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Assesment on Quality Parameters of Water Passing Through Different Materials as Filtration Membranes

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ABSTRACT

Water is one of the most important element for the mankind. As the pollution is increasing day by day the pollutant and toxic concentration in the water is also increasing in a great manner. This increased concentration of pollutants in the water causing various kinds of problems to the human beings. The parameters of the water like alkalinity, Hardness are the major parameters which decide the usage of water. The alkalinity is due to the presence of negative ions in the water and the hardness is due to the positive ions.

The excess concentration of these ions in the water can make the water unfit for the drinking and 0ther purposes as well. In this project the ultra-filtration techniques would be broadly explained. Five different materials like coconut shell, sugarcane waste, Gravel, sand, coal are used as the filtration membranes and the reduction in the alkalinity and hardness in raw water to filtered water are tabulated. The water which is used being tested and the improvement of those water parameters are mainly concentrated in this project The alkalinity and the hardness tests were performed on the water passing through the membranes and the results are tabulated which is used for the comparison purposes as well.

KEYWORDS: Toxic, ultra filtration, alkalinity, hardness, filtration membranes.

INTRODUCTION

The planet keeps nudging us with increasingly extreme droughts, reminding us that water is life. It is an essential resource upon which all living beings depend and it is crucial to all social and economic development, as well as energy production and adaptation to climate change. Nevertheless, we are now facing a gigantic challenge. The purification of the water is involved with the several stages it includes aeration coagulation,sedimentation,disinfection, filtration. These several stages are required for the treatment of raw water. Then the standards of the water to be checked and would be distributed, for the different purposes like drinking, bathing, washing etc. Water treatment is any process that improves the quality of water to make it appropriate for a specific end-use. The end use may be drinking, industrial water supply, irrigation, river flow maintenance, water recreation or many other uses, including being safely returned to the environment. Water treatment removes contaminants and undesirable components or reduces their concentration so that the water becomes fit for its desired end-use. This treatment is crucial to human health and allows humans to benefit from both drinking and irrigation use.

Public drinking water systems use different water treatment methods to provide safe drinking water for their communities. Public water systems often use a series of water treatment steps that include coagulation, flocculation, sedimentation, filtration, and disinfection. The water which is supplied by the govt for the purpose of Drinking has been passed through several stages of the treatment in order to ensure the supply of the good and pure drinking water to the households. The filterable solids and the micro organism concentrations are widely calculated and reduced it to the optimum level. Water may be treated differently in different communities depending on the quality of the source water that enters the treatment plant. The water that enters the treatment plant is most often either surface water or ground water. Surface water typically requires more treatment and filtration than ground water because lakes, rivers, and streams contain more sediment (sand, clay, silt, and other soil particles), germs, chemicals, and toxins than ground water.Some water supplies may contain radionuclides (small radioactive particles), specific chemicals (such as nitrates), or toxins (such as those made by cyanobacteria).Specialized methods to control or remove these contaminants can also be part of water treatment.

Purpose Of Treatment Of Water

- To reduce the impurities to a certain level that does not cause harm to human health.
- To reduce the objectionable colour, odour, turbidity and hardness.
- To make water safe for drinking.
- To eliminate the corrosive nature of water affecting the pipe.
- To make it suitable for a wide variety of industrial purposes such as steam generation, drying, etc.

Characteristics Of The Water:

The characteristics of the water is mainly classified into three types they are namely

i. Physical
ii. Chemical
iii. Biological

1.3.1 Physical Characteristics Of Water:

There are many physical characteristics of the water namely,

1. Turbidity
2. Temperature
3. Colour
4. Taste and odor
5. Solids
6. Electrical

1) Turbidity

Though less used than some of the other water quality parameters on this list, turbidity refers to how cloudy water is. When you use Turbidity sensors, these devices are designed to measure the ability that light has to pass through water**.** High levels of turbidity can occur as a result of higher concentrations of silt, clay, and organic materials. The main issue with turbidity in water is that the water will look bad. No one wants to drink cloudy water. Several additional problems that are caused by high turbidity include:

- Water treatment costs will be higher.
- High levels of particulates can act as a shield for harmful microorganisms, which makes it more difficult to get rid of these contaminants.
- Suspended materials may damage fish gills, reduce growth rates, and decrease resistance to diseases.
- Various suspended particles can act as adsorption media for mercury, cadmium, lead, and other heavy metals.
- Dissolved oxygen concentration will likely decrease.

Turbidity starts to become visible in water when sensors provide you with readings of over five NTU. As for muddy water, it can have turbidity readings of more than 100 NTU.

