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An Activated Carbon-Based Water Filter Innovation from Oyster Mushroom Baglog Waste for Clean Water Solutions in Payakabung Village, Ogan Ilir, South Sumatra

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Abstract: Research is an innovation in utilizing oyster mushroom baglog waste as a material in water filtration, which is being researched and applied to the community. Water samples were taken from three samples for each 3 locations taken form two villages, namely: 1) water used for oyster mushroom cultivation in Payakabung Village (S1), 2) water used for household needs in Payakabung Village (S2), and 3) The Indralaya Combined Cycle Power Plant uses water from the Kelekar River, Tanjung Seteko Village (S3). This study was conducted with three treatments and two replications at each water sample location, as follows: Oyster mushroom baglog waste briquette compositions of 10% (A), 20% (B), and 30% (C). The results showed that. Filtration can increase the pH value from acidic to neutral and decrease the Fe concentration. However, several water quality parameters (TDS, Mn, NO2-N, NO3-N, Cl2, Cd, Pb, F, BOD, COD, total coliform, and *Escherichia coli*) exhibit varying trends but remain in accorandce with the quality standards of existing regulations. Technology validation with the community revealed that most participants understood and considered the system 100% useful as a solution to their water problems.
Keywords: Activated carbon, oyster mushroom baglog, water filter, PT PLN IP UBP Keramasan UP Indralaya

1. Introduction

Clean water plays a vital role in people's lives, serving both consumption and non-consumption needs, such as bathing, washing, toileting, and agriculture [1]. However, access to clean water remains a challenge in many rural areas, including Payakabung Village, North Indralaya District, Ogan Ilir Regency, South Sumatra. Surface water and shallow well water used by the community are often contaminated by organic and inorganic substances, thus failing to meet quality standards for sanitation and agricultural purposes. This situation demands alternative solutions that are affordable, environmentally friendly, and can be adopted directly by the community through participatory approaches.

The oyster mushroom (*Pleurotus ostreatus*) cultivation center in Payakabung Village, Ogan Ilir Regency, is run by the Payakabung Oyster Mushroom Farmers Group, a group fostered by PT PLN Indonesia Power UBP Keramasan UP Indralaya. The oyster mushroom farming group's activities generate large amounts of organic waste in the form of used baglogs, which are not optimally utilized and are discarded around the production area. In fact, baglog waste has a high lignocellulose content, which has the potential to be converted into activated carbon through a carbonization process [2]. Activated carbon derived from biomass is known to have an excellent adsorptive capacity against various contaminants in water, including heavy metals, chlorine compounds, and organic materials that affect BOD and COD values [3].

Several previous studies have examined the use of activated carbon derived from coconut shells [4], corn cobs [5], and rice husks as a water filter medium [6]. However, to date, there have been few studies that have directly developed activated carbon from mushroom baglog waste based on local communities. Furthermore, there has been no innovation in a simple water filter system based on mushroom baglog activated carbon aimed at producing category B clean water, namely water suitable for use for toilets and plant irrigation in accorandce with non-consumptive clean water quality standards.

This research was designed as part of an integrated effort between the development of appropriate technology and community empowerment. Within the context of community service in Payakabung Village, a simple water filter device based on activated carbon from oyster mushroom baglogs was not only tested in the laboratory but also socialized directly to villagers. Mushroom farmers participated in training sessions on the baglog waste carbonisation process, filter system assembly, and water quality testing. Thus, this technology is not only experimental but also implementable and transformative, encouraging the community to manage their own waste as a solution to water problems.

The objectives of this study are: (1) to test the characteristics of water filtered by a simple activated carbon-based water filter system from oyster mushroom baglog waste from the Payakabung Oyster Mushroom Farmers Group under the guiandce of PT PLN Indonesia Power UBP Keramasan UP Indralaya regarding important parameters such as pH, heavy metals, chlorine, TDS, BOD, and COD; (2) to evaluate the suitability of filtered water as category B water for toilet and plant irrigation purposes. This study is expected not only to produce scientific and technological outputs but also to have real social impacts, including improved environmental quality and increased independence for village communities.

2. Material and Methods

2.1. Materials

Main material of this research is post-harvest mushroom baglog waste. Meanwhile, supporting materials consist of fine sand, gravel, palm fiber, geotextile fabric, and PVC for filter pipes. Water quality analytical tools consist of pH meter, TDS meter, Atomic Absorption Spectroscopy (AAS), spectrophotometer, chlorine colorimeter, BOD incubator, COD titration apparatus, and carbonization furnace.

