

Assessment of Pond water Quality in Lubok Bongor, Kelantan area

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Abstract

Recently, the water quality is deteriorating day by day due to anthropogenic input of dissolved nutrient and organic matter and industrial effluent, which is built up on its bank. So it is of vital importance to monitor and simulate the water quality parameters to ascertain whether the water is still suitable for various uses. Therefore in this paper, determination of the BOD and COD in the pond water samples in Lubok Bongor, Kelantan area. The BOD and COD were identified based on dissolved oxygen (DO). The results showed the value of BOD in the range of 2.58 ± 1.17 mg/L which indicated moderately clean and the demand for oxygen by the bacteria is lower. The observed value of COD was 94.2 ± 2.44 mg/L which showed the presence of high concentration of chemical present in pond water. Therefore, based on the results, it can be concluded that the pond water at Lubok Bongor are still safety to use for plants

Keywords. Biochemical oxygen demand (BOD); Chemical oxygen demand (COD); Pond water

Introduction

Standard wastewater and sewage contains plenty of organic matter, including food, soil, soaps and excrement. There are many methods used to measure the amount of organic matter present, or the organic strength of wastewater. Some methods involve calculating the amount of oxygen required to break down the material to a stable product [1]. This is a good measurement of wastewater strength because the amount of oxygen needed is proportional to the amount of organic material [2]. The amount of organic matter present within a water sample and the relative biodegradability of the organics may be estimated by analyzing samples for biochemical oxygen demand (BOD) [3]. A measured amount of BOD concentration in wastewater can tell us how well the treatment method is working, and how much more treatment needs to be done, if any, to achieve a stable end product. A high concentration of BOD is found in water bodies with excessive algal growth or a high level of organic matter. Low levels are associated with cleaner and clearer water bodies with a good level of decomposed material. BOD is the most important measurement that can be made in water quality analysis to determine the oxygen requirement in wastewaters, or polluted waters [4]. "The Chemical Oxygen Demand (COD) test uses a strong chemical oxidant in an acid solution and heat to oxidize organic carbon to CO₂ and H₂O. The test is not adversely affected by toxic substances, and test data is available in 1-1/2 to 3 hours, providing faster water quality assessment and process contro [5-6].

In this study was aimed to determine the e BOD and COD in pond water samples in Lubok Bongor, Kelantan area to confirm that the micronutrient in water sample are good for the public health.

Methods

For the collection of water samples, completely Randomized Selection method was used were selected in Lubok Bongor, Kelantan. The area is between 30 x 25 m and depth is 1 m. In this paper, 10 samples of water sample were tested



Figure 1: Water sample collection site at Lubok Bongor, Kelantan

For BOD, water samples were collected using randomized method. Record the DO level (ppm) immediately using the method described in dissolved oxygen test. Record the DO level (ppm) immediately using the method described in dissolved oxygen test. After 5 days, take dissolved oxygen reading (ppm) using dissolved oxygen test. Subtract the day 5 reading from the day 1 reading to determine the BOD level. Record the final BOD result in ppm.

For COD, water samples were collected using randomized method. DBR200 reactor a turned on and heat to 150°C. 100 ml of sample was homogenized in a blender for 30 seconds, the homogenization time was increased for a sample that containing large amounts of solid. The homogenized solid was poured into 250 ml beaker and stirred gently with a magnetic stir plate. The vial was inverted several times to bring the sediment in the bottom of the vial into suspension. 2.0 ml of sample was pipette into the vial, capped and cleaned the outside of the vial. The sample vial was inverted several times to mix and the sample vial became very hot during mixing. The sample was heated for 2 hours. The reactor was turned off and waited for about 20 minutes for the vial to cool 120 °C or less. The vial was inverted several times while still hot and was placed in the rack to cool at room temperature. The outside of the vial was cleaned and inserted into the cell holder. The instrument was read the sample.

Results and Discussion

BOD is a measure of the amount of oxygen removed from aquatic environments by aerobic micro-organisms for their metabolic requirements during the breakdown of organic matter, and the system with high BOD tend to have low dissolved oxygen concentration. Based on Table 1, the value observed for measuring BOD is 2.58 ± 1.17 mg/L. Generally, when BOD concentration levels are high, the demand for oxygen by the bacteria is high and they are taking that oxygen from the oxygen dissolved in water [7].

Table 1: Result of BOD

Sample	BOD (mg/L) 1st reading	BOD (mg/L) 2nd reading	BOD (mg/L) Total
1	9.56	6.97	2.59
2	9.47	7.13	2.34
3	9.67	7.04	2.63
4	9.63	6.89	2.74
5	9.45	7.19	2.26
6	9.50	6.96	2.54
7	9.60	6.98	2.62
8	9.65	6.89	2.76
9	9.54	6.83	2.71
10	9.62	7.05	2.57
Average			2.58 ± 1.17

Figure 2 shows the compression of the obtained BOD values with the Malaysia standard value. According to the standard BOD level at range for 1-2 indicates that there will not be much organic waste present in the water means it is very good of water quality. Range for 3-5, means the moderately clean of water quality. Range for 6-9 (usually indicates organic matter is present and bacteria are decomposing), means the poor of water quality. Lastly, range for 100 or greater (contains organic waste), means very poor or very polluted of water quality. The value reading below 3mg/L which is the Malaysian standard value means that it moderately clean and the demand for oxygen by the bacteria is lower.

