



Removal Efficiency of Banana Pseudo Stem as Activated Carbon for Pre-treated Laundry Wastewater Treatment

**Aguirre, Diosa Marie A.
Dimayuga, Wilson Jay P.
Moreno, Allysah Faith R.
Valenzuela, Mara D.**

June 09, 2021

Problem Statement



LAUNDRY EFFLUENT

The wastewater which starts in washing machines and households carried nutrients and pathogens.



SURFACTANTS

This lowered the surface tension in water which resulted to foams in the surface water.



BANANA PSEUDO STEM

Are used to cleanse out laundry waste water



ACTIVATED CARBON

The production of activated carbon electrodes from a banana pseudo stem for super-capacitor cell applications has been successfully performed.

Objectives of the Study

1. TO DETERMINE THE QUALITY OF RAW LAUNDRY WASTEWATER IN TERMS OF DIFFERENT PARAMETERS SUCH AS:

- 1.1 Surfactants (MBAS);
- 1.2 COD; and
- 1.3 BOD.

2. TO DETERMINE THE RATE OF EFFECTIVENESS OF BANANA PSEUDO STEM AS ACTIVATED CARBON IN TREATING LAUNDRY WASTEWATER BASED ON THE STANDARDS OF DENR ADMINISTRATIVE ORDER 2016-08 AND IN TERMS OF THE FOLLOWING PARAMETERS:

- 2.1 Surfactants (MBAS);
- 2.2 COD; and
- 2.3 BOD.

Significance of the Study

The production of sand, gravel, absorbent foam and banana pseudo stem as activated carbon helped the researchers as the Philippines itself is rich in raw materials.

The result of the study helped the laundry shop be aware if the wastewater could be reuse or discharged after the treatment.

