

## Treatment of kitchen waste water to reuse for irrigation

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**Abstract:** The main purpose of the kitchen waste water treatment process is to reduce the biological oxygen demand in waste water and to reduce the contamination in waste water. The BOD test is used to measure waste loads to treatment plants, determine plant efficiency (in terms of BOD removal), and control plant processes. It is also used to determine the effects of discharges on receiving waters.

**Key words:** bod, waste water, trihalomethane, sewage.

### 1. INTRODUCTION:

Wastewater treatment is closely related to the standards set for the effluent quality. Wastewater treatment processes are designed to achieve improvements in the quality of the wastewater. About 74 per cent of India's total population, currently about 1.25 billion, live in rural areas. More than one third of the water available to them is not potable. In a grim reminder that poor quality of drinking water leads to serious health problems, India has admitted that about 180,000 rural populated areas are afflicted by diseases which are caused due to impure, toxic organic and inorganic substances including trihalomethane, chlorine. In many countries, water quality standards have been developed governing the discharge of wastewater into the environment. Wastewater, in this context, includes sewage effluent and industrial discharges. The necessity to protect the natural environment from wastewater-related pollution has led to much improved treatment techniques. Extending these technologies to the treatment of wastewaters to potable standards was a logical extension of this protection and augmentation process.

### 2. LITERATURE REVIEW:

Subrata Dasgupta et al. Comparative study on treatment of kitchen-sink waste water using single and multichannel ceramic membrane.

Inderscience publishers, researchers in India have now carried out a study of various waste water filtration systems for kitchen waste water and found that even the most poorly performing can produce water clean enough for horticultural or agricultural use. Comparative study on treatment of kitchen-sink waste water using single and multichannel ceramic membrane.

### 3. EXPERIMENT

#### 3.1 COMPONENTS USED:

Submersible pump  
Tank  
Net filter  
Nozzle  
Pipe  
Iron rod

#### 3.2 FABRICATION:

- A cylindrical plastic water tank of diameter 40cm and height 35cm is fixed inside a 80cm diameter tank of height 80cm.
- A submersible pump of power 40 W is fixed inside the smaller tank
- Then a pipe of diameter 1.25 cm and length 100cm is attached on the pump vertically.
- At the top of the pipe a sprinkler is fixed.
- The opening of the smaller tank is covered by sheet metal.
- Then a filter made of activated charcoal is fixed inside the outer tank at a height of 80cm from bottom.
- Then the second filter made of pebbles is fixed at the height of 70cm

- Then the third filter made of banana fiber is fixed at the height of 60cm
- A motor and pipe arrangement similar to above is fixed inside the outer tank.
- The outlet pipe is fixed at the bottom of the outer tank.

### 3.3 EXPERIMENTAL PROCEDURE:

**STEP 1:** 30 liters of kitchen waste water is poured inside the inner tank via opening provided.

**STEP 2:** Then the submersible motor is switched on to take the water from the tank. The water gets move on the pipe and goes to the sprinkler. The sprinkler spreads the water on the filters.

**STEP 3:** The water is first passed into the filter made of activated charcoal. Then it goes to the second filter.

**STEP 4:** Water from the first filter comes to the second filter and then passed into the second filter consist of pebbles. From the second filter it goes to the third filter made of banana fiber. And collected on the outer tank.

**STEP 5:** The collected water is sucked out by the motor and then moved over the pipe and goes to the sprinkler. Again the water comes to the filter. This process is going on for 30 minutes.

**STEP 6:** Finally the water collected on the outer tank is taken out via outlet provided on the bottom of the tank.



**FIG.1. FILTERING SETUP**

### 3.4 BOD TESTING PROCEDURE

Sample Volume and Dilution Techniques On the basis of chemical oxygen demand (COD), determine expected BOD. Use the following formula for calculating sample volume: Sample volume in ml, per litre dilution =  $X/\text{expected bod} * 1000$ .

