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TREATMENT EFFICIENCY OF RICE HUSK ON WASTE WATER

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Abstract - *Water plays an important role in human development and are on important finite natural resource, the physio-chemical characteristics of water determined to examine the water quality. The study of water quality involves a description of occurrence of various contaminants in water use. The present study was undertaken to carry out a quality assessment and analysis of organic matters on behalf of diary waste water and river waste water using rice husk as adsorbent. Parameters like Turbidity, Alkalinity, Hardness, BOD (Biochemical Oxygen Demand) and TSS (Total Suspended Solids), are tested to find the effect of particle size on the removal efficiency, the effect of dosage of rice husk on removal efficiency and the effect of time on removal efficiency.*

Key Words: **Alkalinity, BOD, Diary waste water, Hardness, River Water, Rice Husk, Turbidity, TSS.**

1. INTRODUCTION

Waste water treatment is the process of converting waste water-water that is no longer needed or is no longer suitable for use-into bilge water that can be discharged back into the environment. It is formed by a number of activities including bathing, washing, using the toilet, manufacturing processes in factories and rainwater runoff. Waste water is full of contaminants including bacteria, chemicals and other toxins. Its treatment aims at reducing the contaminants to acceptable levels to make the water safe for discharge back into the environment.

The quantity of waste water is increasing day by day due to increased population and production. Technologies such as coagulation or flocculation process and oxidation process have been developed over the years to remove organic matter from industrial waste water. These methods are effective in fields of reduction and time but are expensive and require skilled personnel. They also need sludge treatment before disposing and hence such treatments are non-economical and they need large power demand, more chemical consumption and large area.

2. OBJECTIVES

1. To find the percentage reduction of BOD, Hardness, Alkalinity Turbidity and Total Suspended Solids (TSS) in waste water by the use of rice husk.
2. To study the effect of variation in particle size, time and dosage of rice husk on the treatment efficiency.

3. METHODOLOGY

The following methodology has been adopted in the present study:

1. Collected samples for testing

Samples collected for testing are diary waste water and river water. Diary waste water is collected from Milma society, vazhithala, Kerala and River water is collected from Thodupuzha river, Kerala.

Fig -1: Diary waste water

Fig -2: River water

2. Collected rice husk.

Rice husk which is the protective outer layer of the rice grain is abundantly available as a byproduct of therice milling industries. It has been estimated that the annual production of rice husk is estimated to be around 120 million tones, consulting about one-fifth part of the total annual rice production throughout the world. The composition of rice husks is found to consist of about 32% cellulose, 21% lignin, 21% hemicellulose, 20% silica and 3% crude protein. Moreover their granular structure containing abundant floristic fiber, insolubility in water, chemical stability and high mechanical strength make them potential adsorbent. They also consist of functional group such as carboxyl, hydroxyl and amidogen, representing a favorable characteristic of rice husk. Silica present on the external surface of rice husks in the form of silicon-cellulose membrane is responsible for insufficient binding between the functional groups existing on rice husk surfaces and adsorbate ions or molecules present in solution. Presence of wax and natural fats on the internal surface of rice husk as impurities has also got impact on the adsorption properties of rice husk chemically and physically.

Fig -3: rice husk

3. By analyzing data through literature study Determined Size, Dosage, Time interval of Rice Husk for testing.

   A. Selected the variation in dosage of rice husk as 5g/l, 10g/l, 15g/l, 20g/l and 25g/l.

   B. Selected the Size of the Rice Husk,

   - Size A- Passing through 1.18mm and retaining on 600 micron IS Sieve.
   - Size B- Passing through 600 micron and retained on 300 micron IS Sieve.

Fig -4: Rice husk sieved through IS Sieves

   C. Variation in time for the test is taken as 24 hours, 48 hours and 72 hours.

4. Tests Done Such As Alkalinity, Hardness, Turbidity, BOD and TSS.

Tests like BOD, Hardness, Alkalinity, Turbidity and TSS were done in each stage by varying dosage 5g, 10g, 15g, 20g, 25g, by varying size of rice husk (size A and size B) and by varying time to 24hr, 48hr and72 hr of addition of rice husk.

4. RESULTS AND DISCUSSION

4.1 Effect of rice husk on diary waste water and river water by varying dosage.

The effect of rice husk on river water and diary waste water by varying dosage as 5g, 10g, 15g, 20g and 25g are shown in chart 1 and chart 2. It is observed that the maximum removal efficiency is obtained at 20 grams of rice husk. At 25 grams the removal efficiency is almost constant.