Research Methodology

Conceptual Framework

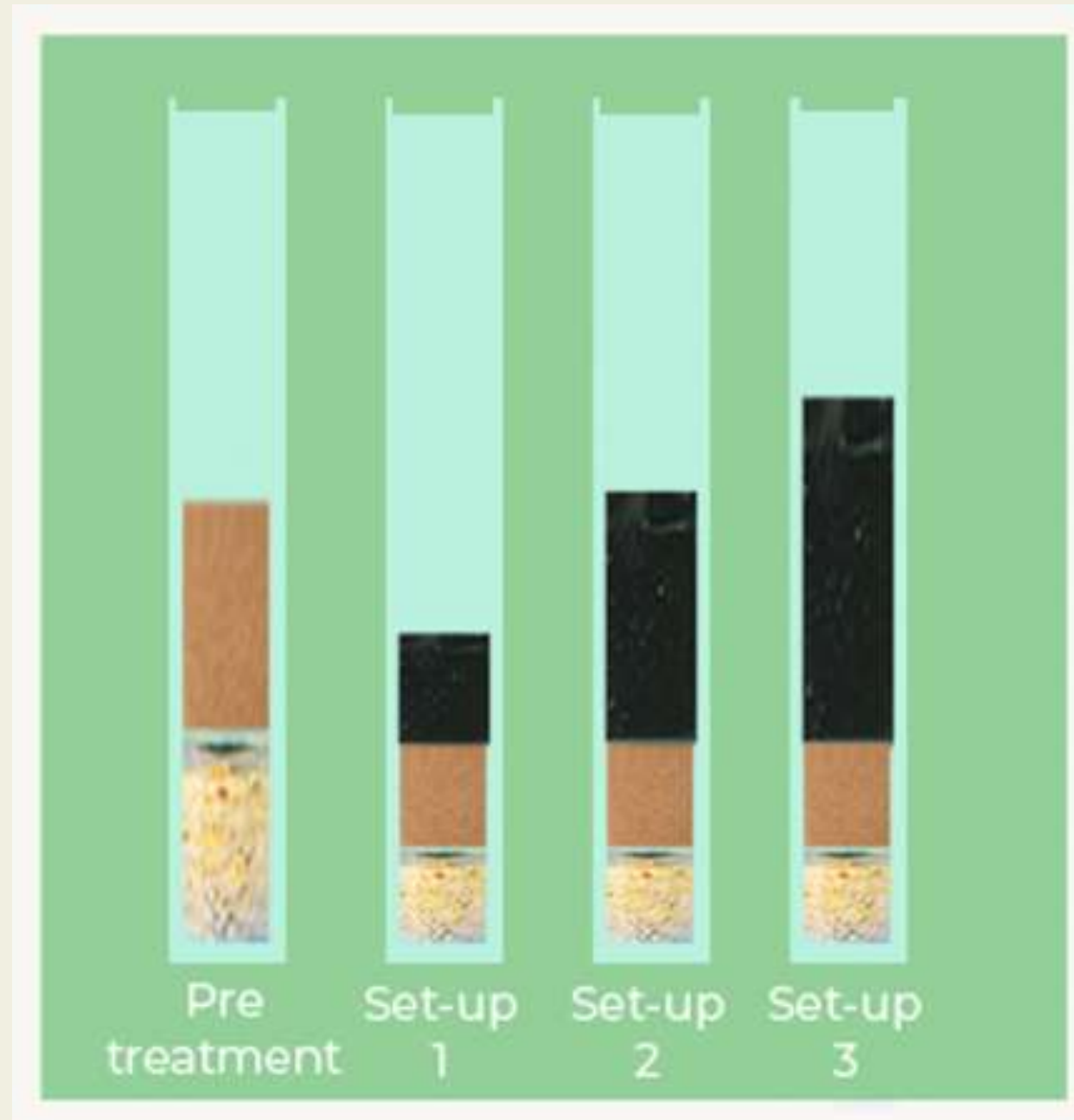


Data Gathering

Wastewater were collected in terms of **grab sampling method**.

The samples were brought at the laboratory for the testing of the parameters needed such as the **SURFACTANTS, COD and BOD**.

Improvised Filter System



Dimensions

Glass Filter:
2 ft x 2 ft

Pretreatment:
6 in x 6 in (Sand and Gravel)

