Treatment of Domestic Water by Using Low Cost Of Material Absorbent

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Abstract- *In ancient ages of human civilization boiling water over a wood fire is one of commonly cheaper clean method for water solution, but it is still hazards in poor ventilation kitchen and for fuels deforestation. India has 16 per cent of the world's population and four per cent of its fresh water resources. Around 37.7 million Indians are affected by water borne diseases annually, 1.5 million children are estimated to die of diarrhea alone and 73 million working days are lost due to water borne disease each year. The resulting economic burden is estimated at $600milliona year. Providing safe drinking water to all in rural India is a challenging task. The user should be made aware of the importance of preventing contamination of water and user's accountability should also realize their individual responsibility in maintaining the quality of water This project is an attempt to study the different rocks like pumice and scoria rock as filtration media and to design and assemble rock filter for treating domestic water. It also used to find out economical design of water filter*

Keywords- Drinking Water, filter, Rocks, Capstone

I. INTRODUCTION

Water is essential for human, it comprises around 60% of the weight of human and it losses through various metabolic and excretory processes must be balanced by an adequate intake. Water may contain contaminants which can affect health and quality of life. Water intended for human consumption must be free from organisms and form concentrations of chemical substances that may be hazard to health. Biological filter that uses stone, pebbles, sand as support material on which microorganisms can grow in a thin biofilm. The biodegradation process that occurs is provided by the bacteria themselves. In order for this to work, sufficient oxygen as well as water and nutrients (for cell growth) is to be supplied. As a Filtration media, pumice is an aggressively-Filtering alternative to sand (and other Filtration media). Low specific gravity and high porosity of pumice make it ideal for irrigation Filtration systems and other water treatment processes and provides several advantages over other Filtration media such as sand, expanded clay.

Water is often only available to those who can pay for it or those in political power; leaving millions of the world's poorest without access. The regions most affected by this type of scarcity are portions of Central and South America, Central Africa, India, and South East Asia. India's water crisis is established in three reasons.

The primary is insufficient water per person as a consequence of population growth. The second cause is poor water quality coming about because of inadequate and postponed investment in urban water-treatment offices. The third issue is waning groundwater supplies because of over-extraction by agriculturists. This is on account of groundwater is an open-access asset and anybody can pump water from under his or her own particular area. India has 16 per cent of the world's population and four per cent of its fresh water resources. Around 37.7 million Indians are affected by waterborne diseases annually, 1.5 million children are estimated to die of diarrhea alone and 73 million working days are lost due to waterborne disease each year. The resulting economic burden is estimated at $600 million a year. Providing safe drinking water to all in rural India is a challenging task. The user should be made aware of the importance of preventing contamination of water and user's accountability should also realize their individual responsibility in maintaining the quality of water.

A. Problem Statement

The main challenge of the bio filter is to remove the dissolved organics. The parameters that canaffect the performance of a bio filter are the characteristics of filter media, hydraulic and organicloading rate, and filter backwash techniques. The mechanisms, which allow bio filters to work and which must be controlled to ensure success, are complex. Ultimately, biotransformation is required to convert the contaminant to biomass, metabolic by-products or carbon

dioxide and water. A systematic investigation of bio- filtration technologies is needed for the control of water pollutants, functioning, mechanism and its Designed parameters.

II. STATE OF DEVELOPMENT

Many researcher over the globe are finding out the water quality capabilities and performance using different techniques. Some of these recent studies are mentioned below-

SMA Mahanim et.al. in their study named , "Production of Activated carbon from industrial waste of bamboo'', carried out a research to study characteristics of activated carbon , chemical composition of bamboo waste and process.

Y. K. Siong a et. al. in their study named, ''Performance of Activated Carbon in Water Filters'', examined the performance of activated carbon in water filtering system.Research identifies that activated carbon is used in water filtering systems due to its excellent adsorption capacity. The pores of activated carbon trapped and locked water contaminants during the water filtering process. However, different activated carbons have different surface area and porosity. The (GAC-A) activated carbon successfully reduced the chemical oxygen demand (COD) and biochemical oxygen demand (BOD) of tap water and well water to lower reading.

Shilpa s. Ratnoji and Nimisha singh carried out a study of coconut shell – activated carbon for filtration and its comparison with sand filtration. They studied water quality improvement between coconut shell activated carbon and sand water filter. They examined reduction in COD and BOD which proves that the organic compounds can be efficiently removed by coconut shell activated carbon. Whereas in case of sand filters, negligible reduction in iron, BOD, and COD was observed. Turbidity reduction was almost same in both types of filtration materials. So, coconut shell activated carbon can be looked upon for future treatment of water in removing suspended solids, iron and total organic carbon instead of sand filtration in the treatment plants.

Jatindra N. Bhakta and Yukihiro Munekage in their research paper, ''Ceramic as a Potential Tool for Water Reclamation'' pointed out the conservation of aquatic resources is one of the most critical challenges to scientists. As the present discussion concludes, it is obvious that ceramic has potential wide ranging applications for aquatic environment reclamation. It cleans drinking water by removing hazardous compounds and microbial pathogens, and it can also be applied for more effective wastewater treatment. Low-cost ceramic water filters in the form of "ceramic balls" and "ceramic pots" improve drinking water quality at the household level.

