

Review Paper: Eco-Friendly Water Filtration Tank for Rural Community

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Abstract— The filter is a slow sand filter and is well suited for rural community on the other hand it is a eco-friendly filter which will not harm the environment. In slow sand filter, filtration rate is slower than other rapid filters. It effectively remove turbidity and pathogenic organism through various bio-logical process. It consume less area in comparison to other slow sand filters Bamboo is uses as base material for the filter because it has long life span which consist three layer, upper layer is used for sedimentation , sedimentation removes a large percentage of suspended solids and organic matter present in raw supplies . Middle layer is used for purification of water, which remove remaining impurity and to produce safe water because water is filter through the bed of fine granular material such as sands etc. Last layer is used as water storage tank. Slow sand filter doesn't have back washing so bed layer can be scrapped periodically.

Keywords: Eco-Friendly, Slow Sand Filter, Biological, Impurity, Back Washing

I. INTRODUCTION

- Water for drinking in adequate quantity and safe quality is basic requirement of all living being. Poor or no access to water can cause many disease like cholera, diarrhea, trachoma etc. While the government attempt to provide safe and removal of unwanted organic matter adequate drinking water but there are many factors which determine the level of availability of water(e.g rainfall, surface flow)
- This project of water purification using naturally available material is affordable for all loss of people and have some advantage over other water purifiers. Some of the natural material which will be use in the purifier are bamboo, charcoal, gravel, pebble etc. Bamboo charcoal have various properties like high porosity, mineral constituent absorption rate etc make it perfect for water purification
- This water purifier is a slow sand filtration. There will be three level in which it is divided, first level is of sedimentation tank in which coagulation and removal of unwanted matter will be take place. Second level is of treatment of water which consist of charcoal, sand and gravels. Third level is a water storage layer.
- In slow sand filter a bed of sand 0.9m deep rests on graded gravel and the sand is normally finer than that in a rapid filter and its quality and grading are less exacting.

II. LITERATURE REVIEW

- HUSSAINI A et al in 2015[1] studied design of filtration system for a small scale water treatment plant for rural community. The conclusion of the experiment is that the

slow sand filter was combined to serve both as the pure water unit and the chlorinating chamber, this also reduces cost. The gravel is arranged asymmetrically below the sand from round washed gravel to stone gravels. Filter stones should be kept 50cm from all sides of the filter; the filter sand will rest on the bottom of the filter around the edges.

- G.K KHADSE et al in 2015[2] It was observed that a blackish precipitate formation was due to the presence of iron and manganese in lake water, which was not completely removed during treatment. To remove iron and manganese from drinking water, treatment studies were carried out with chlorine and KMnO₄ as oxidants. Alum and lime were added for coagulation and pH correction. Jar test studies revealed that treatment with potassium permanganate at pH 7.7–8.0 was effective in the removal of iron, manganese and organics, which were responsible for causing colour and odour to water. The studies helped in improvements in water quality for safe drinking water supply.
- VISHAL et al in 2014[3] fluoride is the major inorganic pollutant of natural origin found in groundwater. Fluoride in minute quantity is an essential component for normal mineralization of bones and formation of dental enamel. Water with high fluoride content is generally soft has high ph and contains large amount of silica. The solution to the problem is removing the excess of fluoride form water. There are some method used to remove fluoride content from water like synthetic ion exchange, precipitation processes and activated alumina filter, reverse osmosis, absorption techniques. These bio-adsorbents have the property of adsorbing various metal ions. In this experiment result the data obtained reveals that various adsorbents used are highly efficient in fluoride removal.
- Chaturvedi et al in 2012[4] studied the removal of iron for safe drinking water. He used the methods of iron removal from drinking water such as electro coagulation; oxidation filtration, ion exchange, lime softening, adsorption by activated carbon, BIRM media, Anthracite, green sand, pebble and sand mixture, ultrafiltration etc. have been discussed.
- Ganvir et al .in 201[5] studied the removal of fluoride from groundwater by aluminum hydroxide coated Rice husk ash [12, 13]. Activated aluminum hydroxide has been used for activating the RHA surface which forms a complex with fluoride ion in water and accelerates the process of removal. RHA was obtained by controlled burning of dry and crushed rice husk and treating with hydrochloric acid before activation.
- BHATT et al in 2008[6] studied about the removal of fluoride and arsenic content adsorb from water by using

activated alumina. Alumina is aluminium oxide manufactured to produce a highly porous and adsorbent material. As water containing fluoride passes through it, the fluoride adsorbs onto the alumina. Sometimes an activated carbon filter is used after the activated alumina treatment unit to remove tastes from the water caused by the alumina treatment. The activated alumina in these treatment units does not have an endless capacity to adsorb fluoride. Once the filter cannot adsorb any more fluoride, it has to be replaced. The volume of water that can be treated before this happens decreases as the concentrations of fluoride and other ions too, such as sulphate.

- Gupta studied in 2006[7] the non-conventional low-cost adsorbents for dye removal. He studied an extensive number of adsorbent for filtration and in the review he showed the critical analysis of these materials, characteristics, advantages, limitations and mechanisms of adsorption. He used activated carbon of agricultural solid waste, industrial by product, clay and materials containing silica.

III. CONCLUSION

The provision of clean drinking water has been given priority in the Constitution of India. Various steps taken by India's central, state, and local governments taking to address water issues with community level. Through this water filtration tank we can provide safe and adequate drinking water to rural community of people. The material used for the construction is easily available all over India and is ecofriendly for the nature. The process uses the construction is of slow sand filtration which will treat the water and make it safe for drinking purposes.

REFERENCES

- [1] HUSSAINI A ABDUL KAREEM (2015)
INTERNATIONAL JOURNAL OF ENGINEERING
SCIENCE INVENTION.
- [2] ISSAC MBIR BRYANT (2015)
JOURNAL OF ADVANCE CHEMICAL
ENGINEERING
- [3] V.V. GONCHARUK (2006)
NATIONAL ACADEMY OF SCIENCES OF
UKRAINE.