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Treatment of the Water Generated From Dye – Industry

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Abstract – Dye waste water are one of the most problematic pollutants because they can be easily identify by the human eye & the dye waste water not easily biodegradable. Colour present even at a very low concentration of 1mg/l will be easily visible. Textile industry produced a large amount of highly coloured waste water containing varieties of dyes in different concentration. Treatment of textile dying industries has been a challenging task yet now in many part of the world problem in the treatment of textile dye industries are majorly the removal of pollutants like colour, BOD, COD AND TDS. In the textile industry there are different type of process are used. The effluents resulting from these process differ greatly in composition. Characterisation of textile dye industry effluents is of great importance for the separate treatment of process streams. Different Colour is released in a greater percentage from dying process of textile industries. Coloured waste water from dye industries is rated as the most polluted is almost all industries sector. The review paper is about which type of treatments are performed and what type of treatment are economical for the treatment of dye waste water. In the review paper the major consideration of the economical treatment, because there are many different process and different methods are available but some method are costlier and some are economical. Economical methods are suitable for most of the small as well as large industry. The reviews provide an overview of the types of method and low cost treatment method.

Key Word: - Textile Waste Water, Adsorption, Activated Carbon, Rice Husk

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1. INTRODUCTION

Textile industry plays an important role in the economy of our country. Dyeing industry is one of the largest water consuming industries. The effluent coming out of the dyeing industries contains various type of chemicals and colouring compounds and the effluent requires proper treatment before it is discharged into any water body. But, the dye house effluents are very difficult to treat satisfactorily because they are highly variable in composition.

In most condition, the use of a combination of different methods of treatment is necessary in order to remove all the pollutant element present in the wastewater. The main methods are Chemical coagulation, biological method, membrane filtration, advanced oxidation and adsorption. Therefore, physicochemical wastewater treatment which contain a low cost treatment, In which adsorption is one of the method which is economical and low cost method. There are many methods to treat dyeing wastewater. Adsorption became one of the most effective methods to remove colour from textile waste water.

Figure: - Textile industrial waste water spreading on land and aquatic system

2. BACKGROUND AND LITERATURE REVIEW:-

Reviews on low cost adsorbents for the removal of dyes from wastewater are presented as follows.

3. METHODS AND MATERIALS: -

Methods:-

1. Physicochemical wastewater treatment

1.1 Equalization and homogenization

1.2 Floatation

1.3 Coagulation flocculation sedimentation

1.4 Chemical oxidation

1.5 Adsorption

1.6 Membrane separation process

2. Biological wastewater treatment method

2.1 Aerobic biological treatment

2.2 Anaerobic biological treatment

3. Biochemical and physicochemical combination processes

4. Cutting-edge treatment process

All the above mention method in which low cost method is use for the treatment of dye waste water. So the Adsorption process is suitable in which some type of activated carbon are expensive and some type of activated carbon are not expensive (low cost). The rice husk, as raw material, collect from the local market to produce activated carbon. First of all, the rice husk is dry in open place in the air. Then, a low-cost furnace is used. The low-cost furnace is develop to produce activated carbon in the laboratory.

■ **Adsorption:-**

Activated carbon:-

Activated carbon is used for the textile wastewater decolorization. The low-cost activated carbon production from locally available materials. Adsorption studies with activated carbon derived from rice husk gave 75~90% colour reduction from textile wastewater whereas the industrial grade activated carbon give only 12~35% colour reduction. The BOD, COD values, Cl-, Mn, PO4- also reduce at about 90~93%, 67~80 %, 50~60 %, 63~87% and 63~87%, respectively from textile wastewater.