There were three water samples of each 3 locations which taken form two villages, namely: 1) water used for oyster mushroom cultivation in Payakabung Village (S_1), 2) water used for household needs in Payakabung Village (S_2), and 3) The Indralaya Combined Cycle Power Plant uses water from the Kelekar River, Tanjung Seteko Village (S_3).

2.2. Methods

The filter system consists of two vertical PVC tubes measuring 20 cm in diameter and 100 cm in height, filled in layers as follows (from bottom to top):
Tube 1: silica sand (23%), dacron cotton (17%), ginger coral (33%) and japmat (27%).
Tube 2 :activated carbon briquettes from oyster mushroom baglog (according to the treatment: 10, 20 and 30%), fine sand (6%), coarse sand (7%), zeolite ((37%, 27%, and 17%), small biofoam (13%), large biofoam (17%) and dacron cotton (10%).Water samples were introduced through the top and collected after exiting the bottom. The filter design is illustrated in Figure 1. This study was conducted with three treatments and two replications at each water sample location, as follows: Oyster mushroom baglog waste briquette composition: 10% (A), 20% (B) and 30% (C).

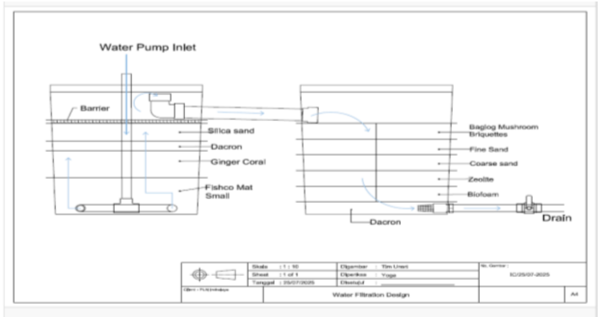

Figure 1. Water filter design

2.3. Experimental variable and analytical procedures

The technology validation activity was conducted through a participatory approach in Payakabung Village. The research team provided training to a local mushroom farmer group on how to make activated carbon from mushroom baglog waste. A field test was conducted on residents' well water using the filter system. Water samples were tested before and after filtration. The parameters and analytical procedure as shown in Table 1.

2.4. Data Analysis

Water quality results were analyzed descriptively, referring to the applicable regulations. Technology validation data are obtained from the results of the evaluation (pre- and post-tests) of filter application activities in the Payakabung village community, particularly the oyster mushroom cultivation group.

Table 1. The water quality parameters and analytical procedur

No.	Parameters	The test equipment/ analysis prosecedure	Measurements
1.	Temperature	Digital thermometer	insitu
2.	Total Dissolved Solid (TDS)	TDS meter	insitu
3.	pH	pH meter	insitu
4.	Iron (Fe)	SNI 6989.4:2009/SNI6989-82:2018	Laboratory analysis
5.	Manganese (Mn)	SNI 6989.5:2009/SNI6989-82:2018	Laboratory analysis
6.	Nitrite (NO_2-N)	SNI 06-6989.9-2004	Laboratory analysis
7.	Nitrate (NO_3-N)	SNI 6989.79:2011	Laboratory analysis
8.	Free Chlorine (Cl_2)	Photometry	Laboratory analysis
9.	Cadmium (Cd)	SNI 6989.16:2009/SNI6989-82:2018	Laboratory analysis
10	Lead (Pb)	SNI 6989.8:2009/SNI6989-82:2018	Laboratory analysis
11.	Flouride (F)	SNI 06-6989.9-2004	Laboratory analysis
12.	Biologicals Oxygen Demand (BOD)	BOD sensors	Laboratory analysis
13.	Chemicals Oxygen Demand (COD)	SNI 6989.2:2009	Laboratory analysis
14.	Total coliform	Filter membrane	Laboratory analysis
15.	*Escherichia colli*	Filter membrane	Laboratory analysis

SNI: Indonesian National Standards

3. Results and Discussion

3.1. Water Quality

3.1.1. Temperature

The pH value of water before and after filtration at the three site locations shown in Table 2.

