PURIFICATION OF WATER WITH THE APPLICATION OF NATURALLY AVAILABLE MATERIAL

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Abstract *:* This work has been carried out to improve the quality of drinking water of municipal supply of Vangaon, Palghar (MH) region with the application of naturally available materials of **activated charcoal, sand, aggregate, gravel**, **red clay, river sand, sawdust**. During this work, examination of treated and untreated sample water for turbidity, PH value, hardness and total dissolved solids (TDS) analyzed. The results showed the significant decreased, up to 85% in reduction of TDS. Treatment with the activated charcoal also help's in purification of water and eliminate the pathogen's present in it. It has been examined that charcoal, river sand, red clay, sawdust was more effective in clearing of suspended organic and inorganic matter present in water sample. This work evaluates the use of natural materials, which are an economical and eco-friendly.

INTRODUCTION

TYPES OF FILTERS

Capping of Sand Filters

Rapid sand filters can be converted for mixed media operation to increase capacity by 100%. The cost of this conversion is much lower than that of installing additional rapid sand filters. Capping involves the replacement of a portion of the sand with anthracite. In this conversion, a 2-6 in. layer of 0.4-0.6mm (0.016-0.024 in.) sand is removed for the surface of the bed and replaced with 4-8 in. of 0.9mm (0.035in.) anthracite. If an increase in capacity is desired, a larger amount of sand is replaced. Pilot test should be run to ensure that reduction in the depth of the finer sand does not reduce the quality of the effluent.

Gravity Filters

• The filter shell, which is either concrete or steel can be square, rectangular, or circular. Rectangular reinforced concrete units are most widely used.

• The support bed, which prevents loss of the fine sand or anthracite through the under-drain system. The support bed, usually 1-2ft deep also distribution of backwash water.

• An under-drain system, which ensure uniform collection of filtered water and uniform collection of filtered water and uniform distribution of backwash water. The system may consist of header and laterals, with perforations or strainers spaced suitably. False tank bottom with appropriately spaced strainers are also used for under drain systems.

• Wash water troughs, large enough to collect backwash water without flooding. The troughs are spaced so that the horizontal travel of backwash water does not exceed 3-3 ft. in conventional sand bed units, wash troughs are placed approximately 2 ft above the filter media during operation at maximum backwash rates.

• Control devices that maximum filter operation efficiency. Flow rate controllers, operated by venture tubes in the effluent line, automatically maintain uniform delivery of filtered water. Backwash flow rate controllers are also used. Flow rate and head loss gauges are essential for efficient operation.

Far Infrared Water

The ability to clean the water and enhance its structure, far infrared water filtration (FIR) has some consumers wondering if this may be the blessing in disguise they've been waiting for. With our body being made up of over 70% water, simply removing contaminants isn't good enough anymore, considering the level of today's knowledge and technology. Far infrared water filters claim to deliver clean water that is opportunity to deliver clean water that is refreshing crisp and energized to boot.

Far infrared rays are the invisible portion of the sunlight spectrum that has been found to promote growth and health to living cells in plants, animals, and humans. By using a far infrared water filtration system, some have estimated an enrichment of treated water that somehow strengthens various organs within our bodies. Is it vital that all drinking filters detect and decontaminate any

sort of impurities that may be found in our water? However, above and beyond this standard requirement, some also crave the ability to enhance the water's structure and properties. By doing so, far infrared water filtration may allow us to drink energized water while getting superior hydration; all in the name of improving overall health. So how does it work you may ask? Far infrared rays are reported to have the ability to penetrate the human body in order to activated cells. With continuous movement, the rays are alleged to reactivate cells to help strengthen the micro-circulatory system. The micro-circulatory system is often the cause of various ailments. By strengthening this system, some may reduce or even reverse aliments that have plagued their bodies for years.as far as our health goes, FIR may also regulate the blood flow, increase resistance against various diseases and balance the acidity levels in our bodies.