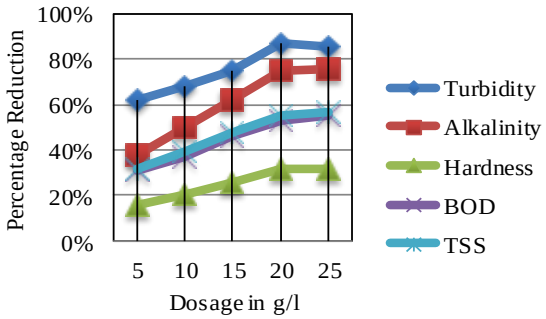

Chart -1: Effect of rice husk by varying dosage on diary waste water

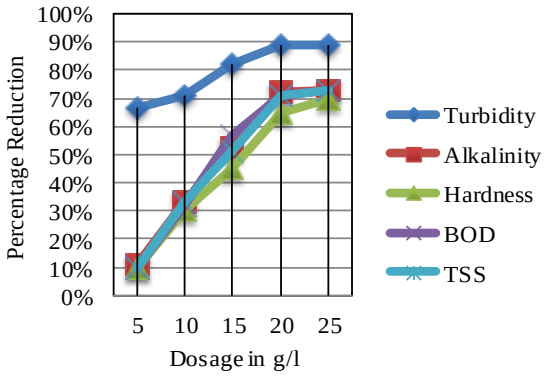

Chart -2: Effect of rice husk by varying dosage on river water

4.2 Effect of rice husk on diary waste water and river water by varying size.

Chart 3 and chart 4 shows the removal efficiency of rice husk on diary waste water and river water by varying size. It is clear that 300 micron sized particles have higher impurity removal since it has larger surface area.

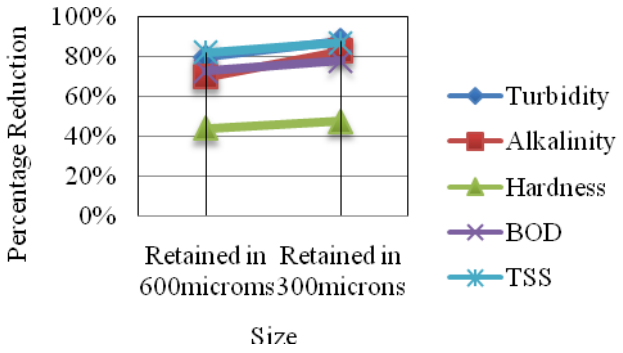

Chart -3**: Effect of rice husk by varying size on diary waste water**

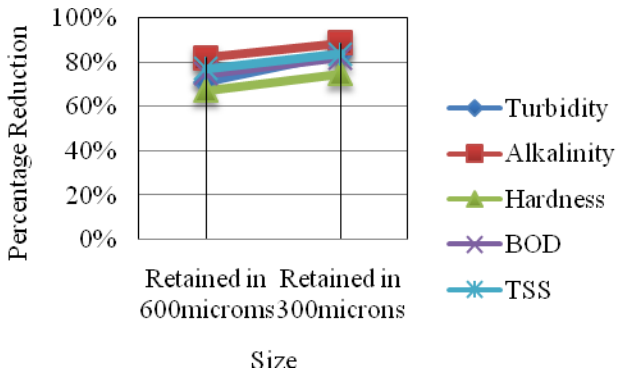

Chart -4: Effect of rice husk by varying size on river water

4.3 Effect of rice husk on diary waste water and river water by varying time.

The removal efficiency of rice husk by varying time is given in cart 5 and chart 6. From the figure it is clear that reduction of impurities is maximum at a time period of 48 hours after that it shows less reduction. More over BOD of both water samples starts increasing after 48 hours.

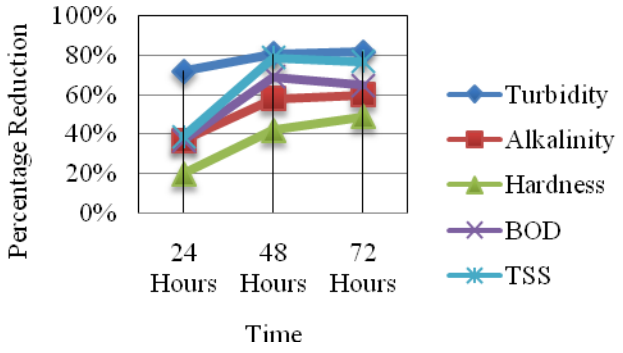

Chart -5: Effect of rice husk by varying time on diary waste water

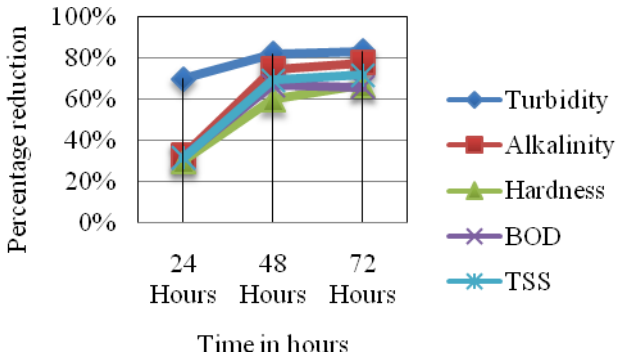

Chart -6: Effect of rice husk by varying time on river water.

5. CONCLUSIONS

This study investigates the effect of rice husk on removal efficiency of impurities contained in river water and diary waste water. The following conclusions can be drawn:

1. Rice husk can reduce BOD, Turbidity, Alkalinity, Hardness and TSS from water.
2. As time increases adsorption also increases. But after the time period of 48hr-72hr adsorption rate is very less. So maximum adsorption takes place in 48 hours.
3. 300 micron sized rice husk has the capacity to adsorb more since it has larger surface area.
4. Similarly maximum adsorption occurs at a dosage of 20g/l.
5. Since rice husk is abundantly available and a cheap material, this study shows that it can be used as an adsorbent for all industries for removal of BOD, TSS, Turbidity, Alkalinity and Hardness.

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