Table 2. Temperature of water

	Temperatur (°C) at site location		
	S_1	S_2	S_3
Before filtration	26.6	26.4	27.1
After filtration:			
A	25.0	24.1	28.0
B	27.3	24.6	28.4
C	24.9	24.4	27.2

In general, the temperature at all locations was relatively good, although observations in Payakabung Village (S_1 and S_2) showed a lower water temperature than in Tanjung Seteko Village. Water temperature is influenced by various factors, including sunlight intensity [7]. Different weather conditions at the time of sampling resulted in temperature differences at the two locations. Temperature values at all three filter units were relatively similar, suggesting that filter use did not affect the resulting water temperature. It is widely acknowledged in the literature and engineering practices of different countries that a link exists between drinking water temperature and quality—lower temperatures are associated with improved quality. However, this link is currently not well understood in relation to a range of potential water quality issues. In certain countries, a link exists between drinking water temperature and quality, including the significance of the 25 °C threshold, which water utilities in some countries are already required to comply with [8].

3.1.2. Total Dissolved Solid (TDS)

Total dissolved solids (TDS) before and after filtration at the three site locations are presented in Figure 2. The increase in TDS after filtration is attributed to the presence of dissolved filter material in the filtered water, which necessitates thorough cleaning of the filter material before use. The high level of TDS is attributed to the presence of higher levels of inorganic compounds in the water [9]. TDS in water represents dissolved substances, both organic and inorganic constituents, soluble in water [10].

In general, the TDS values obtained still meet the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021 [11] which is a maximum of 1000 mg L^{-1} and Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning implementing regulations for government regulation No. 66 of 2014 concerning environmental health, which is a maximum of 300 mg L^{-1} [12]. The maximum TDS permitted for human health by NSDWQ, WHO, and EU is 500 mg L^{-1} (Ezugwu, 2022). TDS in the swamp river border is 38-408 mg L^{-1} [13].

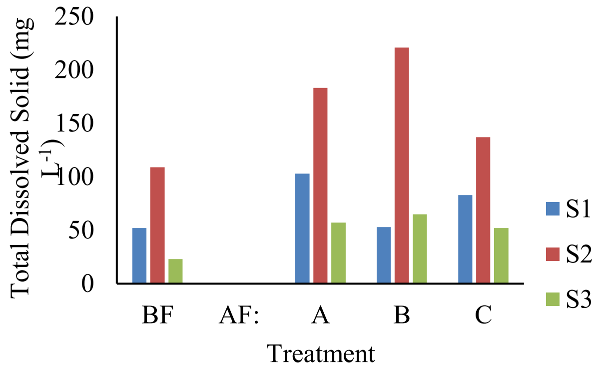

Figure 2. Total Dissolved Solid before filtration (BF) and after filtration (AF)

3.1.3. pH value

The pH value of water before and after filtration at the three site locations shown in Figure 3.

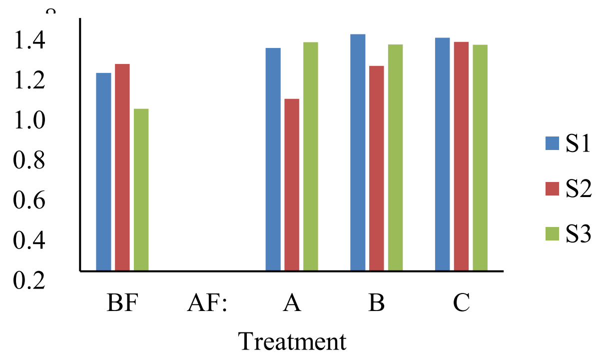

Figure 3. Water pH before filtration (BF) and after filtration (AF)

Figure 3 shows that the filtration process in water used for oyster mushroom cultivation in Payakabung Village (S1) and the Indralaya Combined Cycle Power Plant, which uses water from the Kelekar River, Tanjung Seteko Village (S3), increases the pH value, mainly in S3, where the pH value before filtration is categorized as acidic water. The pH value of water samples used for household needs in Payakabung Village is categorized as meeting the requirements based on existing regulations. It is possible because water management is already in place before distribution to the community, particularly regarding pH levels. The filter results for the treatment using 10% activated charcoal briquettes with mushroom baglogs (A) have a relatively acidic pH value. In contrast, the pH values for the treatments using 20% activated charcoal briquettes with mushroom baglogs (B) and 30% activated charcoal briquettes (C) are more alkaline.

The pH value in all filter treatments reached a pH level that meets the Class I water quality standards, as specified in Government Regulation of the Republic of Indonesia No. 11 of 2021 [11], which is within the range of 6-9 pH units. Class I (one) water quality standards are water that can be used as raw drinking water, and/or water for other purposes that require the same water quality as those uses. This value also meets the criteria for drinking water quality standards, as outlined in Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023, which implements Government Regulation No. 66 of 2014 regarding environmental health, with a range of 6.5-8.5 [12]. The recommended level for human use is 6.5 – 8.5. Above or below this stipulated range directly poses a health risk, as well as other secondary influences [10].