While empirical to back up this technology is sketchy at best, many people swear by far infrared water filters. Not only do these types of filters claim to be able to eliminate harmful contaminants and bacteria, but they also claim to enhance your health and even slow down the again process. Another claimed benefit is that through the warming and eliminating of fats and chemical in your body, this technology is able to reduce or even eliminate certain types of circulatory problems. With these kinds of benefits being touted, it is no wonder that consumers are taking advantage of the infrared water filtration system

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UV Water Filtration

Ultraviolet water purification is the most effective method for disinfecting bacteria from the water. Ultraviolet (UV) rays penetrate harmful pathogens in your home's water and destroy illness-causing microorganisms by attacking their genetic core (DNA). This is extremely efficient in eliminating their ability to reproduce. Disinfecting your water with Ultraviolet light is exceptionably simple, effective and environmentally safe. UV systems destroy 99.99% of harmful microorganisms without adding chemicals or changing your water's taste or odor. UV water purification is usually used with other forms of filtration such as reverse osmosis systems or carbon block filters. While empirical to back up this technology is sketchy at best, many people swear by far infrared water filters. Not only do these types of filters claim to be able to eliminate harmful contaminants and bacteria, but they also claim to enhance your health and even slow down the again process. Another claimed benefit is that through the warming and eliminating of fats and chemical in your body, this technology is able to reduce or even eliminate certain types of circulatory problems. With these kinds of benefits being touted, it is no wonder that consumers are taking advantage of the infrared water filtration system UV systems are an effective means of water disinfection for residential point of entry use to help disinfect the entire home. UV systems are highly recommended to homeowners who may suspect any E. coli, cryptosporidium, giardia or any other types of bacteria and viruses in the water like private well owners, because of the toxic byproducts they create. It is important to avoid drinking any water that is potentially contaminated from bacteria to protect yourself from any water-borne bacterial diseases. Water Ionizer A water ionizer (also known as an alkaline ionizer) is a home appliance which claims to raise the PH of drinking water by using electrolysis to separate the incoming water stream into acidic and alkaline components. The alkaline stream of the treated water is called alkaline water. Proponents claim that consumption of alkaline water results in a variety of health benefits, making it similar to the alternative health practice of alkaline diets. Such claims violate 10 basic principles of chemistry and physiology. There is no medical evidence for any health benefits of alkaline water. The machines originally became popular in Japan and other far eastern countries before becoming available in the U.S. and Europe There are several effects far infrared rays can have on our body, all of which can have a strong positive effect when used as a far infrared water filter. Theoretically, the water filter will soften hard water, eliminate offensive odors, and destroy any potentially harmful contaminants. FIR could also be shown to prevent growth, be used to purify the air, or prevent mould from occurring. As 9 far as our health goes, FIR may also regulate the blood flow, increase resistance against various diseases and balance the acidity levels in our bodies.

REVERSE OSMOSIS (RO)

Is a water purification technology that uses a partially permeable membrane to remove ions, molecules and larger particles from drinking water. In reverse osmosis, an applied pressure is used to overcome osmotic pressure, a colligative property, that is driven by chemical potential differences of the solvent, a thermodynamic parameter. Reverse osmosis can remove many types of dissolved and suspended chemical species as well as biological ones (principally bacteria) from water, and is used in both industrial processes and the production of potable water. The result is that the solute is retained on the other side. To be "selective", this membrane should not allow large molecules or ions through the pores (holes), but should allow smaller components of the solution (such as solvent molecules, i.e., water (H2O) to pass freely. In the normal osmosis process, the solvent naturally moves for an area of low solute concentration (high water potential), through a membrane, to an area of high solute concentration (low water potential). The driving force for the movement of the solvent concentration on either side of a membrane is reduced, generating osmosis. The process is similar to other membrane technology applications.

Reverse osmosis differs from filtration in that the mechanism of fluid flow is by osmosis across a membrane the predominant removal mechanism in membrane filtration is straining, or size exclusion, where the pores are 0.01 micrometers or larger, so the

process can theoretically achieve perfect efficiency regardless of parameters such as the solution's pressure and concentration. Reverse osmosis instead involves solvent diffusion across a membrane that is either nonporous or uses non-filtration with pores 0.001 micrometers in size. The predominant removal mechanism is from differences in solubility or diffusivity, and the process is dependent on pressure, solute concentration and other condition. Reverse osmosis is most commonly known for its use in drinking water purification from seawater, removing the salt and other effluent materials from the water molecules .