► **Production of activated carbon**

Firstly, take a container, then the container bottom is fill up by raw material and then a separator tray is place on it. A second layer of raw material is place on the tray and another tray is place on it. There was one inch (1") gap between bottom layer of the material and the tray. The raw materials in the bottom layer were compacted to a dense condition while the second layer of raw material on the tray is place in a loose condition. After filling the 3 container with raw material, the top of the container is close and sealed with clay. The container is then placed in a furnace. Then the cover of the furnace close and also seal with clay. The fuel place on the grit and start burning. The smoke, produce in the furnace, entered the pot through the bottom opening and passed through the top opening connected with furnace vent line. The heated air and high rise in ambient temperature was effective for the preparation of activated carbon. The smoke came out from the furnace is also observed and initially it is black. The furnace is fuel until the colour of the smoke is change to white. When the colour of the smoke is turn into white, all the openings were sealed with clay. The outlet temperature is found to be 86^0C. Then the sealed furnace was kept unopened for 24 hours and after this time interval the prepared activated carbon is brought out from the container.

► **Textile wastewater treatment**

In conical flask, 100 mL of each textile wastewater sample was taken and take 1.0 g, 3.0 g, 5.0 g and 8.0 g of laboratory grade activated carbon and take 1.0 g, 3.0 g, 5.0 g, 8.0 g, 11.0 g and 14.0 g of prepared crushed activated carbon, prepared activated carbon and two types of commercial grade activated carbon were added to conical flasks. Conical flasks are than subjected to mixing in a horizontal shaker at 200 rpm for predefined maximum adsorption time, 60 minutes and at 40 ^{0}C temperature. Adsorbents were removed by filtration in order to get the clear samples. Percent transmittances of the filtered samples were measured. Experiments were repeated trice all other physico-chemical parameters were measured as per Standard Methods (American Water Work Association, 2005). The results are expressed as average values with standard deviation. Spectrophotometer was used for measuring percent transmittance for measuring the colour.

4. DATA AND RESULTS

Table: - common effluent treatment methods

Physical treatment	Chemical treatment	Biological treatment
Sedimentation	Neutralization	Stabilization
filtration	Reduction	Aerated lagoons
Flotation	Oxidation	Trickling filters
Foam fractionation	Catalysis	Activated sludge
Coagulation	Ion Exchange	Anaerobic sludge
Reverse osmosis	Electrolysis	Fungal treatment
Solvent extraction	flocculation	Stabilization
Ionization	-	-

radiation		
Adsorption	-	-
Incineration	-	-
Distillation	-	-
Membrane treatment	-	-

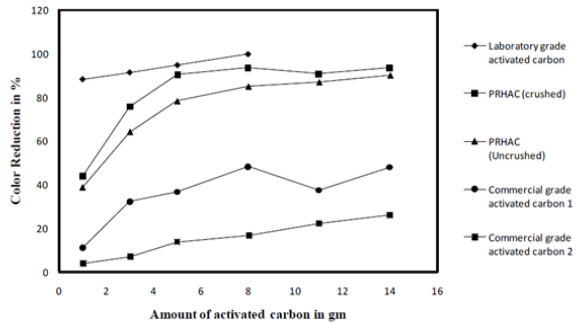

FIG: - Percentage removal of different type's activated carbon

(source: - https://www.researchgate.net/publication/25903072)

5. CONCLUSION

So finally we have conclude that Water is one of the most important sources on earth for the survival of humans and all living Things. We all know if there was no water there would be no life on the earth. As an ancient

Greek philosopher, Empedocles held that water is one of the four classical elements along with fire, earth, and air, and was regarded as the ylem, or basic substance of the universe.

The polluted water without proper treatment is drift age into water streams which lead to pollute the potable water used for the primary purpose which results in the scarcity of potable drinking water.

Adsorption studies with the activated carbon derive from rice husk give comparable and better performance than that of industrial grade activated carbon for decolorization of textile wastewater. Textile wastewater treated with activated carbon reduces BOD, COD, Manganese, Phosphate, and Chloride.

The adsorption capacity depends on the type of adsorbent and the nature of wastewater.

The expensive adsorbents can be replaced by the low cost adsorbents for the removal of dyes from

Wastewater. More research should be carried out to treat other industrial effluents for the exploration of low cost adsorbents and to demonstrate the technology effectively.

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"If you want to go fast, go alone, but if you want to go far, go together"

African proverb

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