3.1.4. Iron (Fe)

The Iron (Fe) concentration in water before and after filtration at the three site locations shown in Figure 4. The Fe concentration obtained in water used for oyster mushroom cultivation in Payakabung Village (S1) was increased after filtration. Meanwhile, the Fe concentration of water used for household needs in Payakabung Village (S2) and water from the Kelekar River, Tanjung Seteko Village (S3), tend to decrease after filtration.

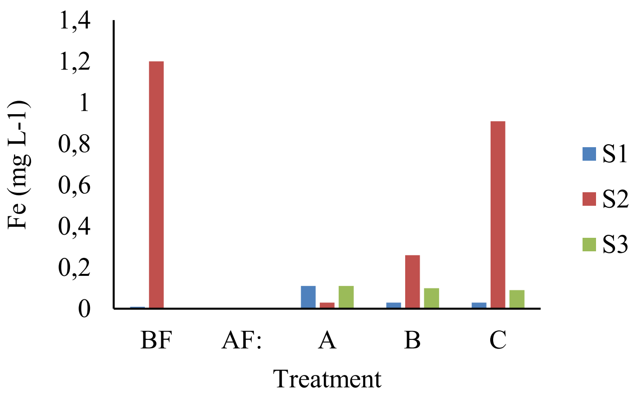

Figure 4. Iron (Fe) concentration before filtration (BF) and after filtration (AF)

The Fe concentration in filtration using 10, 20 and 30% Oyster mushroom baglog waste briquette (treatment A, B and C), except for treatments C site S_2, meet the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021[11], which is a maximum of 0.3 mg L^{-1}. Filtration using 10, 20 and 30% Oyster mushroom baglog waste briquette, except 20 and 30% at S_2, meet the requirements of Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning implementing regulations for government regulation No. 66 of 2014 concerning environmental health, which is a maximum of 0.2 mg L^{-1} [12].

The high Fe content after filtration at location S2 was due to the high initial Fe content. It is believed that the water at S2 originates from swamp water, which contains high levels of Fe. Concentration pattern of the elements in wetland sediment was as follows: Fe>Ni>Zn>V>Pb [14]. Some research has shown that an excess concentration of iron in drinking water can damage blood vessels, kidneys, liver, heart, pancreas, and even cause death in individuals with mutated genes. At the same time, its deficiency can enhance lead absorption and toxicity [10].

3.1.5. Manganese

The manganese (Mn) concentration in water before and after filtration at the three site locations shown in Figure 5.

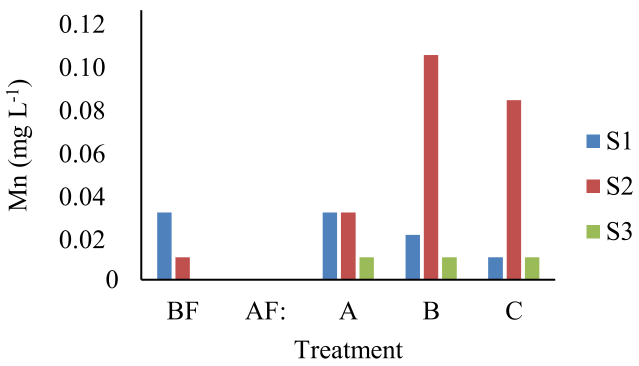

Figure 5. Mn concentration (mg L^{-1}) before filtration (BF) and after filtration (AF)

Filtration can reduce Mn content in S_1, especially when using 20% and 30% mushroom baglog briquettes. However, the opposite is true in S_2 and remains relatively constant in S_3. Nevertheless, Mn concentration obtained still meet the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021 [11] and Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning implementing regulations for government regulation No. 66 of 2014 concerning environmental health, which is a maximum of 0.1 mg L^{-1} [12]. The maximum permitted by NSDWQ, WHO, and EU for Mn concentration is 0.05 – 0.5 mg L-1 [10]. Long-term exposure to Mn levels above safe limits can lead to neurological disorders in humans [15].