Set-up 1:
3 in AC

Set-up 2:
6 in AC

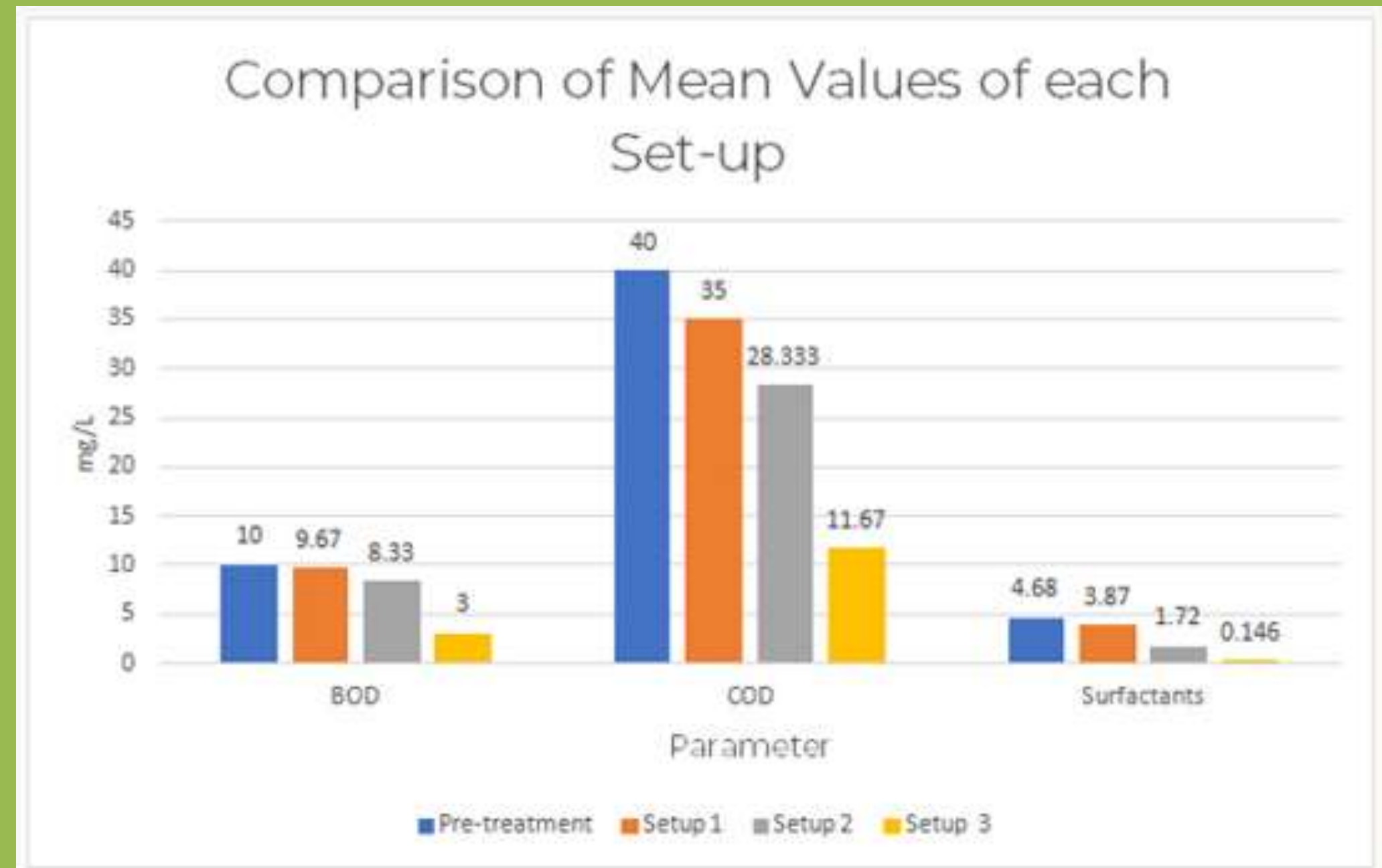
Set-up 3:
9 in AC

The collected water sample passed the sand and gravel filtration and the effluent were collected and tested and then the water sample passed through the three set ups which were consists of the different height of the activated carbon and also have the sand and gravel on it.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

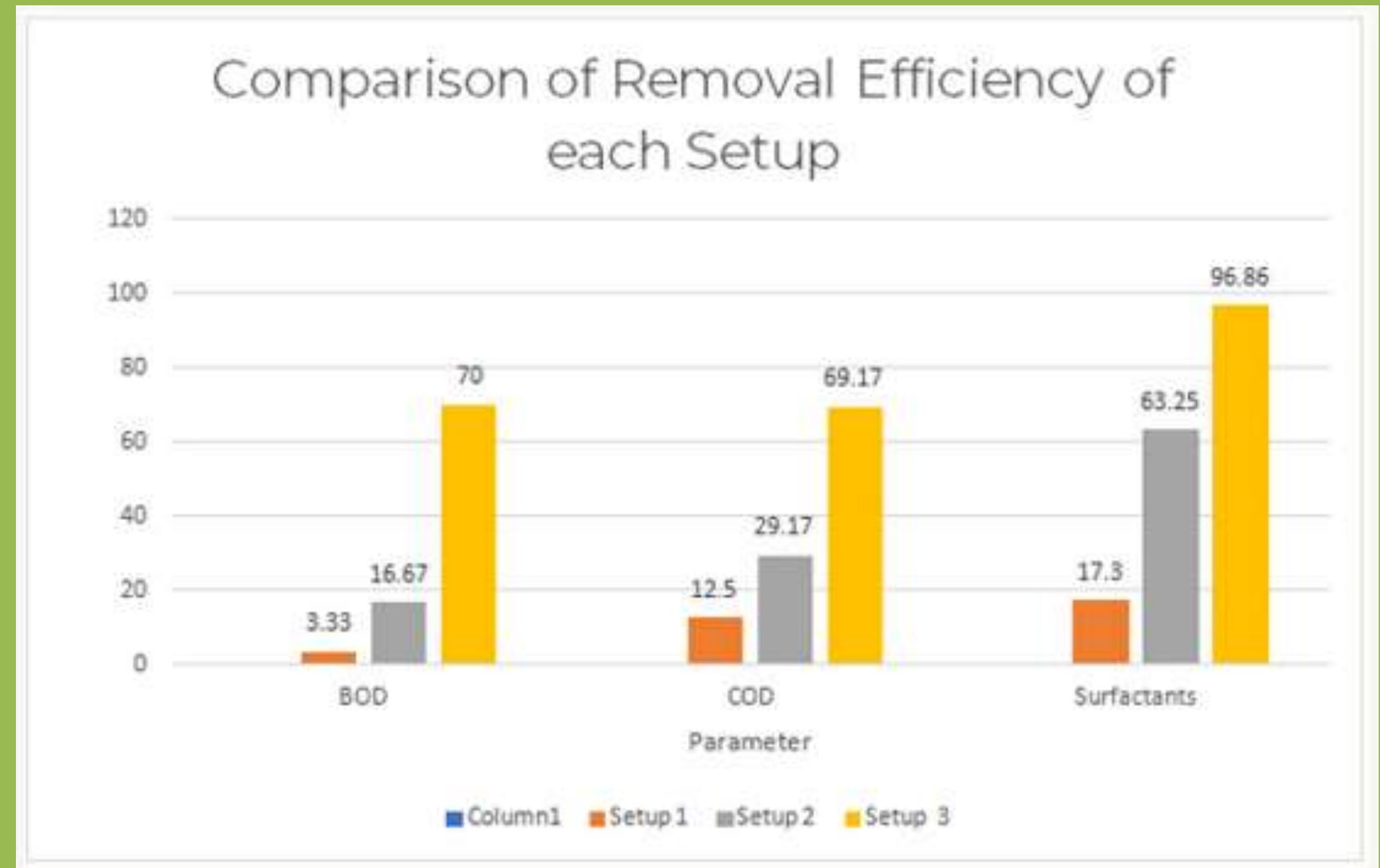
1. Based on the analysis of an accredited laboratory, the initial values of the untreated laundry wastewater in terms of BOD, COD, and Surfactants are 10mg/L, 70mg/L and 10.27mg/L, respectively.
2. Untreated wastewater was filtered with sand and gravel as pretreatment and values of percentage removal acquired in terms of BOD, COD, and Surfactants were 0%, 42.86% and 54.43%, respectively.



FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

3. The percentage removal of the sand, gravel and activated carbon filter was determined after analyzing the wastewater sample that passed through different variations of height of activated carbon.



FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

3.1 The values that developed from the first setup were:

3.1.1 On the first trial the percent reduction of the wastewater sample in terms of BOD, COD, and Surfactants were 10%, 12.5% and 19.01%, respectively.

3.1.2 On the second trial the percent reduction of the wastewater sample in terms of BOD, COD, and Surfactants were 0%, 12.5% and 16.88%, respectively.

3.1.1 On the third trial the percent reduction of the wastewater sample in terms of BOD, COD, and Surfactants were 10%, 12.5% and 16.02%, respectively.

<i>Parameter</i>	<i>Concentration</i>			<i>Average</i>	<i>Unit</i>	<i>Class</i>
	Trial 1	Trial 2	Trial 3			
BOD	9	10	10	9.67	mg/L	A
COD	35	35	35	35	mg/L	A
Surfactants	3.79	3.89	3.93	3.87	mg/L	A

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

3.2 The values that developed from the second setup were:

3.2.1 On the first trial the percent reduction of the wastewater sample in terms of BOD, COD, and Surfactants were 30%, 25% and 67.95%, respectively.

3.2.2 On the second trial the percent reduction of the wastewater sample in terms of BOD, COD, and Surfactants were 10%, 50% and 60.68%, respectively.

3.2.1 On the third trial the percent reduction of the wastewater sample in terms of BOD, COD, and Surfactants were 10%, 12.5% and 61.11%, respectively.

Parameter	Concentration			Average	Unit	Class
	Trial 1	Trial 2	Trial 3			
BOD	7	9	9	8.33	mg/L	A
COD	30	20	35	28.333	mg/L	A
Surfactants	1.50	1.84	1.82	1.72	mg/L	A

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

3.3 The values that developed from the third setup were:

3.3.1 On the first trial the percent reduction of the wastewater sample in terms of BOD, COD, and Surfactants were 80%, 70% and 97.01%, respectively.

3.3.2 On the second trial the percent reduction of the wastewater sample in terms of BOD, COD, and Surfactants were 60%, 87.5% and 96.79%, respectively.

3.3.1 On the third trial the percent reduction of the wastewater sample in terms of BOD, COD, and Surfactants were 70%, 50% and 96.79%, respectively.

Parameter	Concentration			Average	Unit	Class
	Trial 1	Trial 2	Trial 3			
BOD	2	4	3	3	mg/L	A
COD	10	5	20	11.67	mg/L	A
Surfactants	.14	.15	.15	.146	mg/L	A

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. The characteristics of the laundry wastewater in terms of BOD, COD, and Surfactants were low unlike the expected based from the related literature, the values were 10mg/L, 70mg/L and 10.27mg/L.
2. Third setup with the highest amount of activated carbon gives the highest percent of removal efficiency. The greater the amount of the activated carbon the more effective it is. The mean values of the parameters for three trials after filtrations in terms of BOD, COD, and Surfactants were 3mg/L, 11.67mg/L and 0.146mg/L.
3. The results of study showed that the banana pseudo stem activated carbon has been found to be an effective media of filtration treatment for reducing the amount of BOD, COD, and Surfactants from laundry wastewater.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

4. As per DAO 21-08, the water quality of the laundry wastewater was Class C which can be fishery water for the propagation and growth of fish and other aquatic resources, for boating, fishing, or similar activities and for agriculture, irrigation, livestock watering.
5. The water quality of the laundry wastewater was classified as Class A which can be intended as sources of water supply. Due to the current scarcity of water supply, this was a huge advantage to both the laundry shop and the environment. It might have a positive influence since it helps to preserve water.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

RECOMMENDATIONS

1. The column cells that will be used in the setup should be circular because the difference between circular and cube column cells is that circular column is more efficient than the cube column for the reason that when the wastewater passes through into the entire component enclosed in it. On the other hand, in cube column, the wastewater was not able to pass through on the entire components of cube column.
2. The setups should have sand and gravel filtration alone so that the percentage removal of it will be subtracted with the result of setup containing activated carbon to know the rate of the removal efficiency of Activated Carbon.

Thank you!