Carbon Filtering

Carbon filtering is a method of filtering that uses a bed of activated carbon to remove contaminants and impurities, using chemical adsorption.

Each particle, or granule, of carbon provides a large surface area, or pore structure, allowing contaminants the maximum possible exposure to the active sites within the filter media. One gram of activated carbon has a surface area in excess of 3,000 m2 (32,000 sq. ft). Activated carbon works via a process called adsorption, whereby pollutant molecules in the fluid to be treated are trapped inside the pore structure of the carbon substrate. Carbon filtering is commonly used for water purification, air filtering and industrial gas processing, for example the removal of siloxanes and hydrogen sulfide from biogas. It is also used in a number of other applications, including respirator masks, the purification o sugarcane and in the recovery of precious metals, especially gold. It is also used in cigarette filters and in the EVAP in cars.

Active charcoal carbon filters are most effective at removing chlorine, particle such as sediment, volatile organic compounds (VOCs), taste and odor from water. They are not effective at removing, salts, and dissolved inorganic substances.

Typical particles sizes that can be removed by carbon filters range 0.5 to 50 micrometers. The particle size will be used as part as the filter description. The efficacy of a carbon filter is also based upon the flow rate regulation. When the water is allowed to flow through the filter at a slower rate, the contaminants are exposed to the filter media for a longer amount of time. Slow Sand Filters Slow sand filters are used in water purification for treating raw water to produce a potable product. They are typically 1 to 2 meters deep, can be rectangular or cylindrical in cross section and are used primarily to treat surface water. The length and breadth of the tanks are determined by the flow rate desired by the filters, which typically have a loading rate of 200 to 400 liters per hour per square meter (or 0.2 to 0.4 cubic meters per square meter per house).

Slow sand filters differ from all other filters used to treat drinking water in that they work by using a complex biological film that grows naturally on the surface of the sand. The sand itself does not perform any filtration function but simply acts as a substrate, unlike its counterparts for UV and pressurized treatments. Although they are often preferred technology in many developing countries because of their low energy requirements.

RESEARCH METHODOLOGY

This chapter basically describes the methodological strategy designed and deployed by the author, in order to perform this research and achieve the objective of this master thesis.

Research Approaches

According to Creswell (2009), there are three different approaches researching, which may be described as follows:

i. Qualitative research: focus on understanding specific social or human problems. This approach involves typically emerging questions, data collective in small samples, and inductive analysis. The researcher makes interpretations about the data collected in order to better understand the complexity of the problem. This approach is based on the constructed paradigm and it was developed as part of the social science researches.

ii. Qualitative research: focus on testing objective theories by examining the relation among the variables, which are typically measured by instrument and analyzed by the statistical and numerical procedures. The theories are tested deductively, emphasizing the protection against bias in the replication and generalization of the findings. This approach is based on the positivist and post positivist paradigms, and its constituents the main or classic approach for scientific research.

iii. Mixed methods research: focus on collecting quantitative data, and using distinct designs and methods that may involve both philosophical assumptions and paradigms. The core assumption of this approach is that the combination of both approaches provides a more complete understanding of the research problem. The mixed approach is based on the pragmatism paradigm. Regardless its differences, research approaches share a common structure based on three main elements, which are namely:1) philosophical worldview, 2) research methods, and 3) research designs. The approaches and tools regarding each of these elements vary depending on the selected research approach, and consequently they present different degree of suitability for particular research projects (e.g.: scientific, engineering, and social) .

The main features e research of the components, for each specific research approach, are briefly described below:

iv. Paradigm or philosophical worldviews Creswell (2009) represents the philosophical orientation about the world and the nature of the nature of that is performed. There are four main paradigm regard research development, which are: post positivism, constructivism, transformative pragmatism.

v. Research designs are described by Creswell (2009) as types of inquiry that provide specific direction for the procedures in a research design. The research design may be organized the in quantitative (e.g. experimental design or surveys), qualitative (e.g.: narrative research, case study) and mixed (e.g.: convergent, explanatory sequential).

vi. Research method involve the form of data collection, data analysis, and the final interpretation of this data. Research method may be divided in the following groups: quantitative method (e.g.: closed- ended questions, census data, statistical data, statistical interpretation), qualitative method (e.g.: open-ended question, interview data, observation, text analysis, patterns interpretation) and mixed method (e.g.: close and open and closed-ended questions, statistical and text analysis, data interpretation).

