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Development of Low Cost- Eco friendly And Pathogen Free Water Purifier

Pruthviraj R D[1*], Gangadhara N[2], Sri Raksha N[2], Sakshi R[2], Vandana R[2], Vandana[2], and Jahagirdar A A[3]

[1] Department of Chemistry, Rajarajeswari College of Engineering, Bangalore, Karnataka, India

[2] Department of Civil Engineering, Rajarajeswari College of Engineering, Bangalore, Karnataka, India

[3] Department of Chemistry, Dr.Ambedkar Institute of Technology, Bangalore, Karnataka, India

[*]**Corresponding author:** Pruthviraj RD, Department of Chemistry, Rajarajeswari college of Engineering, Bangalore, Karnataka, INDIA, Tel: 9742832678; E-Mail: pruthvirajrd@gmail.com

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Abstract

The water purification is a process of removing undesirable physical and chemical contaminants from water. Water purification system proposed in this project focus on providing eco-friendly pathogen free water at low cost. There are various methods available for purification of water but they are not economically feasible for Rural people. Proposed system consists of combination of natural substances like sand, coarse aggregate, and chemicals. It is an effective method to remove harmful bacteria from water. This method can be made portable, cost effective and energy efficient which will be self-sufficient to meet the water needs. The water samples undergo the Physio-Chemical parameters tests. The results of after passing the water through the filter were found to be within the permissible limit for drinking and for domestic use. In this work an attempt was made to develop a "Low Cost Water Purifier". The Designed Low-cost water purifier can be proved economical and efficient as it can be used in rural households.

Keywords: Impure water, FeCl2, Sand, HCl

Introduction

Water has consistently been a significant and life-supporting beverage to people and is fundamental for the endurance of every single known living being. Over huge pieces of the world, people have insufficient admittance to drinking water and use sources tainted with infection vectors, microorganisms or unac-ceptable degrees of poisons or suspended solids. Drinking such water or utilizing it in food planning prompts wide-spread, intense and ongoing ailments and is a significant reason for

death and hopelessness in numerous nations. The UN evaluations that more than 2 billion individuals have restricted admittance to safe water. Of these, almost 800 million individuals do not have even the most fundamental stock of clean water. There are not many techniques generally pushed for the sanitization of drinking water at the family level. These incorporate bubbling of water for around 10 minutes, or the utilization of certain chlorine intensifies accessible as tablets (Halazone tablets, or calcium hypochlorite tablets) or arrangements (sodium hypochlorite arrangements). These tablets have an ex-piration date, and the guidelines require the expansion of 1 to 2 tablets for every liter of water and hanging tight for 25 minutes before use.As every one of these methodology has its own downsides, their application is very restricted in the creating locales of the reality where water-borne infections are prevalent, and the wellbeing of drinking water supplies can't generally be guaranteed. Accessibility and expenses are the lone contributor to the issue. On account of bubbling, for example, the requirement for around one kilogram of wood to bubble one liter of water is absolutely ridiculous in fuel-short areas al-prepared experiencing aridity and desertification. Also, the obnoxious taste of bubbled water regularly debilitate purchasers. The expansion of 1 to 2 drops of 5% sodium hypochlorite arrangement per liter of water requires the utilization of a dropper and liter measure, both being extraordinary de-indecencies in many homes. Considering these challenges and limitations, advancements that are practical and sustainable should be created. Supportable activity of these treatment measures with locally accessible materials and simplicity of upkeep is required. In this survey article, we zeroed in on the minimal expense supportable innovations available or being used for the creation of clean drinking water.

Available Sources Of Water

Water in spite of the way that covering 70% of the Earth's surface, most water is saline. Freshwater includes only three percent of the outright water available to individuals. Of that, singular 0.06 percent is successfully open—for the most part in streams, lakes, wells, and ordinary springs. What's more, still, toward the day's end, accessible water isn't actually ensured drinking water. The freshwater sources from which most of our drinking water is derived are introduced to a combination of toxins, many arising out of the risky creation, use, and evacuation of inor-ganic and normal blends Freshwater is open in essentially totally populated spaces of the earth, in spite of the way that it may be exorbitant and the store may not by and large be legitimate. Sources where water may be gotten include:

Groundwater

The water emerging out of some significant ground water may have fallen as deluge various thou-sands of years earlier. Soil and rock layers ordinarily channel the ground water to a genuine degree of clarity and routinely it needn't bother with additional treatment other than adding discretionary sanitizers.

2) **Upland lakes and archives**: Typically arranged in the headwaters of stream systems, upland supplies are by and large sited over any human home and may be surrounded by a protective zone to restrict the opportunities for polluting. Infinitesimal creatures and organism levels are for the most part low, anyway a couple of microorganisms, protozoa or green development will be accessible. Where uplands are forested or peaty, humic acids can conceal the water. Various upland sources have low pH, which require change.