For keeping 2 dilutions take  $X = 2.5$  and  $4.0$  for single dilution take  $X = 3.0$  or  $3.5$ . Round off to nearest convenient volume fraction. In case of high BOD samples, prepare primary dilutions with distilled water and then make the final dilution.

Take requisite quantity of sample in one litre volumetric flask. Dilute to the mark with the dilution water by siphoning from the container. Mix well. Rinse three BOD bottles with the diluted sample and fill up these bottles with the diluted sample. Stopper the bottles immediately after removing the air bubbles. Samples of natural surface water

bodies like river, lake and marine, generally do not require seeding and dilution due to naturally available microbiological population and low BOD values. For such samples which are likely to have BOD less than 5 mg/l, BOD determination may be carried out as such ( 100 percent ) without any dilution.

Determination of Initial Dissolved Oxygen (DO) Determine initial DO for one bottle and keep two bottles for incubation at  $27^{\circ}\text{C} \pm 1^{\circ}\text{C}$  for 3 days. Prepare six blanks by siphoning out dilution water directly into the bottles. Determine initial DO in two bottles and incubate remaining four bottles at  $27^{\circ}\text{C} \pm 1^{\circ}\text{C}$  for 3 days..

Determination of Final DO After 3 days incubation at  $27^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , determine final DO in incubated bottle.