Creswell (2009) emphasizes that the selection of research approach must be done based on three main factors:
ii. Nature of the research problem and question,
iii. personal experiences of the author, and
iv. The audience (i.e.: the reviewers and sensors) 16

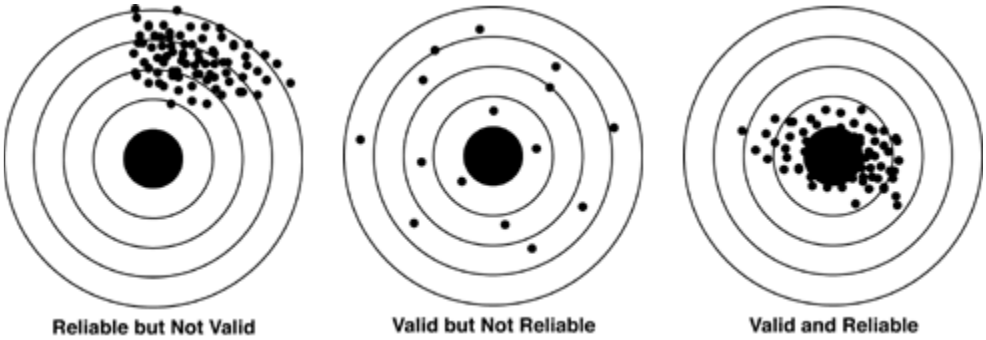


Figure 3.2: graphical representation of reliability and validity in research methods

MATERIALS

• TYPES OF MATERIALS

1. SILICA SAND

Filter sand is an extremely effective filter media because of its ability to hold back precipitates containing impurities. Filter sand size, angularity and hardness are the important filter sand characteristic to ensure proper filtering. Products meet or exceed the NSF/ANSI standard 61 for drinking water system components, as well as AWWA standard B100-01.

Silica sand or water filtration Cairo filter sand is used to filter and clean portable water filters and pool filter and sewage treatment plant purity more than 96% free of any organic materials, no clay, no Radiation, no toxic materials.

CHEMICAL NAME

Silica, silicon dioxide

SYNONYM OR COMMON NAMES

Silica sand and silica gravel.

COMMERCIAL FORMS

Silica sand and silica gravel according to this standard are available in different particle size ranges.

PHYSICAL PROPERTIES OF SILICA SAND SILICA GRAVEL

APPEARANCE

The product is a grey/white, yellow or multicolored granular material. The structure is crystalline, with a smooth to rough texture. The particle shape is spherical or angular depending mainly on the origin and manufacturing procedure (quarrying or dredging, or crushing). The shape influences filtration performance.

The product shall be generally homogeneous and shall be visibly free of extraneous matter.

CHEMICAL PROPERTIES OF SILICA SAND AND FILTER GRAVEL

The minimum purity requirements for silica sand and silica gravel used for the treatment of water intended for human consumption. Limits are given for impurity commonly present in the products.

Depending on the raw material and the manufacturing process other impurities may be present and, if so, this shall be noticed to the user and when necessary to relevant authorities.

User of these products should check the national regulation in order to clarity whether it is o appropriate

Purity for treatment of water intended for human consumption, taking into account raw water quality, required dosage, contents of other impurities and additives stated in this article.

Limits have been given for impurities and chemical parameters where these are likely to be present in significant quantities from the current production process and raw material lead to significant 22 quantities of impurities by products or additives being present, this shall be notified to the user .

PHYSICAL SPECIFICATIONS

Effective sizes: - 2mm-2.5mm
Uniform coefficient: - 1.3-1.7
Specific gravity: - 2.67
Hardness: - 7
Density: - 105-115 lbs. per cubic foot

FINE SILICA SAND

COTTON CLOTH

The cloth is effective because most pathogens are attached to particles and plankton, particularly a type of zooplankton called copepods, within the water. By passing the water through an effective filter, most cholera bacteria and other pathogens are removed. It has been demonstrated to greatly reduce cholera infections in poor villages where disinfectants and fuel for boiling are difficult to get.