Muhammad Al Kholif and Muhamad Abdul Jumali in their research paper, "The Effect of Pumice Stone Media in Reducing Pollutant Load in Grey Water by Using Anaerobic Biofilter" they studied the results showed that anaerobic bio-filter technology was able to eliminate BOD5 and COD pollutant loads on grey water in accordance with specified quality standards. Generally, grey water plays a major role in increasing the concentration of organic substances. They were able to eliminate pollutant load up to 1350 mg/L.

III. METHOD OF MAKING FILTER

- Take 1 bottle of 1 liter capacity and 2 containers of different size.
- Take bigger size container and cut it at the top and cut small size container at bottom in circular shape.
- Pass the bottle through this two container and fix it properly.
- Use the bottle as a filter.
- Assemble the different filter media as shown in fig.
- Then filter is ready to use.

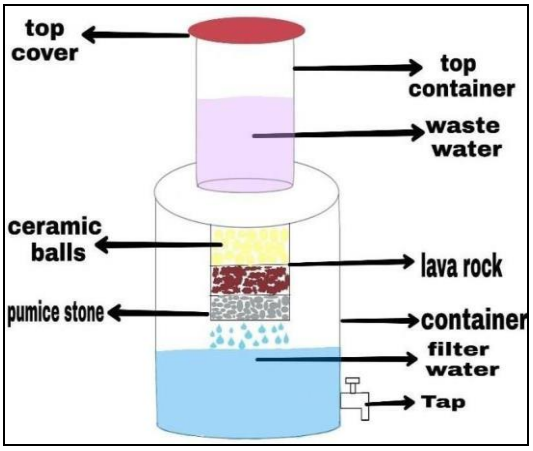

Fig.1 Bio-filter

- First waste water is filled in the upper container. Through the hole it will enter in bottle.
- Then waste water first passes through coconut husk layer. Suspended particles present in water are trapped in this layer
- Then, water passes through charcoal and lava rock (fine powder) layers. This layer will remove fine particles and other impurities present in water.
- Then, finally water passes through pumice stone and ceramic ball .In this layer remaining impurities get absorb. Then water is recollected at the bottom of fiber size container.

IV. RESULTS AND DISCUSSION

It was also observed that the experimental filter model will significantly assist in the removal of pH, total Hardness, total solid, etc will also improve the pH quality of the effluent. Hence, the results of present investigation that this filter will be found to be an effective filter for the removal of impurities from the domestic waste water.

A. Chemical Characteristics of water

Table 1 Chemical Characteristics of water

Filter turns	Chloride as Cl(ppm)	Total Solids (ppm)	Total Alkalinity as Caco3 (ppm)	PH
31	200	583.28	450	7.5
2	150	467.87	340	7.1
3	100	335.93	240	6.8
4	100	310.1	220	6.5

In above table, reductions were observed in Chloride, TDS, and Alkalinity levels in water after each turn. It was observed that chloride contain in water reduced to 200 mg/l after first turn, then reduced to 150mg/l in second turn and then 100mg/l in third turn. But in fourth turn of filtration it was observed no reduction in chloride level. It was also observed reduction in total solids level in water 583.28 mg/l, 467.87 mg/l, 335.93mg/l and 310.10 mg/l respectively. Similarly, reduction also observed in total Alkalinity level in water 450ppm, 340ppm, 240ppm and 220ppn respectively.

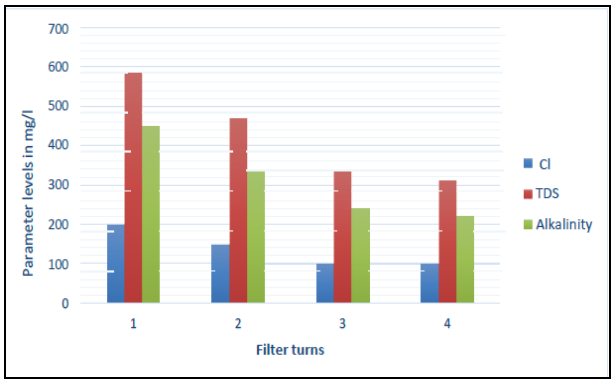

Fig 2 Water quality analysis bar chart

V. CONCLUSION

It was observed that those filter materials such as pumice stone, coconut husk, lava stone ceramic materials, etc.May prove to be more efficient in improving the effluent quality interms of its phi-chemical content. It was also observed that the experimental filter model will significantly assist in the removal of pH, total Hardness, total solid, etc will also improve the pH quality of the effluent. Hence, the results of present investigation that this filter will be found to be an effective filter for the removal of impurities from the domestic waste water and the treated waste water use for Irrigation, toilet flushing, car washing, gardening, firefighting, etc. with proper maintenance and care. It can be concluded that pumice stone and lava stone water filter can be effectively used in treatment of domestic waste water. The low capital cost and ease of operation make this filter attractive option for application of domestic water treatment in rural area.

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