### 3.5 DESIGN OF KITCHEN WASTE WATER TREATMENT PROCESS

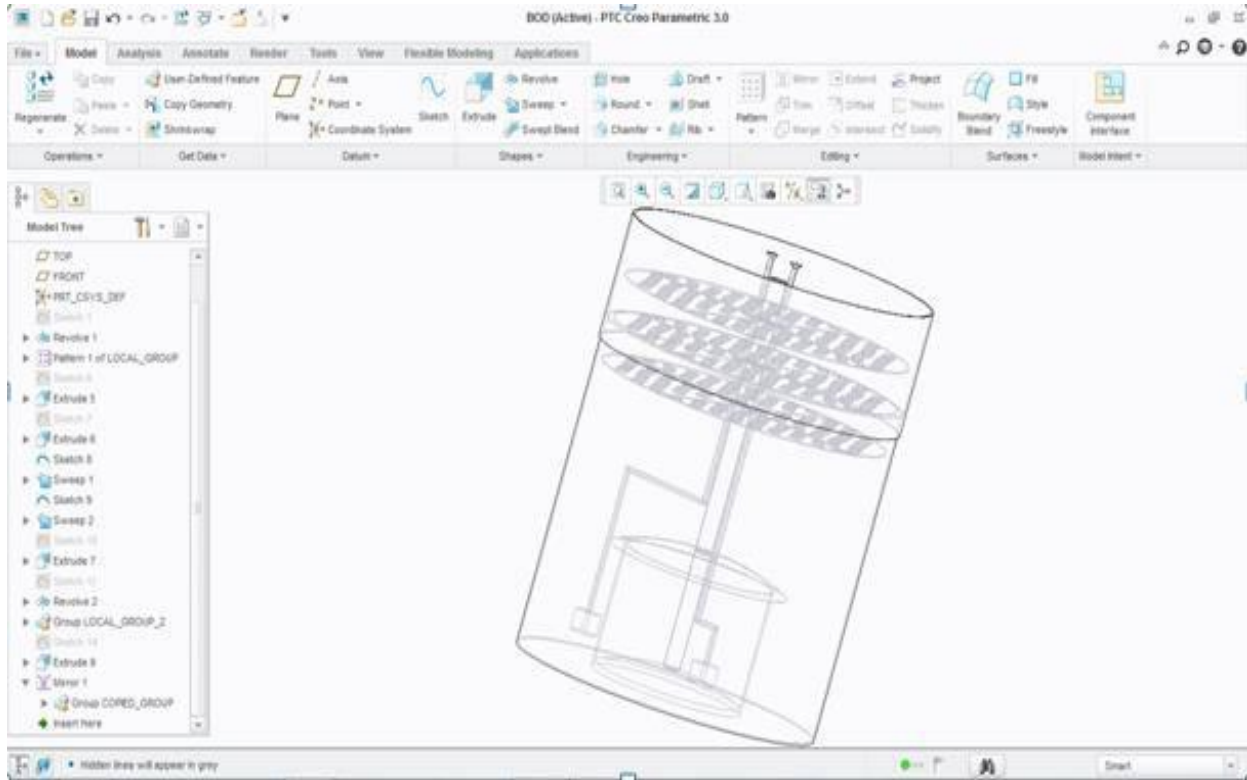


FIG 2. CREO MODELING 1

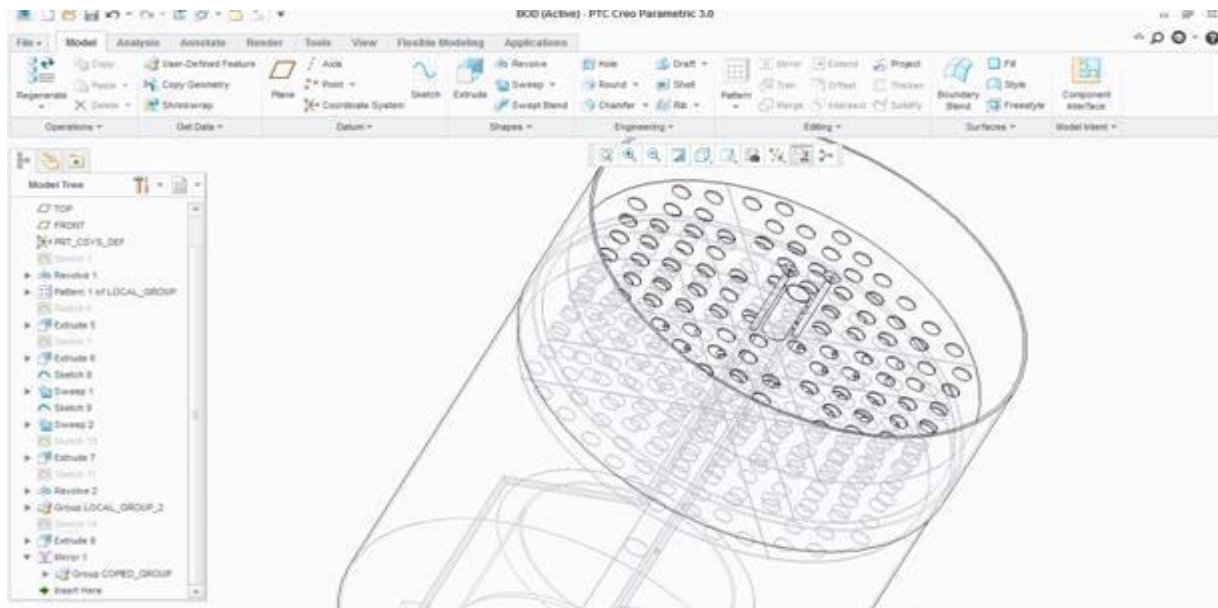


FIG 3. CREO MODELING 2

## 4. TESTING:

### 4.1 TESTING BOD LEVEL OF WASTE WATER:

After the process of filtering the waste water then collect the sample and test the water. First we collect the sample of raw waste water from sink and tested.

s.no	Source	BOD level(mg/l)
1	Kitchen waste water	650

**Table.1. BOD LEVEL BEFORE TREATMENT**

Then we do the treatment process for 15 minutes and collect the sample for checking the bod level.

s.no	Source of water	Before treatment	After treatment
1	Kitchen waste water	650	400

Bod level – (mg/l)