In sub-Saharan Africa where guinea worm infections (dracunculiasis) are endemic, infection is prevented by used of a nylon mesh with pore size of approximately 150 microns to filter out the copepods that host the parasite.

The cloth filter provides less than ideal purification on its own-usually filtering is an initial step, to be followed by further disinfection. However, where there are no other options, water professionals me consider that it is "of course, better than nothing " The cloth filter is a simple and cost-effective appropriate technology method for reducing the contamination of drinking water. Water collection in this way has a greatly reduced pathogen count-though it will not necessarily be perfectly safe, it is an improvement for poor people with limited options. Filtering water to free it from microorganism has been an age-old practice among Jains who carefully remove the microorganism in the cloth through filtered 25 water in order to follow doctrine of ahimsa or non-violence, preventing pain to any living creature.

Cotton Cloth

RIVER SAND

With maybe a couple of exception; bur these exceptions are rare cases that probably don't apply to most situations. If the "beach" in question is a river bed where fresh, non-polluted water flows, then the sand there may be ok; but it is a big risk to use it. For one, most pristine river beds are protected and removing sand may be harmful to the eco system and against the law. There could be any kind of bacteria present in the sand there, and it would take disinfection and testing to be sure the sand was clean.

If the "beach" is on a fresh water lake with no public use and limited access to human use, then maybe the sand would work. There would still be the danger of contamination from zoonotic organisms (this also applies to the river bed sand mentioned above).

RIVER SAND

If the beach is an ocean beach, then there will be salt in the sand which is totally unacceptable, and furthermore is the beach is a place where there is lots of use then there could be anything in the sand anything including salt. think about it: dogs, horses, people all who have walked almost anywhere, another problem with beach sand is lack of uniform size of the individual grains.

WOOD SAW DUST

Chemically modified pine sawdust can be used for removing nitrates and metals from industrial and mining wastewaters. For water purification materials from Finnish wood-based waste materials, and studied their use in wastewater treatment.

The biomaterials selected for the research (sawdust, bark and peat) were chemically modified so that their surface properties became favorable for attachment of harmful substances. It was discovered in laboratory tests with synthetic watery solutions that attachment of nitrate was very quick and that the material functioned on a wide PH and temperature range this is favorable for particle applications. Modified sawdust was successfully used also in purification o actual industry and mining wastewaters.

The purification method is primarily based on ion exchange. Metals attached to the purification material can be salvaged by regenerating the material with saline.

Results from the dissertation study can be used in developed of new water purification technologies. Development of ion-based water treatment materials from local raw materials decrease dependency of fossil raw materials, and offer forestry by-products new applications. It is possible to re-use purification material several times.

WOOD SAW DUST

R.S.S DISC

R.S.S Disc is a sintered red clay porous media useful for purification of drinking. The Disc is prepared from the mixture of red clay (silt clay), river sand and wood saw dust; which are highly inexpensive and available abundantly in rural sector of the country. For production of Disc; all the materials are first mixed thoroughly at particular proportion and particle sizes, then pugged with water, molded in desired shape, dried under sun and sintered at elevated temperature to obtain Disc water filtration media.

During sintering of Disc, the wood particles are burnt and clay particles are sintered around the sand particles leaving elliptical/ circular large size pores in between. The pores are not connected with each other unlike white ceramic water filter candies. These pores are separated by very thin clay walls (membranes) which are semi-permeable in nature. The thin clay walls contain a large numbers of ultra-line capillary openings. The capillary openings bridge a set of the large pores on either side of a thin clay wall.

During filtration process, water flows from one pore to another pore through the capillary openings by the pressure of water on the Disc and the always function like micro-reservoirs for holding water inside the Disc.
Water able to flow easily through the capillary openings even at very less pressure of raw water, since thickness of the ultra-fine clay walls is very less, within 100 microns.
When a Disc media is fixed at the bottom of a container and raw water is allowed to pass through the Disc, the raw water is filtered leaving behind the sediments and impurities on top surface of the Disc.
Diameter of capillary openings is within 0.2 to 0.3 micron which is much smaller than size of most of the microbes and suspended particles present in raw water.
Therefore, almost all suspended particles & microbes etc. cannot travel with water inside the Disc during filtration process.
Generally, these sediments are removed from top surface of Disc time to time and core of Disc never gets clogged unlike white ceramic candle.