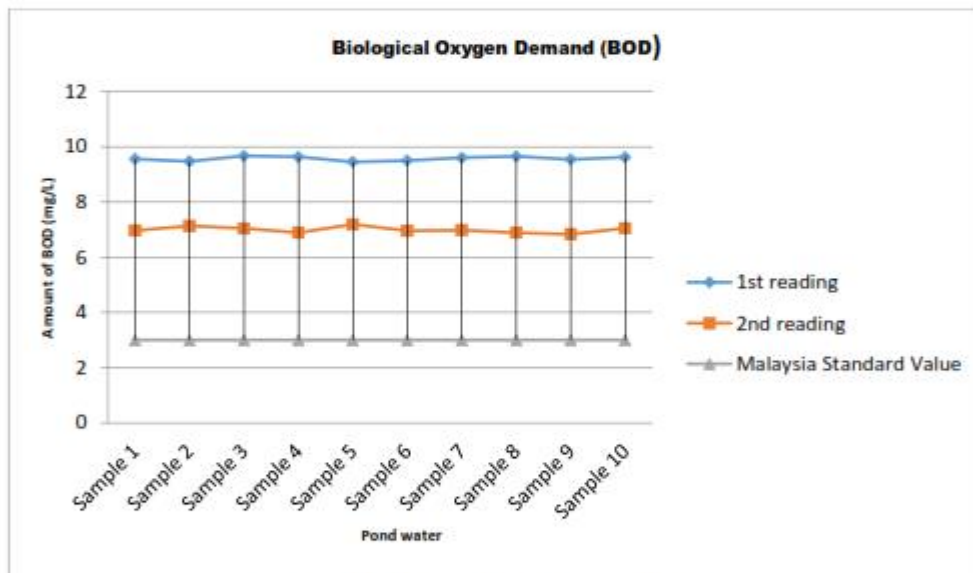


Figure 2: Amount of biological oxygen demand (BOD)

Chemical oxygen demand (COD) is a measure of the oxygen equivalent of the organic matter in a water sample that is susceptible to oxidation by a strong chemical oxidant. Based on the Table 2, the value observed for measuring COD is 94.2 ± 2.45 mg/L.

Table 2: Result of COD

Sample	COD (mg/L)
1	93.0
2	97.0
3	96.0
4	95.0
5	92.0
6	98.0
7	91.0
8	95.0
9	92.0

10	93.0
Average	94.2 ± 2.45

Figure 3 shows the comparison of the obtained values with the Malaysia standard value. The value reading for COD is quite high and it is above 25mg/L which is the Malaysian standard value. Thus, we can conclude that high amount of concentration of chemical present in water sample of *Ipomoea aquatica*. Thus, we can conclude that high amount of concentration of chemical present in the Kg Lobok Bongor pond water because of excess fertilizers of crop.

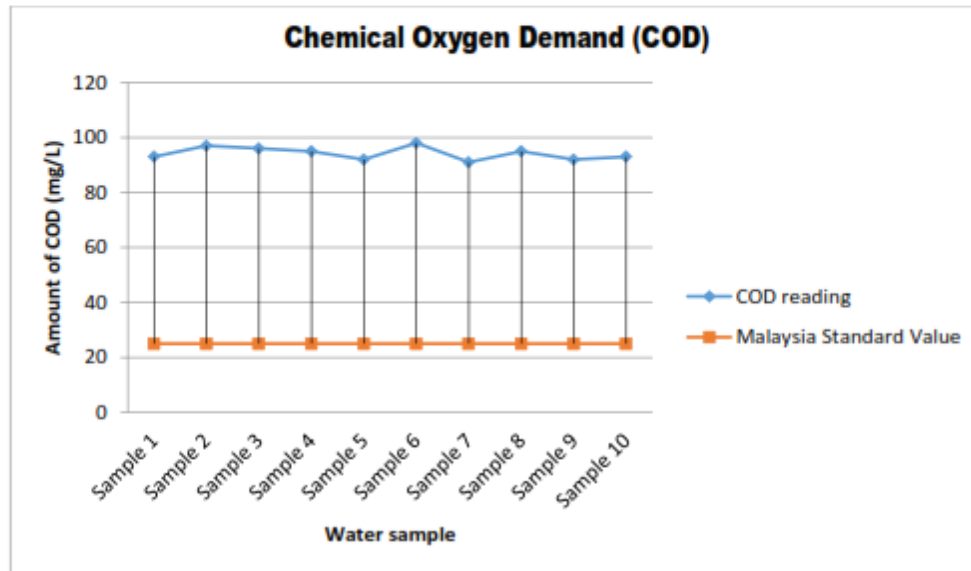


Figure 3: Amount of chemical oxygen demand (COD)

Conclusion

In conclusion, the level of BOD and COD are clearly shown moderately level. Therefore that the pond water at Lubok Bongor does not have any toxic effect and still safety to use.

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