

## Sugar Industrial Waste Water Treatment by Using Low Cost Adsorbents Banana Peel, Orange Peel & Bilva Leaves

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**Abstract:** Low cost by-products from agricultural, household and industrial sector have been recognized as a sustainable solution for waste water treatment. They allow achieving the removal of pollutants from waste water and at same time to contribute to the waste minimization, recovery and reuse. For this scope, low cost adsorbents have been divided into several groups like agricultural waste, house hold waste, industrial by-products, sea materials soil etc. The affinity of adsorbents in removing various pollutants from waste water can be discussed.

**Key Words:** Activated carbon, adsorption, Low cost adsorbents, pollutants, COD, BOD, DO, P<sup>H</sup> and Hardness etc.

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### I. Introduction

**Sugarcane** (or **sugar cane**) is a genus of plants. There are between 6 and 37 types of sugarcane (how many there are depends on the interpretation of what is a grass and what is not). Sugarcane grows in warm and tropical climates India in Asia is second biggest producer after Brazil. Sugarcane stalks grow to between 2 and 6 meters tall. These stalks contain sugar, which is used to sweeten food and drinks. After the sugar has been taken out the remains of the stalks can be burned to generate heat and electricity. It can also be made into paper, cardboard and cutlery. This crop requires high temperature and high rainfall. In areas of low rainfall this crop is cultivated with the help of irrigation. Black soil or alluvial soil is the best for this crop. Sugarcane requires a large amount of water. That is why holding deep soil is required. As this crop absorbs nutrient matter from the soil, compost manure and chemical fertilizers are used. It wants 75-100cm rainfall.

### II. Materials and Methods

#### **Material and Methods:**

**Banana peels:** Fresh banana peels are to be collected from domestic wastes, as its availability and transportation was easy. Banana peel contains lipids (1.7%), proteins (0.9%), crude fiber (31%) and carbohydrates (59%). The various minerals present are potassium (78.10 mg/g), manganese (76.20 mg/g), sodium (24.30 mg/g), calcium (19.20 mg/g) and iron (0.61 mg/g). The peels were washed several times with tap water and followed by distilled water. The washed material then cut in to small pieces and allowed to dry in a hot air oven at 80°C for 24 hours. The moisture content was lost from it and the color change was observed from yellow to brownish black. The dried material was finely ground and screened through the sieves of cut size of 150-212 micro meter.

**Orange peels:** Orange peel powder was selected as adsorbent for carbon dioxide. Oranges were collected from local market, and peeled. Peels were washed thoroughly to remove dirt, dried and powdered. The powder was analyzed for chemical composition, structure and surface area. Original powder used for the capture of carbon dioxide. Carbon was made from the powder with the help of 98% H<sub>2</sub>SO<sub>4</sub>. The yield of reaction was 66.3% with concentrated H<sub>2</sub>SO<sub>4</sub> and orange peel powder to produce carbon. The continuous experiments were carried out for different weight of the material, and different flow rate of gas.

**Bilva leaves:** Collected from Nearby Home.

#### **Mixed Adsorbent:**

The mixed adsorbent plays a vital role reducing cost of the treatment process. The adsorbents are mixed in a homogeneous proportion in a batch mode with the adsorbents to be used. The study involves using the above adsorbents and converting them to mixed activated carbons. The material which can be employed for preparing mixed adsorbents includes Silica gel, Laterite, Bauxite, Dolomite etc which are even the byproducts of industrial process and are usually discarded like bauxite (aluminium ore) and so on.

The material are capable of providing the characteristics relating to that of the effluents, ex: The distillery spent wash is acidic in nature (pH about 3.4) and the mixed adsorbents secondary adsorbents which can be employed to this effluent is laterite, which is basic in nature. Another reason for using these materials is

its abundant availability. In this study, the mixing material to be used is 'silica gel as the seo industry effects are basic in nature (pH around 12).

### III. Result and Discussion

1) Hardness of Water:

Before Filtration	14.6cc		
After filtration	Banana Peel	Orange Peel	Bilva Leaves
	5cc	8.9cc	24.9cc

2) Calcium:

Before Filtration	0.22mg		
After filtration	Banana Peel	Orange Peel	Bilva Leaves
	0.16mg	0.089mg	0.032mg

3) Magnesium:

Before Filtration	0.69mg		
After filtration	Banana Peel	Orange Peel	Bilva Leaves
	0.096mg	0.528mg	0.0192mg

4) TDS:

Before Filtration	897ppm		
After filtration	Banana Peel	Orange Peel	Bilva Leaves
	837ppm	884ppm	879ppm

5) Dissolved Oxygen:

Before Filtration	29.6cc		
After filtration	Banana Peel	Orange Peel	Bilva Leaves
	12.4cc	20.6cc	19.1CC

6) BOD:

Before Filtration	17.3cc		
After filtration	Banana Peel	Orange Peel	Bilva Leaves
	7.0cc	10.4cc	7.8cc

7) COD:

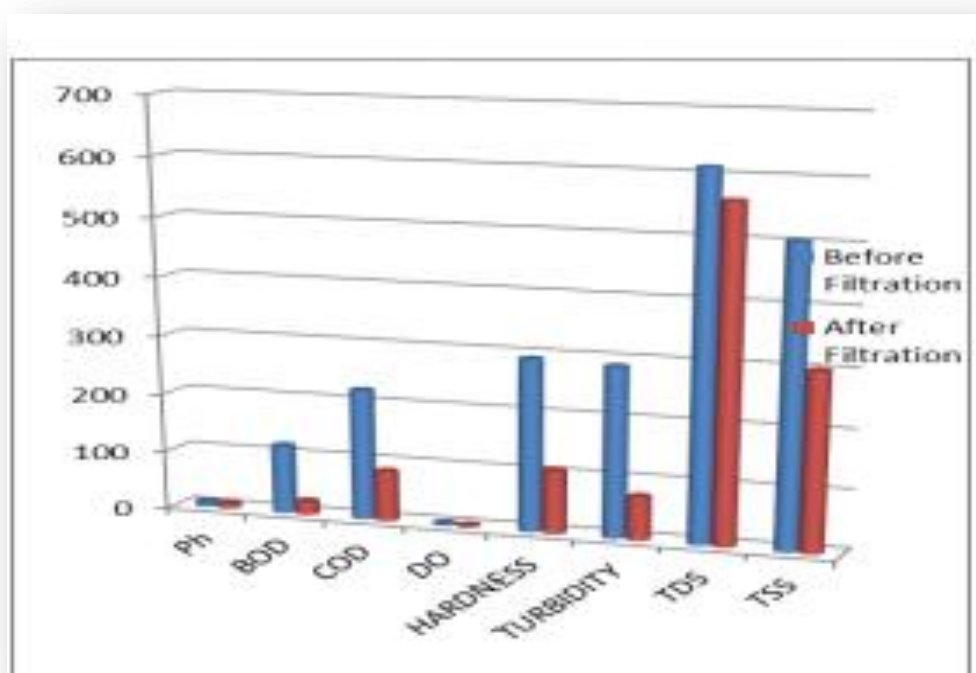
Before Filtration	15.8cc		
After filtration	Banana Peel	Orange Peel	Bilva Leaves
	11.2cc	14.7cc	15.2cc

8) P<sup>H</sup>:

Before Filtration	5.6		
After filtration	Banana Peel	Orange Peel	Bilva Leaves
	2.1	1.9	2.0

TABULAR COLUMN:

Parameters	Before Filtration	After Filtration		
		Banana Peel	Orange Peel	Bilva Leaves
Hardness	14.6	5CC	8.9CC	24.9CC
Ca	0.22MG	0.16mg	0.089mg	0.032mg
Mg	0.69mg	0.096mg	0.528mg	0.0196mg
Cl	9cc	-	-	-
PH	5.6	2.6	1.9	2.0
DO	29.6CC	12.4CC	20.6CC	19.1CC
COD	15.8CC	11.2CC	14.7CC	15.2CC
BOD	17.3CC	7.0CC	10.4CC	7.8CC
TDS	897PPM	837PPM	884PPM	879PPM



From above observation we concluded that adsorbent also play an important role for the treatment of wastewater. present work explores a new approach of development in the field of purification of water through minimal energy input, less labour and low investment, also proves to be biodegradable and effective compared to synthetic adsorbent and chemicals. Adsorption tends to increase with contact time. At first the increase in adsorption is very rapid as there are lots of free sites for the adsorption to take place. Thus it can be concluded that Banana peels Orange peel & Bilva leaves, which are discarded waste materials and are in abundance in the local market, can be used for the removal of heavy metal from waste water. Efficiency of removal of heavy metal concentration is more with banana peel and then with Orange or bilva leaves. Mixture of both the adsorbents gives more efficiency. The bio-adsorbents once used could be re-used through desorption methods for a certain period of time and this could be employed commercially in the future.

#### IV. Results

Adsorption tends to increase with contact time. At first the increase in adsorption is very rapid as there are lots of free sites for the adsorption to take place. Thus it can be concluded that Banana peels Orange peel & Bilva leaves, which are discarded waste materials and are in abundance in the local market, can be used for the removal of heavy metal from waste water.

#### V. Conclusion

Water treatment by adsorption using low cost adsorbent is a demanding area as it has two fold advantages i.e. water treatment and waste management. As inspected in this article different waste product have been converted into low cost adsorbent like Banana peel, Orange peel & Bilva leaves utilize for water treatment. There are greater chances of utilizations of low cost adsorbents for water treatment in near future. Besides, the universal and inexpensive natures of adsorption technology are other assets for bright future of low cost adsorbent. Moreover, is believed that future of low cost adsorbents is quit bright in developing and under developed countries. These adsorbents should be prepared eco-friendly and utilized in a controlled way to avoid any environmental hazards.

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