Heating of R.S.S brick

So long operational life of R.S.S Disc is obtained easily the red clay of Disc is activated during sintering process and negatively charged. Therefore, soluble iron and some heavy metals present in raw water are also removed by ion-exchange or adsorption process and the same get precipitated on the top surface of the Disc in long run.
In this way turbid raw water can be filtered and treated into clean drinking water. About 99% of turbidity, 90-95% of micro-organisms, 90-95% of soluble iron, colors etc. are effectively removed from the raw water during filtration process through the Disc. Removal of 100% bacteria can be achieved when about 0.003 gm/lit of normal bleaching powder is added to the filtered water. Average rate of filtration of turbid raw water (50-100 NTU) with 250mm water head over the Disc is 13ml/he per cm2 of top surface area of Disc.Rate of filtration increases by many folds at higher water pressure. The average turbidity of the product water is 0.5-3 NTU irrespective of any high turbid raw water is used. Iron content of the filtered water is within 0.3 mg/lit, permissible limit of BIS. More over the PH of water is always improved during filtration of acidic water. Therefore R.S.S. Disc water filter is able to provide good quality clean drinking water from surface or ground water sources for a long period with minimal expenditure.

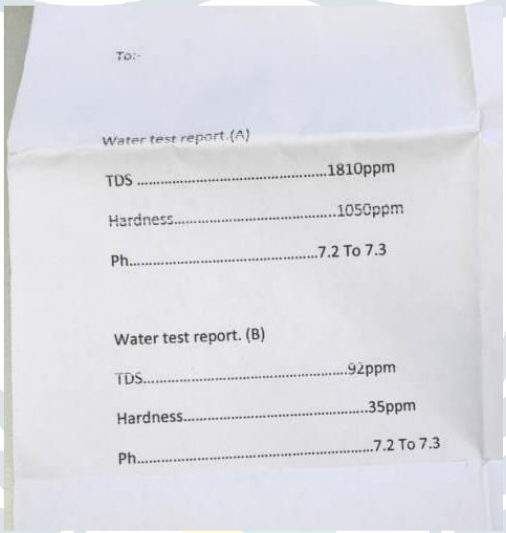
Turbidity
Experimental raw water exhibiting maximum 45 NTU of turbidity was passed though the Disc. 30-cycles of filtration indicated the turbidity in t filtration ranging between 0.3-1.19 NTU with the turbidity removal efficiency varying 97.35 to 99.33 %.

Turbidity in the filtrate obtained in all the 30- cycles, was found well within the desirable limit 5.0 NTU, as prescribed by the Indian Standard of Drinking Water IS: 10500-1991

Before Processing After Processing

PH

pH of raw water ranges from 7.2 to 8.5 was passed through the filter.30cyclesof filtration indicated the pH in the filtrate ranging between the desirable limit 6.5to 8.5.



Result Of Water Treatment

Iron

30cycles test was conducted with the experimental raw water ranging from1.64 to 2.97 mg/ltr. In the filtrate, iron was found ranging between 0.08 to 0.29mg/ltr. Thereby, indicating the iron removal efficiency varying between 90.23 to95.12%. Iron (as Fe) in the filtrate obtained during all the cycles, was found below the desirable limit 0.30 mg/l, as prescribed by the Indian Standard of Drinking Water IS: 10500-1991.

CONCLUSION:

• Turbidity and Iron, both the contaminants were removed effectively by the filter, asevinced by the 36-cycle test conducted. Removal efficiency in case of Turbidity wasfound 97.35 to 99.33%, while that in case of Iron was estimated 90.23 to 95.12%

• Turbidity & iron in the filter water obtained during the 36-cycle test were found wellwithin the desirable limit of IS: 10500-1991(Indian Specification of Drinking Water).

• 36cycles of filtration indicated the pH in the filtrate ranging between the desirablelimit of 6.5-8.5 (IS:10500-1991, Indian Specification of Drinking Water)

• 99.94 to 99.98 % microorganisms were removed by filtration R.S.S. Disc filter without chemical treatment.

