.org/10.20886/jklh.2018.12.2.62-70

Gross, M. 2015. Oceans of plastic waste. *Current Biology*, **25:** R93-R96. https://doi.org/10.1016/J.CUB.2015.01.038

Gusril, H. 2010. Studi Kualitas Air Minum pdam di kota duri riau. *Geografi*, **8:** 1-7.

Han, D., Kohfahl, C., Song, X., Xiao, G., Yang, J. 2011. Geochemical and isotopic evidence for palaeo-seawater intrusion into the south coast aquifer of Laizhou Bay, China. *Applied Geochemistry*, **26:** 863-883. https://doi.org/10.1016/j.apgeochem.2011.02.007

Hem, J.D. 1985. *Study and Interpretation of the Chemical Characteristics of Natural Water*, pp. 272, United State Goverments Printing Office, USA.

Hrinko, M. 2020. Toxicity of plastics in a fire and its dangerous properties. *Krízový Manažment*, **19:** 5-13. https://doi.org/10.26552/KRM.C.2020.2.5-13

Kitab Hadits Pegangan: 642 Hadits Sahih Pilihan Beserta Tafsir Untuk Pedoman ... - Maulana Muhammad Ali - Google Buku. (n.d.). Retrieved January 15, 2022, from https://books.google.co.id/books?hl=id&lr= &id=pFd6CwAAQBAJ&oi=fnd&pg=PP2&dq=kitab+hadits&ots=ZLRgIz1Sy2&sig=pfN-wLBPoj2xqnYVsWp7sXH6IIA&redir_esc=y#v=onepage&q=kitab hadits&f=false

Krishna, K.S., Logeshkumaran, A., Magesh, N.S., Godson, P.S., Chandrasekar, N. 2015. Hydro-geochemistry and application of water quality index (WQI) for groundwater quality assessment, Anna Nagar, part of Chennai City, Tamil Nadu, India. *Applied Water Science*, **5:** 335-343. https://doi.org/10.1007/s13201-014-0196-4

Kumala, S., Yuliani, Tulus, D. 2009. Pengaruh pemberian rebusan kayu secang (*Caesalpinia sappan* L.) terhadap mencit yang diinfeksi bakteri *Escherichia coli*. *Journal Farmasi Indonesia*, **4:** 188-198.

Laage, D., Elsaesser, T., Hynes, J.T. 2017. Water dynamics in the hydration shells of biomolecules. *Chemical Reviews*, **117:** 10694-10725. https://doi.org/10.1021/acs. chemrev.6b00765

Sherlly, M.F.L., Reinner, I.K., Debora, R. 2013. Aktivitas antibakteri *Eschericia coli* Pada minyak atsiri batang genoak (*Acorus calamus*) Asal Pulau Timor. *Molekul*, **8:** 1. https://doi.org/10.20884/1.jm.2013.8.1.120

Marpaung, M.D.O., Marsono, B.D. 2013. Uji kualitas air minum isi ulang di kecamatan sukolilo surabaya ditinjau dari perilaku dan pemeliharaan alat. *Journal Teknik Pomits* **2:** 2-6 ISSN: 2337-3539 (2301-9271 Print).

Mirza, M.N. 2014. Hubungan antara hygiene sanitasi dengan *Jumlah coliform* air minum pada depot air minum isi ulang (Damiu) di kabupaten demak tahun 2012. *Unnes Journal of Public Health*, **3:** 1-8.

Mulyono, A., Muthmainnah. 2023. Analysis of drinking water quality in Qirbah made of rabbit skin (an effort to promote the use of Qirbah). *Journal Pendidikan MIPA,* **13:** 382-389. https://doi.org/10.37630/jpm.v13i2.935

Pandey, G., Verma, K., Singh, M. 2014. Evaluation of phytochemical, antibacterial and free radical scavenging properties of *Azadirachta indica* (neem) leaves. *International Journal of Pharmacy and Pharmaceutical Sciences*, **6:** 444-447.

Proshad, R., Kormoker, T., Islam, M.S., Haque, M.A., Rahman, M.M., Mithu, M.M.R. 2017. Toxic effects of plastic on human health and environment: a consequences of health risk assessment in Bangladesh. *International Journal of Health*, **6:** 1. https://doi.org/10.14419/ijh.v6i1.8655

Purwaningrum, P. 2016. Upaya mengurangi timbulan sampah plastik di lingkungan. *Indonesian Journal of Urban and Environmental Technology*, **8:** 141. https://doi.org/10.25105/urbanenvirotech.v8i2.1421

Rumondor, P. P., Porotu'o, J., Waworuntu, O. 2014. Identifikasi bakteri pada depot air minum isi ulang di kota manado. *Journal E-Biomedik*, **2:** 4-7. https://doi.org/10.35790/ebm.2.2.2014.5518

Sigler, M. 2014. The effects of plastic pollution on aquatic wildlife: current situations and future solutions. *Water, Air and Soil Pollution*, **225:** https://doi.org/10.1007/s11270-014-2184-6

Soegoto, E.S., Ramana, J.M., Rafif, L.S. 2021. Designing an educational website regarding recycling of plastic waste into roads. *ASEAN Journal of Science and Engineering Education*, **1:** 135-140. https://doi.org/10.17509/ajsee.v1i3.33755

Wati, R.Y. 2018. Pengaruh pemanasan media PCA berulang terhadap uji TPC di laboratorium mikrobiologi teknologi hasil pertanian unand. *Journal TEMAPELA*, **1:** 44-47. https://doi.org/10.25077/temapela.1.2.44-47.2018