2) Temperature

Some of the aspects of water quality that are influenced by the water's temperature include odours, chemical reactions, solubility, palatability, and viscosity. As such, biological oxygen demand, sedimentation, and chlorination all depend on the water's temperature. The ideal water temperatures range from 50-60 degrees Fahrenheit.

3) Colour

It's possible for the colour of the water to be altered by materials that decay from organic matter, the primary of which include vegetation. Such inorganic matter as rocks, soil, and stones may also affect the colour of the water. Even though these changes to a water's colour may create aesthetic issues with the water, they don't change how the water tastes. You can effectively measure colour by comparing a water sample to colour glass disks or standard colour solutions.When you're attempting to identify the colour of water, it's important to understand the difference between the water's apparent colour and its true colour. Apparent colour is made up of suspended material and dissolved solid colours. The true colour of water can be identified after all suspended materials have been filtered out of the water. Keep in mind that colour can be graded on a scale that ranges from 0-70 colour units. Pure water contains no colour units because it is essentially colourless.

Taste and Odour

It's possible for the taste of water to change and for odours to develop as a result of foreign matter being introduced to the water. This matter can include organic materials, dissolved gases, and inorganic compounds. Most of this matter is derived from agricultural, natural, and domestic sources.

Solids

Solids can be in suspension or in solution when they get into the water. If you put a water sample through a glass fibre filter, suspended solids will remain at the top of this filter. On the other hand, any dissolved solids will pass through and remain in the water. When measuring the number of solids in water, it's common for total dissolved solids to be measured. You can identify how much organic matter is present in the water by measuring for total dissolved solids. The three different water classifications for total dissolved solids include:

-Freshwater – Less than 1,500 mg/L TDS
-Brackish water – 1,500-5,000 mg/L TDS
-Saline water – More than 5,000 mg/L TDS

4) *Electrical Conductivit*

Another core physical parameter that you should be aware of involves electrical conductivity, which measures how well a sample of water or similar solution can carry or conduct electrical currents. Conductivity levels will increase as the amount of ions in the water increases.This is one of the main parameters when measuring water quality because of how easy it is to detect water contamination levels when measuring the conductivity of water. High conductivity means that the water contains a high amount of contaminants. On the other hand, potable water and ultra-pure water are practically unable to conduct an electrical current. The main units of measurement for electrical conductivity include micromhos/cm and milliSiemens/m, the latter of which is abbreviated into mS/m.

Chemical Characteristics Of Water:

There are many physical characteristics of the water namely,

1. P^H
2. Acidity
3. Alkalinity
4. Chlorine
5. Hardness
6. Disolved Oxygen

5) *P^H*

When measuring the quality of water, P^H is one of the first measurements that you should take. The P^H of water is measured with a simple P^H sensor or test kit, which will tell you how acidic or basic the water is. Acidic water will invariably be comprised of more hydrogen ions. On the other hand, basic water contains more hydroxyl ions.

It's possible for P^H levels to range from 0-14. If you receive a reading of 7.0, this means that the water is neutral. Any readings below 7.0 are acidic, while any readings above 7.0 are alkaline. Pure water has a neutral P^H. However, rainfall is somewhat more acidic and typically has a 5.6 P^H. Water is considered to be safe to drink if it has a P^H of 6.5-8.5. The many effects that changing p^H levels can have on plants and animals include:

- The majority of aquatic plants and animals are able to live in water with a specific $P^{H,}$ which means that slight changes could worsen quality of life.
- Slightly acidic water can irritate fish gills, damage membranes, and reduce the number of hatched fish eggs.
- Water with extremely high or extremely low P^H is fatal to aquatic plants and animals.
- Low P^H can kill amphibians because their skin is sensitive to contaminants.

6) *Acidity*

This refers to the measure of how much acids are in a specific solution. The water's acidity is the quantitative capacity that it has to neutralize a base at a certain P^H level. Acidity is commonly caused by the presence of mineral acids, hydrolysed salts, and carbon dioxide. When acids are introduced to water, they can influence many different processes, which include everything from biological activities and chemical reactions to corrosion. The acidity of water is measured with a P^H sensor.

Alkalinity

Alkalinity indicates the water's acid-neutralizing capacity. Likely the most common reason to measure the alkalinity of a sample of water is to identify how much soda and lime must be added to the water for water softening purposes. The water softening process is particularly beneficial for mitigating corrosion in boilers. In the event that water is alkaline, this means that it has a PH that's at least higher than 7.0. The presence of bicarbonate ions, carbonate ions, and hydroxide ions increases the alkalinity of water. If you find that your water samples have high alkalinity or acidity, this indicates that the water is contaminated in some way.

