

DESIGN AND FABRICATION OF DOMESTIC HERBAL WATER FILTER

T. Varun kumar¹⁾, V.Manoj Mohan Prasath², C.Prashanth³, D.Santhosh⁴, K.V.Santhosh⁵

¹⁾ Department of Mechanical Engineering, P.A College of Engineering and Technology,

Pollachi-642002, Tamilnadu, India. E mail: ercrazyvarun@gmail.com

^{2,3,4,5)} Mechanical Engineering, P.A College of Engineering and Technology, Pollachi-642002, Tamilnadu, India.

Abstract

An experimental investigation was carried out for the treatment of waste water using low cost adsorbents. The peel of orange and cinnamon were used as adsorbent in this study by carbonization and dehydration methods and the effect of ph, contact time adsorbent dosage and adsorbent particle size in removal of pollutants present in waste water were evaluated. The studies showed that the orange peels and cinnamon were most effective than the banana peels in the removal of pollutants from the waste water. The carbonization method is found to be more efficient than the dehydration method. Orange peel found to be more efficient in both the methods with highest percentage removal of 50.1% and 14.3% respectively.

Introduction

Ensuring that your client's household or domestic water supply is clean for use cannot be done without some form of a water purification unit. Unwanted compounds, debris, and bacteria from organic and inorganic materials can cause various type of illness for members of the household if specific contaminants are not removed from the supply. Through various channels, these impurities can find their way into the water supply that serves your home. The public water supply can become contaminated while in transit even though tremendous effort is placed in the treatment and conditioning of water at public water facilities run by municipal authorities. Public water systems can carry germs and hazardous parasites before the distribution to residential homes in urban areas; this is the main challenge faced by water treatment facilities. Water borne diseases caused by protozoan water bacteria cause more sicknesses or serious illnesses than any other form of bacterial based pollutant. A water purification system using RO membranes can easily remove contaminants from water using modern filtration technologies.

Research Literature

An experimental investigation was carried out for the treatment of wastewater using low cost adsorbents. The peels of orange and cinnamon were used as adsorbents in this study by carbonization and dehydration (bio sorption) methods and the effect of pH, contact time, adsorbent dosage, and adsorbent particle size in removal of pollutants present in wastewater was evaluated [1]

In the following project Thuraiya Mahir Al Khusaibi (2015) had tried to develop a "Low Cost Water Purification Technique" using the basic ideas of bottle filter, some locally Herbal available filter material like Tulsi leaves powder, Neem leaves powder, Rice Husk, Sugarcane bagasse, fine graded sand and tries to improve the methodology using the UV Filter, RO Filter, and Activated Carbon Filter mechanism [2]

Abdur Rahman (2007) Natural herbs like Tulsi, Neem, Amla, orange peel, cinnamon, Wheatgrass etc. are effective in water purification because of their antibacterial activity. Also these herbs are widely used as medicine for human with no side effects. Hence this study was done to evaluate effectiveness of Tulsi, Neem and Alma in water purification; especially with antibacterial activity [3].

H., Mostafapour (2013) Water purification is a process of removing undesirable physical, chemicals, biologically contaminants from water. Water purification system proposed in this paper focus on providing a pure drinking water at low cost with high [4].

Although getting safe drinking water is a fundamental right but huge people has no access to drink safe water around the world. Water unavailability as well as water contamination is the major cause of water-borne diseases, some of which are life threatening and can break out severely [5]

HERBAL SELECTION

Worldwide water demand is increasing day by day due to rapid population and industrial growth, and on the other hand there is continuous decline in ground and surface water levels due to over exploitation. Efforts are being made to find the alternatives for water supply and one prominent solution is treatment and re-use of industrial wastewater. The industry involves processing of waste water and generates lot of wastewater which contains very high concentration of organic substances such as proteins, carbohydrates and lipids. Many technologies are in practice to treat the waste water and in the present study; an attempt was made to investigate the application of low cost adsorbents from orange and cinnamon for the treatment by considering the wastewater from local waste water form in domestic. Tones of orange were discarded and send to garbage as useless materials and it is very significant and even essential to find applications and uses for these peels, as the management of wastes nowadays is becoming a very serious environmental issue. These waste peels are low cost, non-hazardous and environment friendly bio-materials which can be used as adsorbents in wastewater treatment. Dehydration and carbonization methods were used to prepare the adsorbents from these peels and the effect of contact time, pH, dosage and particle size in removal of pollutants from the waste water was evaluated.

