

DESIGN OF ECO-FRIENDLY, COST EFFECTIVE WATER FILTER USING EASILY AVAILABLE LOCAL MATERIALS

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Keywords:

Eco-friendly, Cost-effective, Materials used, Water filter, Statistical analysis software-R, Specifications of water filter.

Introduction:

- This project deals with the design of eco-friendly, cost-effective water filter using easily available local materials.
- This project is an attempt to address the problem of existing water crisis by filtering the water using easily available local materials in an eco-friendly and cost-effective way.
- In this project we are trying to analyse the efficiency of various naturally occurring materials to come up with the best possible material to treat water in the most sustainable and economical way.
- By going through various research papers and journals related to this context we identified the area where there is a scope to work and we can carry our project forward.
- The project is to design the filter medium, and also to build the prototype in addressing the specifications, details of the materials used and also the efficiency of the water filter designed.
- Usage of highly efficient coagulant after it is being identified for the rapid sand filter. And also introducing the filter medium to efficiently filter the water, and also making the observations on Rate of filtration of the water.
- Bringing out the Suitability of the designed water filter in the conventional water treatment and also its application in particular treatment process.

Objectives:

1. Check for initial water quality controlling parameters.
2. Providing a 3- way graphical interpretation for the sample data collected and analysing the accuracy statistically.
3. Study of various low cost, eco-friendly and easily accessible materials to create a water filtration system for rural area.

- Making certain alterations in the existing water filtration system to come out with better and more efficient results and requiring less maintenance.
- To provide easily affordable water filtration system to the rural population.

Methodology:

- First we tested the water to get the information regarding the initial water quality controlling parameters of the water.
- Then the study was made to find out about various easily available and local materials. After studying various journals and making lots of research, we decided to go with following materials.

Materials Used:

- Sugarcane husk (As a filter medium layer)
- Drumstick seeds (As a coagulant in the Rapid sand filter to be designed)
- Using drumstick seeds as a coagulant and sugarcane husk as coagulant as well as filter medium we conducted various tests and compared the variation in various water quality controlling parameters such as pH and turbidity.
- Deciding of the various layers of the Filter medium to be used and the arrangements of filter medium.
- Measurement of the water filter, Rate of Inlet, Rate of Filtration, Effective produce of water after filtration is being tabulated.
- Using mathematical and statistical analysis software, named R, we compared various data that we have collected through our experiments.
- Conducted the sieve analysis test on the sand to obtain the Uniformity coefficient and also to obtain Effective size of the sand to be used as a filter medium.

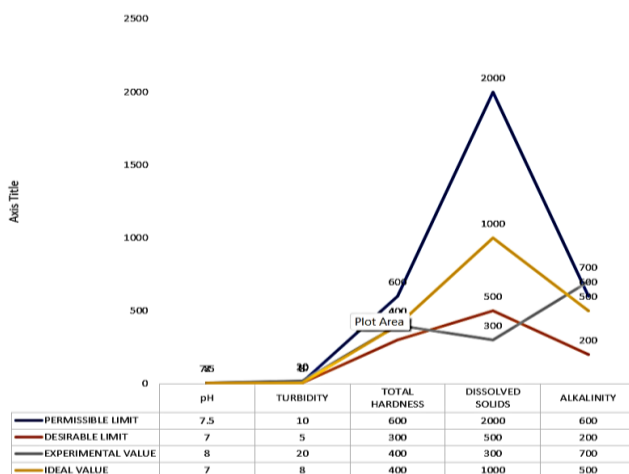


Fig 1: Providing 3 way graphical solution for the values obtained by various Tests

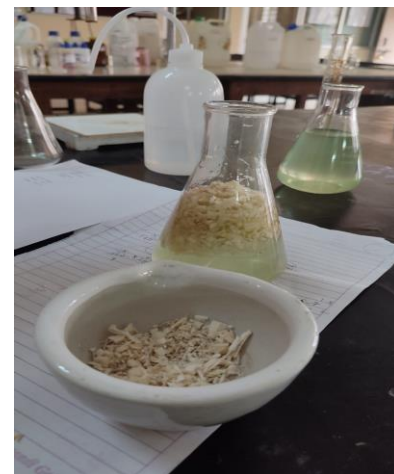


Fig 2: Conducting of various experiments using sugarcane husk

Result and Conclusion:

1. Based on the experiments we have performed, the two materials- sugarcane husk and drumstick seeds are found to be efficient to carry further process in our project and designing of water filter.
2. Based on the experiments, it is decided to design the Rapid sand filter medium with sugarcane husk as an additional filter medium with conventional layers.
3. It is found out that using of the drumstick seeds as a coagulant can enhance the ability of the filtration of the water filter and also it is found to reduce turbidness and solids in the water.
4. Based on various trial process, we came to conclusion to use sand as the bottom layer, over which fine charcoal and above which coarse aggregate and coarse charcoal is used, and the top layer of the filter being Sugarcane husk.

Scope for Future Work:

1. To design a prototype of water filter which could filter water for secondary uses using the easily available and local materials that we have found efficient through various experiments.
2. To provide a three-way graphical solution for the water filter design using R.
3. To feed all the data of Tests conducted in the R and later it is to be processed to design the water filter details and specifications. The same could be used as a program, for the future works in the water filter designs.
4. To produce the prototype, containing specifications and details of the materials used as a filter medium and coagulant and also to give out efficiency details of the Designed water filter.