7) *Chlorine*

While chlorine doesn't occur naturally in water, it's commonly added to wastewater for disinfection purposes. Even though base chlorine is a toxic gas, the aqueous solution is completely harmless to humans. If a small amount of chlorine is found in water, this indicates that the water is clean and essentially free from contaminants. You can measure chlorine residual with a spectrophotometer or colour comparator test kit.

8) *Hardness*

Hardness occurs when water contains high mineral levels. If left untended, the dissolved minerals in your water could create scale deposits on hot water pipes. If you take a shower with water that has high mineral content, you may find it difficult to produce a lather with the soap you're using. Hardness in water is mainly caused by the presence of magnesium and calcium ions, which can enter water from rock and soil. In most cases, groundwater has more hardness to it than surface water. You can measure water hardness with a colorimeter or test strip.

Dissolved oxygen

This is a critical water quality parameter that can help you determine how polluted rivers, lakes, and streams are. When water has a high concentration of dissolved oxygen, you can be confident that the water quality is high. Dissolved oxygen occurs because of the solubility of oxygen. The amount of do that you can find in water depends on numerous factors, the primary of which include the water's salinity, pressure, and temperature. It's possible to measure dissolved oxygen levels with a colorimeter or with the electrometric method.

9) *Biological Oxygen Demand*

Microorganisms like bacteria use organic matter as a source of food. When this material is metabolized, oxygen is consumed. If this process takes place in water, the dissolved oxygen in a sample of the water will be consumed. In the event that there is a substantial amount of organic matter in the water, high amounts of dissolved oxygen will be consumed in order to make sure that the organic matter decomposes. However, this creates problems since aquatic plants and animals require DO to survive. You can measure biological oxygen demand with the dilution method. if the BOD levels are high, the water is contaminated.

10) *Bacteria*

Bacteria are single-celled plants that can ingest food and reproduce at rapid rates if the water's pH, food supply, and temperature are ideal. Because bacteria can grow rapidly, it's almost impossible to count the number of bacteria in a sample of water. In most cases, bacteria will reproduce at a slow rate in colder water. There are many harmful waterborne diseases that can be caused by high amounts of bacteria in water, which include cholera, tularemia, and typhoid

Algae are tiny, microscopic plants that consist of photosynthetic pigments. These plants are able to support themselves by effectively converting inorganic matter into organic matter, which is done with energy from the sun. While this process is ongoing, the algae consume carbon dioxide and release oxygen. Algae are also essential in wastewater treatment processes that use stabilization ponds. The main issues caused by algae include strange odours and poor taste problems. Keep in mind that some species of algae can pose serious public health risks. For instance, it's possible for blue-green algae to kill cattle.

11) Viruses

Viruses are tiny biological structures that can be harmful to a person's health. Only strong electronic microscopes are able to view viruses. All viruses require parasites to live. Because of how small viruses are, they are able to pass through the majority of filters. Certain waterborne viruses can cause hepatitis and similar health problems. Despite the difficulty in treating viruses, most water treatment facilities should be able to eliminate viruses during the disinfection process.

Understanding the three primary types of water quality parameters may prove useful when you want to treat water and remove the many contaminants that can be found in water. Whether your water has high turbidity, a low pH, or ample bacteria, there are an array of solutions that you can use to eradicate these issues for good.

LITERATURE REVIEW

Title : Sugarcane leave-derived cellulose nanocrystal/grapHene oxide filter membrane for efficient removal of particulate matter.

Author : Minthra chantaso,selorm torgbo,buapan puangsin(2023).

Description : Sugarcane leave-derived cellulose nanocrystal/grapHene oxide filter membrane for efficient removal of particulate matter.

Title : Sustainable Living Filtration Membranes.

Author:Christina G. Eggensperger, Mattia Giagnorio, Marcus Holland, Keriannem(2020).

Description : The filtration membrane filtration procedure was understood and the usage was known as well.

Title : Metal-organic frameworks (MOFs) in water filtration membranes for desalination and other applications.

Author : Mohammed kadhom,Baolin deng(2018).

Description : MOFs neat pore size and special structures promote them for different applications.MOFs membranes proved their durability in various water filtration

processes.

Title:Enhanced antibacterial profile of nanoparticle impregnated cellulose foam filter paper for drinking water filtration

Author : Shikha Jain, Gaurav Bhanjana, Solmaz Heydarifard, Neeraj Dilbaghi, Mousa M Nazhad, Vanish Kumar, Ki-Hyun Kim, Sandeep Kumar(2018).

