SURFACE WATER PURIFICATION BY RICE HUSK AS A FILTER MEDIA

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ABSTRACT

Water is an inorganic, transparent, tasteless, odorless, and nearly colourless chemical substance, which is the main constituent of earth's hydrosphere and the fluids of all known living organisms. We need water to digest our food and get rid of waste .Water is needed by each cell to work. WHO produces a series of water quality guidelines, including on drinking-water, safe use of wastewater, and safe recreational water environments. The water quality guidelines are based on managing risks, and it promotes the Framework for Safe Drinking-water. The Framework recommends establishment of health-based targets, the development and implementation of Water Safety Plans by water suppliers to most effectively identify and manage risks from catchment to consumer, and independent surveillance to ensure that Water Safety Plans are effective and health-based targets are being met. Groundwater is fresh water located in the subsurface pore space of soil and rocks. It is also water that is flowing within aquifers below the water table. Sometimes it is useful to make a distinction between groundwater that is closely associated with surface water and deep groundwater in an aquifer (sometimes called "fossil water").Groundwater can be thought of in the same terms as surface water: inputs, outputs and storage. The critical difference is that due to its slow rate of turnover, groundwater storage is generally much larger (in volume) compared to inputs than it is for surface water. This difference makes it easy for humans to use groundwater unsustainable for a long time without severe consequences. Nevertheless, over the long term the average rate of seepage above a groundwater source is the upper bound for average consumption of water from that source.The natural input to groundwater is seepage from surface water. The natural outputs from groundwater are springs and seepage to the oceans.If the surface water source is also subject to substantial evaporation, a groundwater source may become saline. This situation can occur naturally under endorheic bodies of water, or artificially under irrigated farmland. In coastal areas, human use of a groundwater source may cause the direction of seepage to ocean to reverse which can also cause soil salinization. Humans can also cause groundwater to be "lost" (i.e. become unusable) through pollution. Humans can increase the input to a groundwater source by building reservoirs or detention ponds. Water is one of the most important elements on Earth when it comes to sustaining life. extremely susceptible to dissolve many substances. While this is a wonderful quality that we take advantage of for everyday tasks such as cooking, cleaning and taking medication, it is also the exact quality that causes water to become polluted so easily. The main reasons for water pollution are Industrial wastes, marine dumping, oil leaks and spills, agriculture etc.

Water purification means the process of removing undesirable chemicals, biological contaminants, suspended solids, and gases from water. The goal is to produce water that is fit for specific purposes. Most water is purified and disinfected for human consumption water purification may also be carried out for a variety of other purposes, including medical, pharmacological, chemical, and industrial applications. The history of water purification includes a wide variety of methods. Using bio adsorbent such as Tamarind seeds and rice husk have emerged as one of the potential alternatives for removal of pollutants from water. The methods used include physical processes such as filtration, sedimentation, distillation biological processes such as slow sand filter or biologically active carbons ; chemical process such as flocculation and chlorination; and the use of electromagnetic radiation such as ultraviolet light.

According to a 2007 World Health Organization (WHO) report, 1.1 billion people lack access to an improved drinking water supply; 88% of the 4 billion annual casesof diarrheal diseases are attributed to unsafe water and inadequate sanitation and hygiene, while 1.8 million people die from diarrheal disease each year. The WHO estimates that 94% of these diarrheal disease cases are preventable through modifications to the environment, including access to safe water. Simple techniques for treating water at home, such as chlorination, filters, and solar disinfection, and for storing it in safe containers could save a huge number of lives each year Reducing deaths from waterborne diseases is a major public health goal in developing countries.

Keyword : - *Rice husk, Filter media, Purification of water , Surface water,*

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1. OBJECTIVES

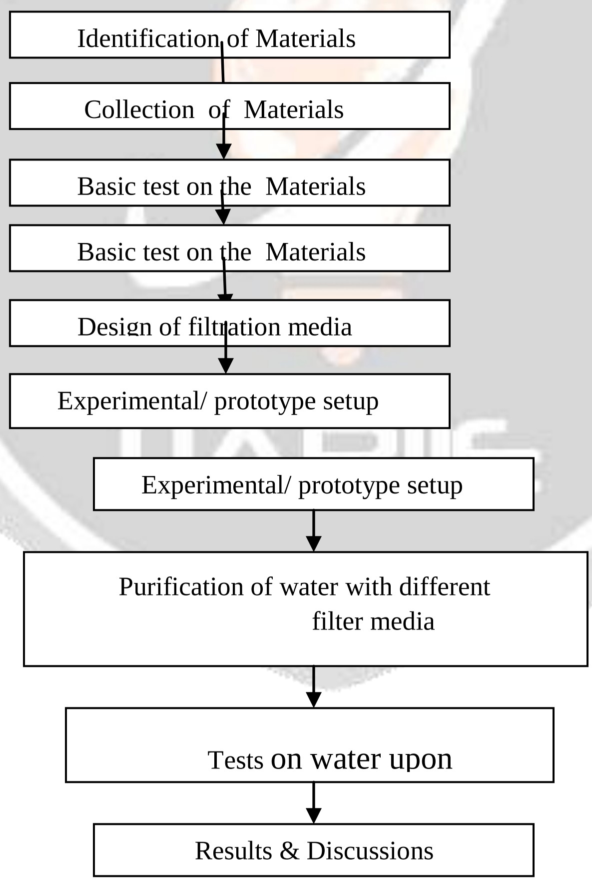
To remove unwanted impurities from the source of water.

