

PERFORMANCE ASSESSMENT OF TREATMENT OF WASTEWATER USING ACTIVATED CARBON PREPARED FROM VAGAI TREE AS ADSORBENTS.

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Abstract - Due to the presence of contaminants in wastewater, the importance of wastewater treatment using inexpensive sorbents is very important. This study describes the production of activated carbon from the bark of the VAGAI TREE (*Albizia lebbek*) and the feasibility of adsorption and flocculation in domestic wastewater treatment. Plants are abundant in tropical regions. Activated charcoal is dried and powdered tree bark. It was washed with an acetic acid solution to decolorize and held in a muffle furnace at 650° C. to dry again. The effect of activation temperature of activated carbon was studied. We found that the continuous release of volatiles and combustion of carbon via weak carbon-CO₂ oxidation resulted in significant weight loss during the activation process, resulting in an increase in solid density and a decrease in bulk density. I was. The adsorption properties of Vagai bark were studied in a batch system by considering the influence of various parameters such as contact time, initial concentration, pH, temperature, stirring speed and absorption amount. Adsorption was pH dependent, with maximum adsorption capacity observed at pH 4.5–5.8. Haze and dissolved solids removal efficiencies are 98% and 97%, respectively. The results showed that the low-cost biosorbent was effective in removing contaminants in wastewater.

Keywords – **activated carbon, adsorption, coagulation, biosorbents, wastewater.**

1.Introduction

Water is used by humans for a variety of purposes, but the purity of the water consumed is very important as it directly affects health. Treated water is very expensive as traditional water purification methods using aluminum sulfate (alum) and calcium hypochlorite are imported.

Coagulation : Coagulation is an important process in water and wastewater treatment and is used to remove total suspended solids (TSS), chemical oxygen demand (COD), and turbidity. The most common coagulants are aluminum and iron based salts. Other coagulants include polyacrylamide (PAA) and chitosan (a biodegradable, non-toxic, high molecular weight linear cationic polymer). Also, the chemicals used to treat water pose serious health hazards, especially if problems arise during the treatment process. High levels of aluminum sulfate in the brain have been identified as a risk factor for Alzheimer's disease and as a causative agent of neuropathy.

B. Exchange problems such as pre-senile dementia are identified. Alum is also used as a coagulant. There are also many concerns about the use of aluminum sulfate and the negative impact of disposal on the environment from the continued use of alum as a coagulant in water treatment. This

is due to the non-biodegradability and high disposal costs of sludge from water supplies. The high cost of these chemicals has been found to account for approximately 35-70% of the ongoing costs of water treatment plants. Inexpensive adsorbents can reduce the cost of applying adsorption technology (Onundi et al., 2010). Activated carbon adsorption appears to be a particularly competitive and effective method for removing total suspended solids (TSS), chemical oxygen demand (COD), and turbidity.

The genus *Albizia* (Fabaceae) has about 150 species native to tropical and subtropical regions of Asia and Africa, mainly trees and shrubs. *Albizia lebbek* was imported from India many years ago and is well adapted to the harsh environmental conditions of central Saudi Arabia. Current literature indicates that some plants of the genus *Albizia* have excellent medicinal properties. *Albizia lebbek* is a well-known tree in the Indian subcontinent for its versatile uses. *Albizia lebbek* is used in Indian folk medicine to treat various inflammatory conditions such as asthma, arthritis, and burns. *Albizia lebbek* inhibited passive cutaneous anaphylaxis and mast cell degranulation in rats. Furthermore, we were able to protect sensitized guinea pigs from antigen-induced anoxic convulsions. Recently, alcoholic extracts have been found to have antihistamine properties, directly neutralizing histamine or through corticotropic effects, as evidenced by increased plasma cortisol levels. In addition, saponins from *Albizia lebbek*, claimed to be useful in the treatment of Alzheimer's and Parkinson's disease. The leaves are said to have antispasmodic and nootropic effects, possibly due to the presence of certain key compounds such as alkaloids and flavanoids.

2. Materials and Methods

Albizia lebbek is a species of *Albizia*. It is a spiny deciduous tree that grows up to 50 feet tall and is widely distributed in central and northern India. Ayurveda recognizes the use of *Albizia lebbek* as invaluable due to its powerful astringent and antioxidant properties. All reagents used in this study were of analytical grade, Distilled water was used to prepare the extract. *Albizia lebbek* bark powder was collected from nearby farmland. The bark of *Albizia lebbek* was thoroughly washed with water and dried in the sun at room temperature for 3 days. Finely chop the bark and grind. It was then sieved by passing 300 μ and holding at 150 μ .