• Total coliform count in the treated raw water is within 2330 CFU/ml, when the rawwater is treated with 2mg/ltr bleaching powder in 36-cycles of experiments

• Total Coliform count became nil in the filtered water, when the raw water wastreated with 2mg / ltr of bleaching powder (30% chlorine) followed by filtration through Tearful water filter.

• Total Coliform count in both raw and filtered water also became nil, when the rawwater was treated with 3mg / later of bleaching powder.

• It is established that when raw water having total coliformcount up to 2500 CFU/ml is filtered through R.S.S. Disc water filter, total coliform countbecame nil in the filtered water

CHARCOAL

Carbon filtering is a method of filtering that uses a bed of activated carbon to remove contaminants and impurities, using chemical adsorption Each particle, or granule, of carbon provides a large surface area, or pore structure, allowing contaminants the maximum possible exposure to the active sites within the filter media. Carbon filtering is commonly used for water purification

Active charcoal carbon filters are most effective at removing chlorine, particles such as sediment, volatile organic compounds (VOCs), taste and odor from water. They are not effective at removing minerals, salts, and dissolved inorganic substances. Typical particle sizes that can be removed by carbon filters range from 0.5 to 50 micrometers. The particle size will be used as part of the filter description. The efficacy of a carbon filter is also based upon the flow rate regulation. When the water is allowed to flow through the filter at a slower rate, the contaminants are exposed to the filter media for a longer amount of time.

The reason that activated charcoal makes such a great material for water filters is that it is natural and effective at removing many toxins from the water, such as volatile organic compounds and chlorine, without the use of chemicals or stripping the water of salts and minerals. As you may remember from chemistry class, carbon-based organic impurities in the water are attracted to the carbon in the charcoal, which readily bonds to these impurities. However, other compounds, depending on their molecular weight and polarity, are not attracted to the carbon, and so pass through the filter. Because the process results in bonds being formed between compounds, and the impurities are kept in the filter, charcoal filters need to be replaced once all the pores have been filled. Fortunately, maintaining and replacing charcoal filters is easy and cheap to do, making charcoal filters a popular choice for many households.

Natural Charcoal

<u>The Benefits of Using a Charcoal Filter:</u>

1. It doesn't remove the "good stuff."

Drinking water isn't just made of hydrogen and oxygen, there are also many other minerals, in addition to nasty chemicals and impurities, which make up the composition of water.

2. It makes water healthier.

Not only do charcoal filters remove a lot of the nasty stuff from water, they can add things back into your water to make it healthier. Activated charcoal can add minerals, such as calcium, magnesium and iron back into your water to improve the water quality.

3. It improves the flavor.

Many people dislike the taste of tap water, complaining it tastes metallic or has an off-putting aroma. This taste is often due to the additives, such as chlorine, that are added to tap water to kill bacteria and pathogens found in reservoirs.

4. It is cheap.

Many water filtration systems can be an expensive, though necessary, investment for your home. Charcoal filters, on the other hand, are relatively inexpensive to produce, and those savings are passed down to the consume

5. They are easy to maintain.

Although the filters need to be replaced once the charcoal has been used, replacement parts are cheap, as well as easy to source .

Advantages of Water Filtration

1) It is very easy and straightforward to use.
2) Water filtration is cost effective, and it does not require a lot of money to maintain .
3) The odor and taste of the water will improve. Walter filtration also gets rid of chlorine in the hard water .
4) The method also ensures that harmful toxins are removed from the hard water.
5) Water purifiers take time to process water into purified form. This may mean that it takes longer for a faucet or pitcher to produce drinkable water .
6) It is very easy and straight forward to use.
7) Water filtration is cost effective and it does not require a lot of money to maintain.
8) Protection against harmful organisms .
9) It removes sediment removal .

Disadvantages of Water Filtration

1) Thorough cleaning and care of the equipment is very vital .
2) Not all germs and contaminants are removed filtered water .
3) When the process is taking place very, small particles can pass through the membranes used to perform water filtering.
4) It creates blockage when excess dirty water passed through the Disc.
5) Discharge of water is low.
6) It is delicate to handle.