To choose the best filter media for purification.

Comparison of filter media among the considered.

1.1 Materials & Methodology

The methodology of this dissertation flows in the mentioned order



1.2 Identification of materials

The basic materials identified for purification of the water are

Rice husk. Rice hulls are the coatings of seeds, or grains, of rice. The husk protects the seed during the growing season and is formed from hard materials, including opaline silica and lignin. The hull is hard to eat or swallow and mostly indigestible to humans because of its enriched fiber components. However, during times of food scarcity in ancient China, a common daily meal was a pastry made from rice husks, wild vegetables, and soybean powder. This led to the idiom "meals of cereal ,hulls, and vegetables for half a year," indicating poverty and food

Fig 1.2.1: Rice husk

Coarse aggregates.

The broken stone is generally used as a coarse aggregate. The nature of work decides the maximum size of the coarse aggregate. Locally available coarse aggregate having the maximum size of 20mm was used in our work. The aggregates were washed to remove dust and dirt and were dried to surface to dry condition. The aggregates were tested as per Indian Standard Specifications IS:383-1970.

Fig 1.2.2: Coarse aggregate

Fine aggregates.

The sand used for the experimental programmed was locally procured and conformed to Indian Standard Specification IS:383-1970.The sand was first sieved through 4.75mm sieve to remove any particles greater than 4.75mm and then was washed to remove the dust.

Fig 1.2.3: Fine aggregate

2. Methodology:

Rice husk preparation: Rice husk is taken for the preparation of sample and then it is washed severally with water and sun dried for a week ,after that the rice husk is placed at topmost layer in the experiment setup for the purification process before that the experiment setup is marked for the equal distribution of layers. The rice husk is placed according to the markup is done.

Fig 2.1: Rice husk

Coarse aggregate preparation: Coarse aggregate is firstly collected of different sizes and then it should be sieved with the sieve sizes of 10mm,7.5mm,6mm,4.75mm and and it should be severally washed with water and it should be oven dried .After it is dried it should be placed in layer from descending sizes.

Fig 2.2: Coarse aggregate

Fine aggregate preparation: Fine aggregate is sieved with sizes of 2.36mm,1.18mm and it should be washed thoroughly and sun dried, after it is sun dried it should be places in order according to the layers distributed.

Fig 2.3: Coarse aggregate

3. Test to be conducted:

3.1 pH test: The pH is one if the basic waters and wastewaters characteristics. It expresses the intensity of acid or alkaline conditions by indicating the hydrogen ion activity. Some of the processes in water quality engineering that require pH monitoring and control are the following: disinfection, coagulation, softening, biological treatment etc. Natural waters usually have pH values close to neutral.

Measurement of pH using digital pH meter:

Fig 3.1: Coarse aggregate

Immerse the electrode in pH 6.86 (under the temperature of 250 C) standard buffer solution of phosphate, and gently shake the electrode. Regulate the trimmer with screwdriver until the buffer solution value corresponding to the measurement temperature is obtained. Immerse the electrode in pH 4.01 or 9.18 the standard buffer solution. After one minute

3.2 Turbidity test : Turbidity is the measure of resistance of water to allow the light pass through it. It is caused by the pressure of suspended and colloidal matters such as clay, finally microscopic organisms. To estimate the turbidity of such sample can be made using digital Nephelo turbidity meter. Measurement of turbidity using the photoelectric turbidity meter is based upon comparison of the intensity of light scattered by standard reference suspension under same conditions.

Procedure : Switch ON the instrument and allow it to warm up for 10-15 minutes. Take distilled water and set the instrument to zero by using coarse and fine knobs. Calibrate the instrument to a known value. Take the sample in the curette then start to take a reading in NTU.

Fig 3.2: Turbidity meter

3.3 Conductivity test: Conductivity meter measure the ion capacity in aqueous solution to carry electric current. As the range in aqueous solution are usually small, the basis units of measurements are milliSiemens/cm (mS/cm) and microSiemens/cm (µS/cm)

Fig 3.3: Conductivity meter

3.4 Acidity test: Acids contribute to corrosiveness and influence chemical reaction rates, chemical specification and biological processes. Acidity of water is its quantitative capacity to react with a strong base to designated pH. The measured value may vary significantly with the end point Ph used in the determination. When the chemical composition of the sample is known study mineral acids, weak acids such as carbonic and according and hydrolyzing salts such as iron or aluminum sulphate may contribute to the measured acidity according to the method of determination.