**Table.2. BOD LEVEL AFTER TREATMENT**

**4.2 THE REPORT OF THE BOD TEST:**

SL. NO	PARAMETERS	METHOD	RESULT	LIMITS
1.	BOD @ 27°C	IS 3025 (P – 44) 1993 (RA – 2003)	400	30.0 mg/l
2.	COD	IS 3025 (P – 58) 2006	1616	250.0 mg/l
3.	TDS	IS 3025 (P – 16) 1984 (RA 2006)	1100 mg/l	2100.0 mg/l
4.	TSS	IS 3025 (P - 17) 1984 (RA - 2002)	2.42 mg/l	100.0 mg/l
5.	pH@27°C	IS 3025 (P-11) 1983 (RA – 2002)	5.65	5.50 – 9.0
6.	Chloride	IS 3025 (P - 32) 1988 (RA - 2003)	289.76 mg/l	1000 mg/l
7.	Sulphate	APHA 21 <sup>ST</sup> EDI – 4500 – SO <sub>4</sub> <sup>2-</sup> E	135.29 mg/l	400 mg/l
8.	Oil & Grease	IS 3025 (P - 39) 1991 (RA - 2003)	4.78 mg/l	20 mg/l

**Table.3. TEST RESULT 1**

Then the circulation raw water for about 45minutes and then collect the samples. Test the bod level in the sample water.

s.no	Waste water type	Before treatment	After 15minutes	After 45minutes
1	Kitchen waste water	650	400	60

Bod level – (mg/l)

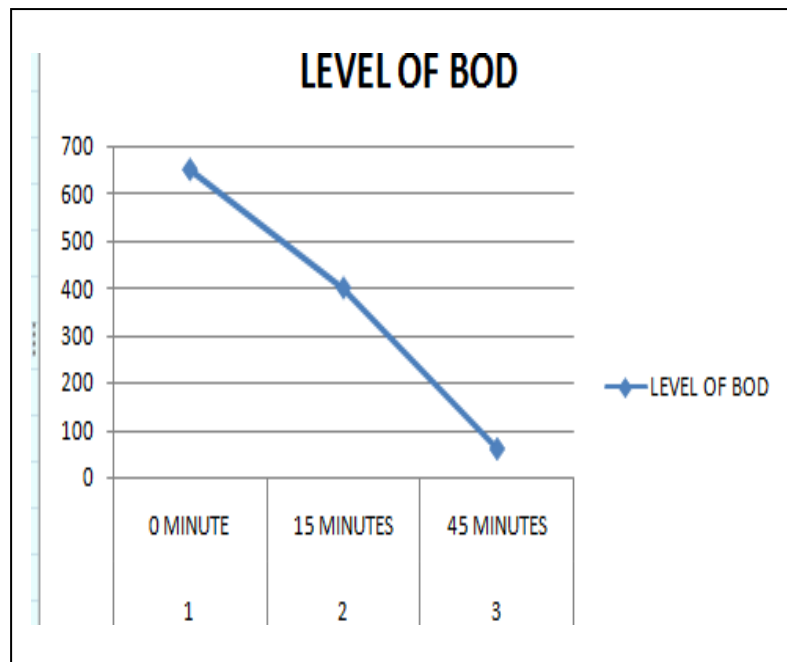
**Table.4. TEST RESULT 2**

**LEVEL OF BOD IN WASTE WATER:**

<b>Type of Waste</b>	<b>BOD(mg/L)</b>
Domestic Sewage	200-600
Slaughterhouse Wastes	1000-4000
Cattle Shed Effluents	20000
Vegetable Processing	200-5000

**Table.5. LEVEL OF BOD IN OTHER WASTE WATER**

#### 4.3. COMPARISON OF RESULTS FOR CIRCULATION OF RAW WASTE WATER



#### 5. RESULT:

As our project is to reduce the bod level in kitchen waste water by using the filtration method. We test the bod level for three different time to test the decreasing bod level content in the waste water. Finally the result of the bod level can be reduced by spraying the waste water in to atmosphere. The waste water has odour, dust, and colour. Here we reduce the level of smell, colour Present in the kitchen waste water.

#### 6. CONCLUSION:

The water so filtered can be used for the irrigation but not possible for the drinkable water because the level of bod must be below 50. First we reduce the level of 650 bod to 400. And do the treatment for extra time to control the bod level. Finally we get 60 as the last bod level. It can be concluded that the level of filtration increases with time.

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