3.1.6. Nitrite (NO_2-N)

The nitrite (NO_2-N) concentration in water before and after filtration at the three site locations shown in Table 3. the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021 [11] which is maximum of 0.66 mg L^{-1} and Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning implementing regulations for government regulation No. 66 of 2014 concerning environmental health, which is a maximum of 3.0 mg L^{-1} [12]. The maximum permitted by NSDWQ, WHO, and EU for nitrite concentration is 0.2 – 0.5 [10]

Table 3. Nitrite concentration

	NO_2-N (mg L^{-1}) at site location		
	S_1	S_2	S_3
Before filtration	<0.0033	0.02	0.02
After filtration			
A	0.02	0.03	0.17
B	0.03	0.01	0.08
C	0.02	0.03	0.08

The filtration increases nitrite concentration. It is thought to be because oyster mushroom baglog waste contains nutrients such as P 0.7%, K 0.02%, N 0.6%, and C-organic 49.00% [16]. Nitrite is one of the nitrogen forms that serves as an intermediate in oxidative and reductive processes, such as nitrification and denitrification. A high concentration of nitrite can be associated with intoxication processes and metabolic disorders in humans [17].

3.1.7. Nitrate (NO_3-N)

The nitrate (NO_3-N) concentration in water before and after filtration at the three site locations shown in Table 4. In general, nitrate concentration decrease after filtration and still meet the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021 [11] which is maximum of 10 mg L^{-1} and Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning implementing regulations for government regulation No. 66 of 2014 concerning environmental health, which is a maximum of 20 mg L^{-1} [12]. The maximum permitted by NSDWQ, WHO, and EU for nitrate concentration 50 mg L^{-1} [10].

Table 4. Nitrate concentration

	NO_3-N (mg L^{-1}) at site location		
	S_1	S_2	S_3
Before filtration	nd	0.180	0.090
After filtration			
A	nd	0.169	0.057
B	nd	0.079	0.090
C	0.012	0.091	0.046

Note: nd (not detected)

The nitrate concentration in surface water is normally low (0–18 mg L^{-1}) but can reach high levels because of agricultural runoff, refuse dump runoff, or contamination with human or animal wastes [18]. Nitrate concentration in the swamp river border ranges from 0042 to 0.6 mg L^{-1} [13].

3.1.8. Free Chlorine (Cl_2)

The free chlorine (Cl2) concentration in water, both before and after filtration, at the three site locations is not detectable, which means the concentration is at or below the lower method calibration limit (MCL). Based on the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021 [11] which is maximum of 0.03 mg L^{-1} and Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning for drinking water, which is 0.2-0.5 mg L^{-1} with contact time 30 minutes [12].

3.1.9. Cadmium (Cd)

The Cadmium concentration in water before and after filtration at the three site locations shown in Table 5. The Cadmium concentration obtained were very low and still meet the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021 [11] which is maximum of 0.01 mg L^{-1} and Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning for drinking water is a maximum of0.003 mg L^{-1} [12]. Maximum permitted by NSDWQ, WHO, EU for Cd concentration is 0.003 – 0.005 [10]

Table 5. Cadmium concentration in water

	Cd (mg L^{-1}) at site location		
	S_1	S_2	S_3
Before filtration	<0.0025	<0.0025	<0.0025
After filtration			
A	<0.0025	<0.0025	<0.0025
B	<0.0025	<0.0025	<0.0025
C	<0.0025	<0.0025	<0.0025

Recent studies have shown that cadmium induces various epigenetic changes in mammalian cells, both in vivo and in vitro, leading to pathogenic risks and the development of various types of cancers [19]. Accumulation of Cd in the body can result in poisoning with severe impacts on bone and kidney health, as well as reduced bone mineral density due to renal damage. Research has linked Cd to lung cancer and pulmonary toxicity, and elevated urinary biomarkers suggest compromised renal function. Cd also affects the cardiovascular, cerebrovascular, and immune systems, as well as the liver and reproductive systems, contributing to various diseases by disrupting blood pressure and calcium regulation, causing oxidative stress and DNA damage, and impairing cellular functions [20].

3.1.10. Lead (Pb)

The lead (Pb) concentration in water before and after filtration at the three site locations shown in Table 6. The lead concentration obtained decrease after filtration at S_1 and S_2, but in general, Pb meet the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021 [11] which is maximum of 0.03 mg L^{-1} and Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning for drinking water, which is 0.01 mg L^{-1} [12]

Maximum Permitted by NSDWQ, WHO, EU for Pb concentration is 0.01 mg L^{-1} [10]. Lead (Pb) contamination in drinking water poses serious public health risks. Water Pb level is a strong correlate for blood Pb level and associated health effects. Values of the hazard index (*HI*) for adults and children were as follows: Pb > Cr > Cd > Zn > Ni > Co > Cu [21].