3.5 Alkalinity test: The alkalinity of the water is a measure of its capacity to neutralize acid. The alkalinity of natural water is due preliminary to the salts of weak acids. Bicarbonates represents the major form of alkalinity.

Alkalinity is significant in many users and treatments of natural waters and wastewaters. As alkalinity of many surface waters constituent of carbonate, bicarbonate and Hydroxide contents, it is assumed to be an indicator of this constitutes as well, Alkalinity in excess of alkaline earth metal concentrations is significant in determining the suitability of water for irrigation. Alkalinity measurements are used in the interpretation and control of water and wastewater treatment processes. Raw domestic wastewater has a alkalinity less than or only slightly greater than that of the water supply.

Phenolphthalein Alkalinity

Sample of 50ml in a conical flask and add 2-3 drops of phenolphthalein indicator. Andfill the burette with 0.02 N H2SO4 solution and titrate till the pink colour just disappears indicating the end point. Record the volume of titrate consumed as V1 in ml.

Methyl orange Alkalinity

Add 2-3 drops of methyl orange indicator to the sample. If the colour turns yellow, continue the titration till the solution turns faint orange colour develops in the solution .

3.6 Hardness test

Take 50 ml of the sample in a conical flask. Add one drop of ammonia buffer to the flask. Add 2-3 drops of EBT indicator to the flask wine red colour will be developed. Titrate it with standard EDTA solution which is filled in the burette till the colour changes from wine red to blue.

Test Name	Rice Husk	Coarse aggregate	Fine aggregate
Specific gravity	✓	✓	✓
Fineness modulus	✓	✓	✓
Water absorption		✓	✓

4. Result & Discussion:

According to this filtration process, it was clearly observed that the removal of color and odor was directly after the passing through the filtration bed (sand + carbonized rice husks). The differences between water quality before and after filtration. More analyses were carried out immediately after passion through the filtering bed. Analyses include physical and chemical parameters of the well water before and after filtration. the main water parameters that had been analyzed. fulvic and humic acids, which have an intense color and can be found in the soil. The electric conductivity of the water shows a small increase after the treatment. This parameter indicates the presence of salts dissolved in the water, which is proved by the small increase in the total dissolved salts parameters. there was a considerable reduction in color and turbidity of the well's water after treatment. The color in the water for human supply is generally due to the presence of colored organic material in the soils, which is principally composed of fulvic and humic acids. Table 1 shows that a considerable reduction of water color from 550 to 13 Pt/Co in the water treated by the filter. Levels below 15 Pt/Co are generally acceptable by consumers. The turbidity of the water is due to the presence of particulate material in suspension in the water, such as finely divided organic and inorganic material, phytoplankton and other microscopic organisms, passing from 391 NTU to NTU. Turbidity values around 4 NTU are generally imperceptible visually. According to the national standards, the turbidity of 5 NTU is acceptable to consumers. However, according To WHO, 1 NTU is recommended. At varying coagulant dosages, the effect on constituent parameters is varying dosage no significant changes were observed on pH, temperature, conductivity and TDS for the water sample treated with sapodilla seed as coagulant, however, there was a notable decrease in the turbidity of the water sample after treatment. The coagulation and flocculation ability of some seeds has been investigated in several studies. These studies have shown that neither pH nor conductivity was affected during water treatment. The greatest decrease was seen at the dose of 2mg/L of water which reduced the turbidity from 114 to 6NTU. This value is not up to the WHO recommended level of 5NTU. However, the optimal dosage for a water is defined as the dosage which gives the lowest turbidity in the treated water, therefore the optimum dosage is 2mg/L.

Parameters	**Unit**	**Before filtration**	**After filtration**	**National standards**
pH	-	6.99	7.01	6.0 - 9.0
Conductivity	µS	780	793	1000
TDS	ppm	476	479	1000
Hardness	mg/L	82	72	500
Turbidity	NTU	391	4	5
Acidity **1.Phenolphthalein** **2.Methyl orange**	mg/L	Absent	Absent	6.5-8.5
Alkalinity **1.Phenolphthalein** **2.Methyl orange**	mg/L	26 75	29 78	20-400

4. CONCLUSIONS

In this paper, a new technique for using activated carbon that is embedded in rice husks was created and used. The created filter has shown good results regarding water purification process. The filter was quite successful, with the visible reduction turbidity. It may be a substitute for industrial activated carbon. The use of this technique creates a possibility of offering a contribution to the current investigations on the mechanism of the use of carbonaceous materials. Moreover, the possible use of primary materials, which considered residuals and wastes in the agriculturalindustry, possesses implications of interest as much economicas environmental since it is already evident that its appropriate use will benefit the sustainability and the process of environmental conservation. Consequently, it would be a big mistake of a noble primary material to consider it a wasteinstead of a source, since it may be used in various industrial branches such as water purification.

5. REFERENCES

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