ORANGE PEEL

In rural areas, germs aren't the only danger to drinking water; pollutants and pesticides can get into supplies too. But soak small segments of peel orange and cinnamon, dry them out, and put them in dirty groundwater for a couple of hours and they adsorb heavy metal ions. Remove the peels and the water is ready to drink. While it doesn't rid the h₂o of pathogens, it provides cleaner water using bio waste already on hand. Luckily, fruit and veggie peels are cheap and

plentiful compared with expensive infrastructure or purifying technology.



CINNAMON

Cinnamon is an important food for diabetics' *cinnamons* has the ability to help regulate blood sugar levels. **Cinnamon** also makes a great alternative to sugar and will help with weight loss. Put a few drops of **cinnamon** into a warm bath will help numb sore muscles and heal skin conditions. Cinnamon is Antiviral, Antibacterial, Antidepressant, Anti-fungal, helps stop the spread of infection, Anti-inflammatory, Anti-microbial, Anti-oxidant Anti parasitic, Antiseptic, arthritis, diarrhea, menstrual cramps, heavy menstrual blood flow, yeast infections, Antispasmodic, Astringent, Enhances other oils, Immune system Stimulant, Purifier, Stimulating aphrodisiac, Warming sensation.

Working

An experimental investigation was carried out for the treatment of waste water using low cost adsorbents. The peels of orange and cinnamon were used as adsorbents in this study by carbonization and dehydration (bio Adsorption) methods and the effect of pH, contact time, adsorbent dosage, and adsorbent particle size in removal of pollutants present in dairy wastewater was evaluated.

In the following project we had tried to develop a "Low Cost Water Purification Technique" using the basic ideas of bottle filter, some locally Herbal available filter material like Tulsi leaves powder, Neem leaves powder, Rice Husk, Sugarcane bagasse, fine graded sand and tries to improve the methodology using the UV Filter, RO Filter, and Activated Carbon Filter mechanism.

Natural herbs like Tulsi, Neem, Amla, orange peel, cinnamon, Wheatgrass etc. are effective in water purification because of their antibacterial activity. Also these herbs are widely used as medicine for human with no side effects. Hence this study was done to evaluate effectiveness of Tulsi, Neem and Amla in water purification; especially with antibacterial activity.

Water purification is a process of removing undesirable physical, chemicals, biologically contaminants from water. Water purification system proposed in this paper focus on providing a pure drinking water at low cost with high.

Although getting safe drinking water is a fundamental right but huge people has no access to drink safe water around the world. Water unavailability as well as water contamination is the major cause of water-borne diseases, some of which are life threatening and can break out severely.

Cinnamon essential oil boosts brain activity diffuse in air while studying and before test. Elderly may find use in cinnamon's ability to retain memories. Use cinnamon essential oil to purify the blood and clear skin of acne. Cinnamon helps the blood carry more oxygen throughout the body while reducing pain and aches. Cinnamon essential oil can lower the risk of heart attack.



WATER PURIFICATION

Chemical disinfection

In most developed countries the standard process of filtrating water is speeded up with chemicals, in some instances, with less turbid water, chemicals can be used alone. The most common chemical used to disinfect water is chlorine (Cl). Chlorine is a very effective disinfectant and also provides some residual disinfection; it remains in water to stop re-contamination. Chlorine is more than 3 times more effective in disinfecting water than the equivalent concentration of bromine and 6 times more effective than iodine.

Drawbacks of using chlorine can be:

Strange taste and smell of water (usually associated with shock-chlorination with much higher concentrations)

As well as a slight risk of naturally occurring organic compounds combining with chlorine to form carcinogenic compounds

Disinfection By-Products (DBPs). However, the WHO states that that health risks associated with DBPs are much smaller than risks associated with inadequate disinfection.

Chlorine can be used by itself, but as it is a naturally volatile gas it is usually used in compounds such as hypo-chloric acid or chloramines.

Chloramines may produce slightly lower levels of DBPs, but chlorine is toxic to fish and aquatic organisms and should be kept out of natural water systems.

Chlorine is only toxic to humans after long exposure and at concentrations much greater than those used for disinfecting drinking water.

Sedimentation

A process in which contaminants that are heavier than water sink to the bottom of a basin and the water is then led out of the basin above the sediment layer.

Flocculation

Elements such as Aluminum (Al) can be used in a process called flocculation [9]. Flocculation is a process where colloids come out of suspension in a solute, such as water. Aluminum, which is positively charged attracts negatively charged bacteria and viruses, all this then sinks to the bottom (Sedimentation) and can then be filtered out.