Table 6. Lead (Pb) concentration in water

	Pb (mg L^{-1}) at site location		
	S_1	S_2	S_3
Before filtration	0.010	0.010	<0.003
After filtration			
A	<0.0042	<0.0042	0.0065
B	0.0070	<0.0042	0.0021
C	0.0021	<0.0042	0.0065

3.1.11. Flouride (F)

The flouride (F) concentration in water before and after filtration at the three site locations shown in Figure 6.

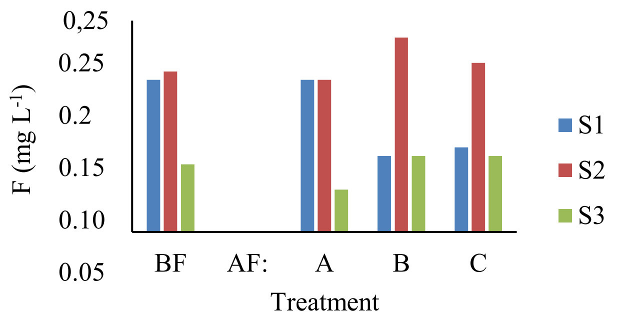

Figure 6. Fluoride concentration before filtration (BF) and after filtration (AF)

The fluoride concentration decreases in S1 and in the filtration of 10% briquette baglog mushroom in S2 and S3. However, the concentration obtained were very low and meet the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021 [11] which is maximum of 1 mg L-1 and Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning for drinking water, which is 1.5 mg L-1 [12]. The Maximum Permitted by NSDWQ, WHO, and EU for fluoride concentration is 1.5 mg L-1 [10]. Fluoride in water sources contributes most to human health risks for drinking, followed by NO3− and Total Iodine [22].

3.1.12. Biological Oxygen Demand (BOD)

The BOD in water before and after filtration at the three site locations shown in Table 7. The BOD5 obtained was very low and met the requirements of Class I water quality standards, as per Government Regulation of the Republic of Indonesia No. 11 of 2021, which stipulates a maximum of 2 mg L-1 [11].

Table 7. Biologycal Oxgen Demand

	BOD_5 (mg L^{-1}) at site location		
	S_1	S_2	S_3
Before filtration	0.73	0.72	nd
After filtration			
A	0.84	0.73	nd
B	nd	0.97	nd
C	nd	0.85	nd

3.1.13. Chemical Oxygen Demand (COD)

The COD in water before and after filtration at the three site locations shown in Table 8.

Table 8. Chemical Oxgen Demand

	COD (mg L^{-1}) at site location		
	S_1	S_2	S_3
Before filtration	2.0	2.0	nd
After filtration			
A	2.5	2.0	nd
B	nd	3.0	nd
C	nd	2.5	nd

The COD obtained were in a limited maximum and/or higher than the requirements of class I water quality standards but still met the class II according to Government Regulation of the Republic of Indonesia No. 11 of 2021 (which is a maximum of 2.0 mg L-1 (class I) and 3.0 (class II) [11].

3.1.14. Total Coliform

Total colform in water before and after filtration at the three site locations shown in Table 9.

Table 9. Total coliform (TC)

	TC (CFU per 100 ml) at site location		
	S_1	S_2	S_3
Before filtration	106	130	36
After filtration			
A	200	200	4
B	58	44	22
C	32	22	36

Total coliform obtained meet the requirements of class I water quality standards according to Government Regulation of the Republic of Indonesia No. 11 of 2021 [11] which is maximum of 1000 CFU per 100 mL, but higher than Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning for drinking water, hygiene and sanitation which is 0 [12]. Maximum Permitted by NSDWQ, WHO, EU for total coliform is 10 CFU per mL [10]

3.1.15. Escherichia colli

Escherichia coli in water before and after filtration at the three site locations shown in Table 10. *Escherichia coli* levels were higher than those specified in the Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning drinking water, hygiene, and sanitation. They exceeded the maximum permitted by NSDWQ, WHO, and EU, which is 0 [10] [11].

Table 10. *Escherichia colli*

	TC (CFU per 100 ml) at site location		
	S_1	S_2	S_3
Before filtration	6	10	9
After filtration			
A	200	200	4
B	28	0	2
C	38	2	17

3.2. *Technology Validation*

The Payakabung village community, primarily comprising members of PLN-supported mushroom cultivation groups, received training as part of a technology transfer initiative. Technology transfer activities were conducted through technical training for mushroom farmer groups in Payakabung Village.