2.1 Adsorbent preparation:

sieves were washed with HCl solution and destained overnight. Then, it was cooled, washed with distilled water to remove acid, oven-dried at 150° C. for 1 hour, activated in a muffle furnace at 400° C., and the activated carbon was cooled to room temperature.

Wastewater Sampling:

Sample was collected from boys hostel mess at the place before the waste water enters into the sewage treatment plant. It is collected in a two litre plastic bottle. And its preserved in refrigerator

2.2 Treatment Process of wastewater

The waste water can be diluted with distilled water in the ratio of 350ml in 1ml (1ml of waste water). This proportion can be mixed. Three Conical flasks was taken each of had 100ml of diluted waste water and added the

prepared adsorbent material such as activated carbon. Dosage of adsorbent can add 0.1g, 0.2g, 0.3g respectively. After that the conical flask was kept in rotary shaker for 4 hours because the adsorbent can mixed with diluted waste water thoroughly. After 4 hours the conical flask was taken from rotary shaker, this sample was used for our project to determine the adsorbent and coagulant as well comparatively evaluate that.

2.3Coagulation experiment

Jar testing or multiple spindle stirrers which consist of six beakers mixing paddle and a gauge for maximum 250 revolution per minutes (rpm).The experiment was performed by using water sample having constant turbidity’s. For each water sample, six beakers was filled up to 1000ml, placed in the jar tester, agitated at 30 rpm for 5 min.

Various concentrations of stock solutions was added to each of the beakers and then agitated further for 5 min at 150 rpm to achieve uniform mixtures.

The mixing speed was then reduced to 30 rpm and maintained at slow mixing for 30 min, followed by Sedimentation for 30 min, after which 5 ml of sample was collected at approximately 5 cm from the top of water surface for residue turbidity measurement followed by pH, turbidity, Total solids, and COD measurements.