3)**Rivers, channels and bog supplies**: Low land surface waters will have a basic bacterial weight and may similarly contain green development, suspended solids and a collection of broke down constituents. Atmospheric water age is another technology that can give brilliant drinking water by extracting water from the air by cooling the air and in this manner gathering water smolder. Rainwater assembling or fog collection which collects water from the air can be used especially in districts with basic dry seasons and in areas which experience dimness regardless, when there is little storm. Desalination of

seawater by refining or chat osmosis. Water stock association: Tap water, passed on by local water structures in different countries nations, implies water supply association.

The most useful way to deal with send and pass on consumable water is through pipes. Plumbing can require gigantic capital endeavor. A couple of structures persevere through high working and upkeep costs. Considering these high initial in-attires, numerous non-mechanical nations can't bear creating or support fitting structure, and thus people there may spend trouble for water. In excess of 40 countries in the world experience the evil impacts of an ensured drinking water deficit, with a normal 1.2 billion people drinking muddled water reliably and 5,000,000 people, generally adolescents, passing on reliably from water-related infections. The United Nations evaluates that, by 2025, 2.7 billion people will not move toward safe drinking water. Regardless, three essential issue including 1) untreated city and local sewage; 2) untreated mechanical effluents; and 3) provincial run-off are attributed to the freshwater crisis in non-modern countries.

Methodology

In this project we have collected 2 litres of the impure water which contains pathogens, chemicals or toxic substances from Vrishabhavathi river flowing near Kengeri The sample collected is tested before filtration and also after filtration. The project required 6kgs of aggregates which is sieved in the sieve Shaker. The aggregates are collected from first 4 sieves that is 4.75mm, 2.36mm, 1.18mm, 600 microns based on Indian standards. Then 1kg of 4.75mm sized aggregate is coated with Iron oxide and another 1Kg is coated with copper oxide and both are cooled to room temperature which is done at the laboratory itself. Then used in filtration process by placing them in layers After placing the coated layers at the bottom the aggregates are placed according to their sizes in the increasing order from bottom to top by layer arrangements. Each layer is divided by screens of 1mm in between to avoid mixing of aggregates. Vrishabavathi River is passed through four stages by using different sizes of aggregate layers. We have Taken 4 conical flasks of 250ml are placed on the table for trial testing and funnels are inserted into all the 4 flasks along with the filter paper for Filtration process .Later equal amount of uncoated aggregates with different sizes are transferred to each of the funnels and coated aggregates are transferred to last funnel for higher purification. And water is transferred to each of the funnel one after the other. Further to kill pathogens and bacteria completely potash alum is added which completes the final filtration the filtered water is next tested in the laboratory

Filtration Process of Water in Aggregate Layer

Filtration is a process used to separate solids from liquids or gases using a filter medium that allows the fluid to pass through but not the solid. In this aggregate layers present will act as filters to separate the solids and the liquid will be purified. We have kept the layers of different sized aggregates in in decreasing order from top and the large particles are filtered in each layer. At last the coated aggregates purifies even more with anti-bacterial properties. The impure water passes through all the layers from top to bottom and gets purified. The purified water is collected and can be supplied for further usage (Figure 1&2).