Figure 7. Training for making filtration using briquete baglog mushroom and The result of assembling a simple water filter system

Table 11. Evaluation activities

No.	Question	The result		
1.	Do you understand the material presented?	80% understand	10% quite understand	10% do not understand
2.	Is the material presented clearly?	90% clear	10 clear enough	0% unclear
3.	Was the material presented useful?	100 useful	0% quite useful	0% useless
4.	Do you agree if this activity continues?	100% agree	0% quite agree	0% do not agree

The training consisted of two main sessions: (1) training on making activated carbon from mushroom baglogs, and (2) assembling a simple water filter system. Thirty participants, including active mushroom farmers, members of women's farming groups, and village youth, attended the training. The training was facilitated by a team of researchers and technicians from the university, as well as village administration facilitators.

Field validation was conducted by testing well water from the homes of three residents who had used it for toilet and bathing purposes. Further technology transfer and field validation activities will be conducted. One important dimension of this research is the active involvement of the community in all stages of the research and technology implementation. Community involvement extends beyond simply serving as test subjects also to include technology co-creation, where participants contribute to the design and production of the filter system. Community contributions can be seen in three main aspects: a) Raw Material Collection and Selection, b) Innovation in Filter Assembly and c) Self-Replication System. During the training, pre- and post-tests were conducted to assess the community's knowledge. The results showed that 80% of participants understood and 100% considered the system helpful, hoping for its continuation.

4. Conclusion

Activated carbon briquettes derived from oyster mushroom baglogs can be utilized as a water filter material, which, when combined with other materials, can increase the water pH and decrease the Fe concentration. Although there are fluctuating trends in other parameters, all parameters exhibit values that meet Class I standards (drinking water) and requirements for hygiene and sanitation. This water filter system can also be applied to the community in Payakabung Village. It is recommended to clean the filter thoroughly before use. Further research is needed to determine the lifespan of briquettes as a filtration material.

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References

[1] A. N. Pulungan, F.A. Syuhada, A. Sutiani, H.I. Nasution, J.L. Sihombing, and H Herlinawati, "Pengabdian Kepada Masyarakat (PKM) dalam Pengolahan Air Bersih di Desa Sukajadi," *Jurnal Pengabdian Kepada Masyarakat (JPKM) TABIKPUN*, vol. 2, no. 1, pp. 1-10. 2021. https://doi.org/10.23960/jpkmt.v2i1.23

[2] H. Anif, T. Panji, F. Dimawarnita, and I. M.

Artika, "Pemurnian alfa–selulosa dari baglog bekas jamur tiram putih (*Pleurotus ostreatus*) menggunakan NaOH and hidrolisis sulfat," *Menara Perkebunan*, vol 87, no. 1, pp. 52-59. April. 2019. https://doi.org/http://dx.doi.org/10.22302/iribb.jur.mp.v1i87.325

[3] N. Cheng, B. Wang, P. Wu, X. Lee, Y. Xing, M. Chen, and B. Gao, "Adsorption of emerging contaminants from water and wastewater by modified biochar: A review." *Environmental Pollution*, vol. 15, no. *273*, March. 2021. 116448. https://doi.org/10.1016/j.envpol.2021.116448

[4] P. Susmanto, Yandriani, A.P. Dila, and P.R. Dela, "Pengolahan zat warna direk limbah cair industri jumputan menggunakan karbon aktif limbah tempurung kelapa pada kolom adsorpsi," *Jurnal Riset Sains and Teknologi*, vol. 4. no. 2, pp. 77-87. Sept. 2020.

[5] R. Wirosoedarmo, T. S. A. Haji, and E.A. Hidayati, "The influence of concentration and contact time in domestic sewage treatment using activated carbon the cob of corn to reducing BOD and COD," *Jurnal Sumberdaya Alam and Lingkungan,* vol 3, no. 2, pp. 31-39. Aug. 2016.

[6] Legiso, H. Juniar, and U.M. Sari, "Perbandingan efektivitas karbon aktif sekam padi and Proc. kulit pisang kepok sebagai adsorben pada pengolahan air Sungai Enim," in *Proc. Seminar Nasional Sains and Teknologi*, 2019, pp. 1–13

[7] H. Effendi, *Telaah Kualitas Air Bagi Pengelolaan Sumber Daya and Perairan.* Yogyakarta: Kanisius. 2024.