3. RESULT AND DISCUSSION

3.1 Adsorption results with moderate sample.

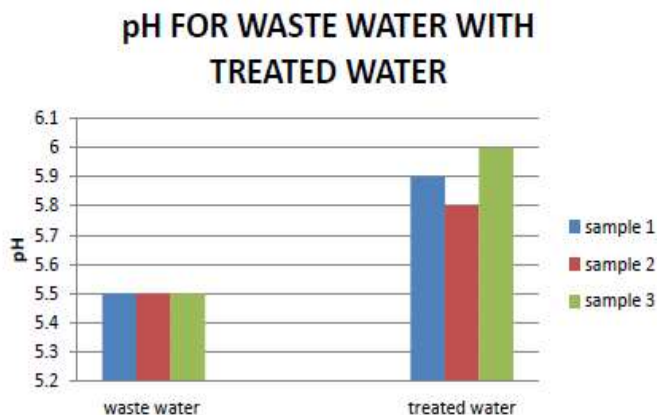


Fig 3.1.1 Graph for Waste water And Sample Water of PH

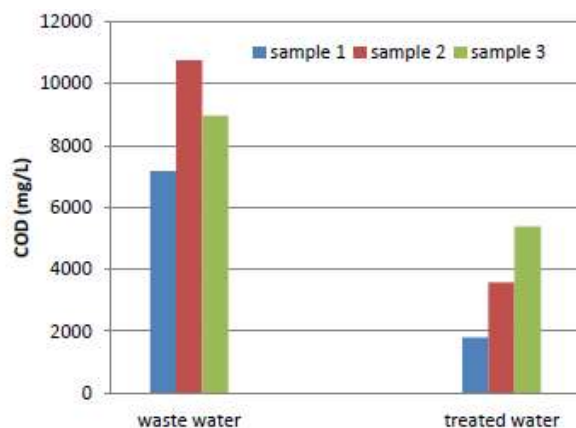


Fig 3.1.2 Graph for Waste water With Treated Water of
COD Calculation

3.2 Adsorption studies with acidified sample

**ADSORPTION OF ACIDIC SAMPLE
WITH WASTE WATER**

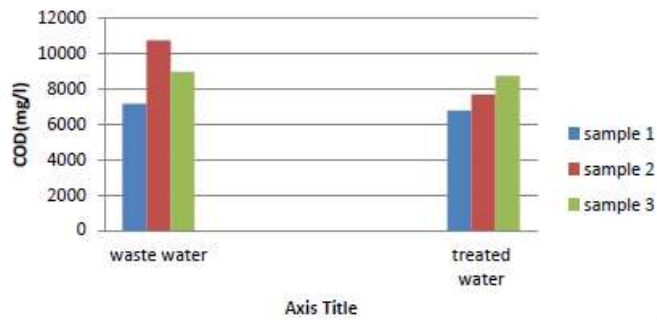


Fig 3.2.1. Graph for Wastewater and Sample Water in
acid of COD

3.3 Adsorption studies with basic sample

**ADORPTION OF BASIC SAMPLE WITH
WASTE WATER**

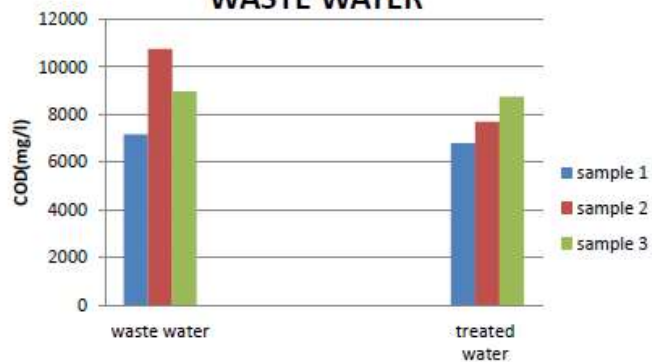


Fig 3.3.1 Graph for Wastewater and Sample Water
for base of COD

3.4 Coagulant Results:

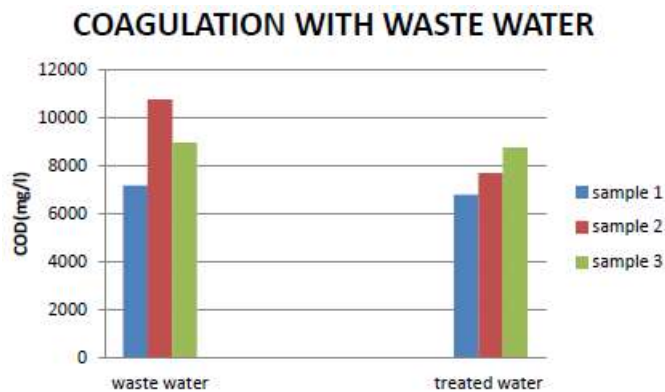


Fig 3.4.1 Graph for sample water and wastewater of Cod

3.5 Comparative Evaluates of Adsorption And Coagulation:

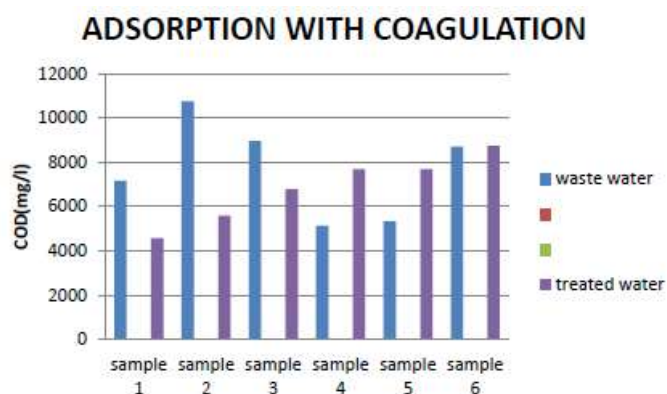


Fig 3.5.1 Graph for Adsorption and Coagulation

5. CONCLUSIONS

The substrate materials are not only cheap, inexpensive, and easily available but needs simple processing for effective removal of impurities without use of any sophisticated equipment or expert attention.

It could be effective alternative to conventional adsorbents like activated charcoal or alumina and expensive ion exchange resins. Application of this adsorbent to wastewater treatment is expected to be economical and efficient. *Albiza lebbeck* is a good adsorbent and coagulant. In our project we discussed and finalized the comparative evaluation of adsorption and coagulation using *albizia lebbeck*.

The results was obtained after the treated water by using natural material of vagai tree (*Albizia lebbeck*) pH results range 5.8-6 , and turbidity range 25-30 NTU, and the COD range has to obtained optimum range.

5. REFERENCE

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