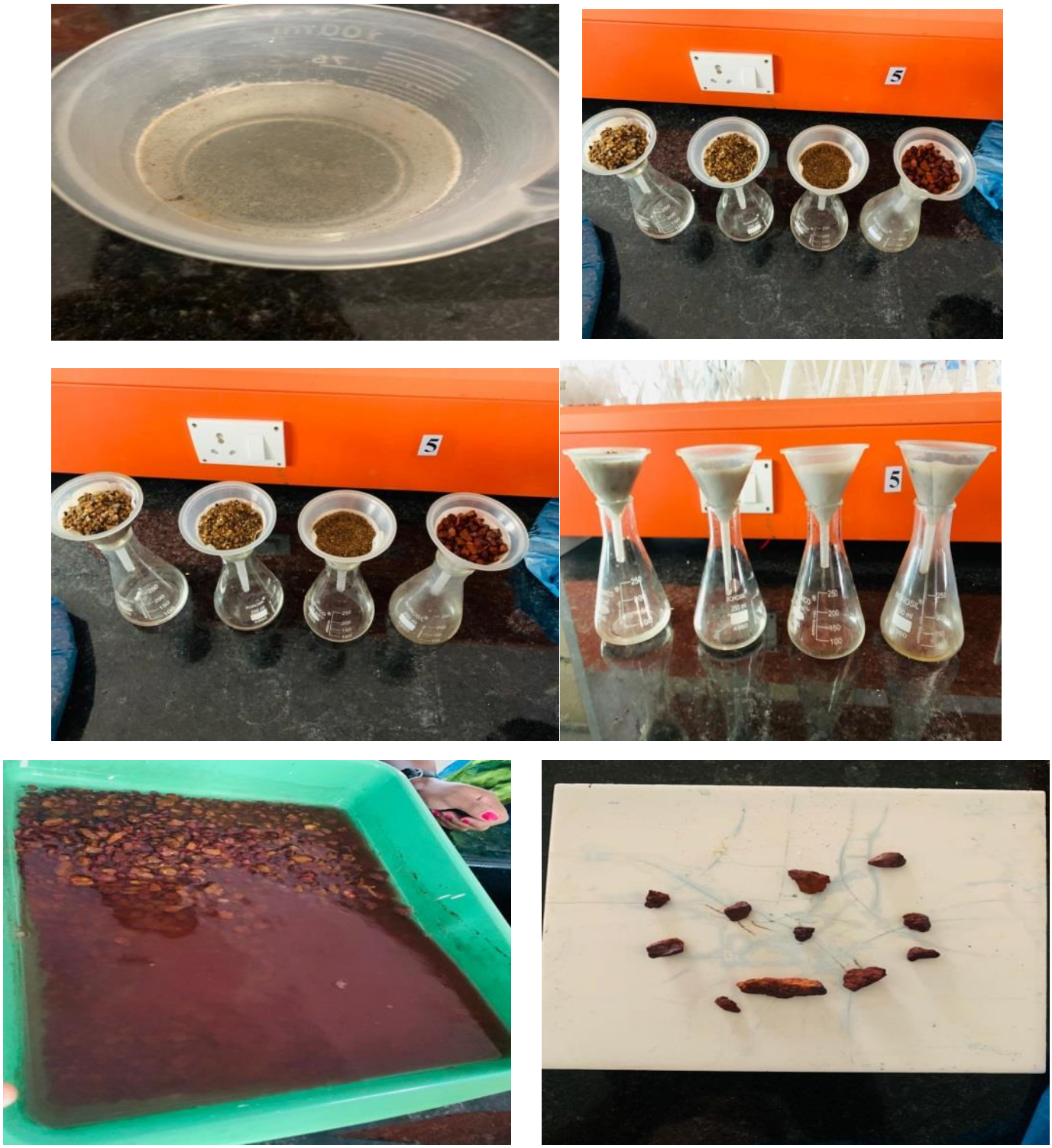

FIG.1. Steps Involved in Coating and Filtration Process

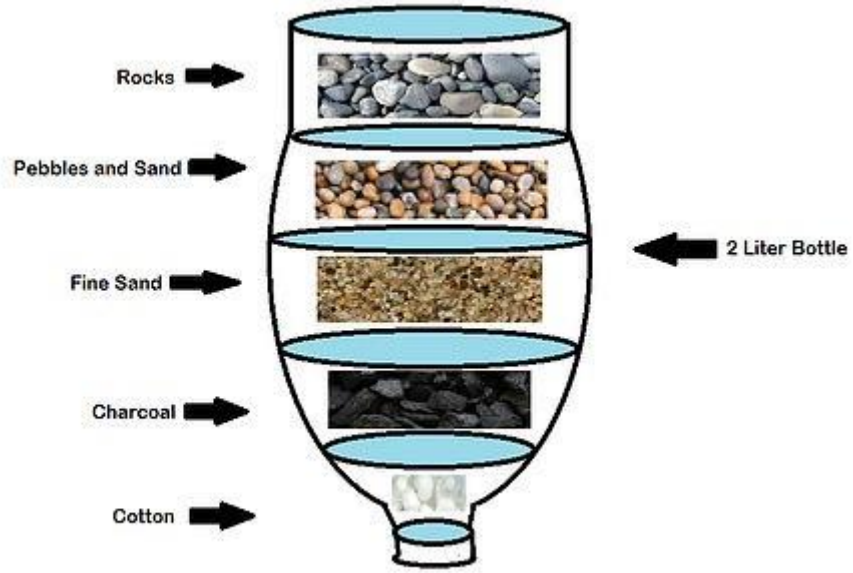

FIG.2. Model Developed for Filtration Process

Conclusions

A major problem that people in developing countries are facing is the abundance of organic micro-pollutants in natural water resources. An example of the consequences of this for public health is an increased number of birth defects, spontaneous abortion, cancers, and disturbances of central and peripheral nervous system. Hence, the research on low-cost drinking water treatment technologies should not only focus on removal of contaminants to reduce waterborne diseases, but also on the removal of micro-pollutants to prevent dangerous chronic diseases (including cancer) in large scale drinking water treatment plants. Concerning the selection of a suitable method for microbial examination, it should be observed that no technique that is 100% sensitive, 100% specific exists. All methods have advantages and disadvantages. Now the challenge is to decide the method that performs the most of the characteristics of the ideal method for the users' practical background. Advantages should be optimally exploited and disadvantages should be recognized. Different users may choose appropriate alternative techniques based on two criteria: 1) corresponding tests to resources and 2) corresponding tests to applications.

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