Fabrication

DEHYDRATED METHOD

The collected peels were cut into small pieces, washed with distill water to remove dirt and suspended impurities and then dried for 48 hours in an oven at 100oC to remove the moisture content from the peels. After the drying process, the peels were removed from the oven and kept in the desiccators for 30 minutes. The desiccators contains calcium chloride (CaCl₂) which is used to cool and maintain a dry environment and then the peels are ground to fine powder and sieve through 600µm, 425µm, 300µm for different particle size. These dehydrated peels were directly used as bio Absorbents in the experimental investigations.

CARBONISATION METHOD

The collected peels were cut into small pieces, washed with distil water to remove dirt and suspended impurities and then dried for 48 hours in an oven at 100oC to remove the moisture content from the peels. After the drying process, the peels were removed from the oven and kept in the desiccators for 30 minutes and then the dried peels kept in the furnace for 3 hours at 200oC to convert it into carbon. After that the peels were removed, cooled and ground to fine powder and sieve through 600µm, 425µm, 300µm for different particle size.

COMPONENTS

- Coconut shell
- Orange peel
- Cinnamon

PROCESS OF MAKING CARBON WATER FILTER CATRIDGES

Raw Materials

- powdered Carbon (orange peel)
- Additional Flavor – Cinnamon



Sediment cartridge:

It is made from cotton, it is used for filtering dust, sand and it is used as first stage in water filtration process.

Carbon block cartridge:

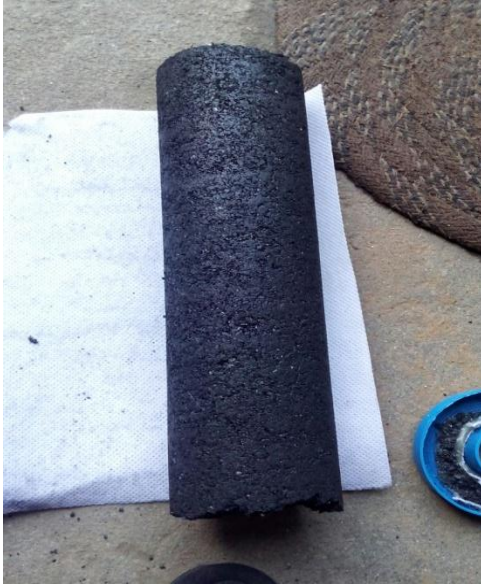
- C It is made by compressing carbon particles using mould, used to filter
- O the chlorine and salts from water

C



P

A



These two are merged in to one and carbon spun cartridge is produced. By applying a layer of carbon (orange peel) on the sediment of spun cartridge.



Then it is dried and it's covered by thin fiber Material, then with a plastic mesh.

S.NO	TYPES OF WATER	PH	PPM
1	TAP WATER	7.45	195
2	BORE WATER	8.013	106
3	DIRTY WATER	5.95	63
4	R.O. WATER	6.77	35.46

Now it is ready and it can be placed in the filters for filtration process.

PERCENTAGE OF INGREDIENTS

45% Orange peel carbon: Improves Digestion and metabolism, good for skin and weight loss

45% Coconut shell carbon: Naturally filters harmful salts

10 % Cinnamon flavor: prevent Diabetes, increases appetite, well for digestion and immunity.

Above values shows the percentage of ingredients added in the filtration process.



PPM AND PH VALUE OF WATER:

BEFORE TREATED

After treated water

S.NO	TYPES OF WATER	PH	PPM
1	BORE WATER	7.2	150.123
2	DIRTY WATER	6.7	100

Conclusions

The removal of organic substance from waste water using de-hydration and carbonization methods for orange peel and cinnamon was studied by investigating the effect of pH, time, adsorbent dosage and particle size. The carbonization method is found to be more efficient than the de-hydration method for both, orange peel and cinnamon with highest percentage removal of 50.1 % and 44.1% respectively. The carbonization method is considered to be better since carbon is a strong oxidant and has a unique pores structure which adsorbs the organic substances to its surface easily. The orange peel and cinnamon found to be more efficient in both methods with the highest percentage removal of 50.1% and 14.3% respectively. This is due to the characteristics of orange peels in its content fiber which contain more hydroxyl radicals, hence more adsorption capacity. The optimum pH for methods, orange peel and cinnamon are found to be in a range between pH 6-8. The optimum adsorbent dosage for the dehydration method of orange peel is at 45% and for cinnamon is at 10%. The optimum adsorbent dosage for carbonization method of orange peel and cinnamon is at 55%. The optimum particle size for methods, orange peel and cinnamon are at 300µm.

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