[8] C. Agudelo-Vera, S. Avvedimento, J. Boxall, E. Creaco, H. de Kater, A. Di Nardo, *et al.* "Drinking water temperature around the globe: sunderstanding, policies, challenges and opportunities," *Water,* vol. 12, no. 4, pp. 1-19. April. 2020. doi:10.3390/w12041049

[9] R. Nawaz, I. Nasim, A. Irfam, A. Islam, A. Naeem, N. Ghani, *et al*., "Water quality index and human health risk assessment of drinking water in selected urban areas of a mega city," Toxics, vol. 11, no. 7, pp. 1-18. July. 2023. doi: 10.3390/toxics11070577.

[10] Ezugwu, M. Ogoamaka, and A.F. Osarumwense, "Review of effects of water characteristics and quality of human health," *International Journal of Current Science Research and Review*. Vo. 5, no. 3, pp. 673-685. March. 2022. DOI: 10.47191/ijcsrr/V5-i3-09, Impact Factor: 5.825.

[11] Pemerintah Republik Indonesia, "*Peraturan Pemerintah Republik Indonesia Nomor 22 Tahun 2021 tentang Penyelenggaraan Perlindungan and Pengelolaan Lingkungan Hidup*", Jakarta. Pemerintah Republik Indonesia

[12] Kementerian Kesehatan Republik Indonesia, *"Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2023 tentang Peraturan Pelaksanaan Peraturan Pemerintah Nomor 66 Tahun 2014 Tentang Kesehatan Lingkungan,"* Jakarta: Kementerian Kesehatan Republik Indonesia.

[13] A.F. Anggana, and P.D. Susanti, "Evaluation of water quality in the swamp river border using water quality index," *Journal of Degraded and Mining Lands Management,* vol. 7, no. 4, pp. 2373-2379. July. 2020. DOI:10.15243/jdmlm.2020.074.2373

[14] H. Janadeleh, A. H. Alhashemi, and S.M.B. Nabavi, "Investigation on concentration of elements in wetland sediments and aquatic plants." *Global J. Environ. Sci. Manage,* vol. 2, no. 1, pp. 87-93. 2016. DOI: 10.7508/gjesm.2016.01.010.

[15] S. A. A. Putri, S.M. Indirawati, and T. Ashar, "Risk management of manganese (Mn) contamination in drinking water sources." *Indonesian Journal of Global Health Research*, vol. 7. No. 4, pp. 471-478. Aug. 2025. https://doi.org/10.37287/ijghr.v7i4.6293.

[16] D. Sulaiman, "*Effect of compost made from waste of white oyster mushrooms (Pleurotus ostreatus Jacquin) baglog on the physical properties of soil and the growth of yellow passion fruit seedling (Passiflora edulis var. Flavicarpa degner).* Bogor: Institut Pertanian Bagor.

[17] S.B. Lucas, L.M. Duarte, K.C.A. Rezende, W.K.T. Coltro, "Nitrite determination in environmentalwater samples using microchip electrophoresis coupled with amperometric detection," *Micromachines,* no.13, pp. 1-12. 1736. Oct. 2022. https://doi.org/10.3390/mi13101736

[18] World Health Organization, "*Nitrate and nitrite in Drinking-water Background document for development of WHO Guidelines for Drinking-water Quality.* Geneva: World Health Organization. 1998.

[19] G. Genchi, M. S. Sinicropi, G. Lauria, A. Carocci, and A. Catalano, "The Efects of cadmium toxicity," *Int. J. Environ. Res. Public Health,* vol. 17, pp 1-24, 3782. May. 2020. doi:10.3390/ijerph17113782.

[20] Y. Yang, M.F. Hassan, W. Ali, H. Zou, Z. Liu, and Y. Ma, "Effects of cadmium pollution on human health: A narrative review," *Atmosphere,* vol. 16, pp.1-23. Feb. 2025. https://doi.org/10.3390/atmos16020225

[21] M.B. Rosen, L.R. Pokhrel, and M.H. Weir, "A discussion about public health and lead in drinking water supplies in the United States." *Sci Total Environ,* vol. 15, no. 590-591, pp. 843-853. July. 2017. doi:10.1016/j.scitotenv.2017.02.164.

[22] S. Huang, J. Guo, Y. Xie, R. Bian, N. Wang, W. Qi, and H. Liu, "Distribution, sources, and potential health risks of fluoride, total iodine, and

nitrate in rural drinking water sources of North and East China," *Science of The Total Environment*, vol. 898:165561. Nov, 2023. doi: 10.1016/j.scitotenv.2023.16556.