Description : To develop highly efficient drinking water filter paper, water-resistant cellulose foam paper with a high wet strength property was fabricated using diverse metal oxide (e.g., copper oxide (CuO), zinc oxide (ZnO), and silver oxide (Ag_2O)) nanoparticles. These nanoparticles were synthesized using the hydrothermal reaction method. Their morpHological structures were studied using a field emission scanning electron microscope (FESEM). The presence of coated nanoparticles on the cellulose foam filter was verified by energy dispersive X-ray spectroscopy (EDX) methods.

Title:Greywater treatment by granular filtration system using volcanic tuff and gravel media.

Author : Abeer albalawneh, Tsun – kuo chang , Heba Aishawabkeh(2017).

Description : The main objective of this study was to evaluate the efficiency of a granular filtration system (GFS) in greywater treatment under arid and semi-arid conditions. Six GFSs were designed, constructed, and monitored for approximately13 months. Each GFS served a single rural Jordanian home by treating their greywate.

Title : Water filtration using plant xylem

Author : Michael SH Boutilier, Jongho Lee, Valerie Chambers, Varsha Venkatesh, Rohit Karnik(2014).

Description : Here we show that plant xylem from the sapwood of coniferous trees – a readily available, inexpensive, biodegradable, and disposable material – can remove bacteria from water by simple pressure-driven filtration. Approximately 3 cm3 of sapwood can filter water at the rate of several liters per day, sufficient to meet the clean drinking water needs of one person.

Title : Chitosan-silver nanoparticles composite as point-of-use drinking water filtration system for household to remove pesticides in water.

Author : N Saifuddin, CY Nian, LW Zhan, KX Ning(2011).

Description : Biosorbents such as natural and waste materials from industries and agriculture can be used as alternatives adsorbents which are inexpensive and easily obtainable. The objective of this study was to prepare silver nanoparticles embedded in chitosan, which is a non-toxic and biodegradable natural polymer, using microwave irradiation for the removal of pesticides from water.

Title : Point of use household drinking water filtration: A practical, effective solution for providing sustained access to safe drinking water in the developing world".

Author : Daniele Lantagne, Regula Meierhofer, Greg Allgood, KG McGuigan, Robert Quick(2009).

Description : stored in the home and reduce the risk of diarrheal diseases in people using these technologies in developing countries. Several organizations are developing strategies to increase the impact of HWTS by scaling-up programs that promote the proven HWTS options: chlorination, solar disinfection.

Title : Point of use household drinking water filtration: a practical, effective solution for providing sustained access to safe drinking water in the developing world.

Author : Mark D Sobsey, Christine E Stauber, Lisa M Casanova, JosepH M Brown, Mark A Elliott (2008).

Description : Point-of-use (POU) water treatment technology has emerged as an approach that empowers people and communities without access to safe water to improve water quality by treating it in the home. Several POU technologies are available, but, except for boiling, none have achieved sustained, large-scale use. Sustained use is essential if household water treatment technology (HWT) is to provide continued protection, but it is difficult to achieve. The most effective, widely promoted and used POU HWTs are critically examined according to specified criteria for performance and sustainability.

Title : Environmental Textbook.

Author : P.Venu Gopal rao.

Description : Treatment of water necessity and the required knowledge to study the raw water.

Title : Microbiology and drinking water filtration.

Author : Gary S Logsdon(1990).

Description : Filtration studies related to removal of microorganisms have generally been motivated by the need to learn about the removal of pathogens or indicator organisms, or both. Reducing the risk of waterborne disease has been a goal of microbiologically related filtration research for nearly 100 years.

PROPOSED METHOD

ALKALINITY :

- Alkalinity indicates how much acid a solution can absorb without changing the pH. It is the buffering capacity of a solution (water). Therefore, solutions with low alkalinity have a lower buffering capacity, and change pH rather quickly when something acidic is added.

Procedure :

1. Fill the burette to H_2SO_4 solution.
2. Take a 100ml water sample in flask. Add few drop of Phenolphthalein indicator.
3. Note the initial reading on burette scale. Titrate against H_2SO_4 till the pink colour disappear.
4. Note the end point reading and get volume of used H_2SO_4 in ml (P) (Concordant value I).
5. Add 1-3 drop of Methyl Orange in same sample flask.
6. Titrate it, till the appearance of light orange colour
7. Note down the final reading and find the volume of used H_2SO_4.
8. Repeat the steps of using the sample to get concordant value (Concordant value II).
9. Calculate the total alkalinity of sample.

HARDNESS :

- In scientific terms, water hardness is generally the amount of dissolved calcium and magnesium in water. But in layman's terms, you may notice water hardness when your hands still feel slimy after washing with soap and water, or when your drinking glasses at home become less than crystal clear. Learn a lot more about water hardness on the Water Science School site.

Procedure :

1. The burette is filled with standard EDTA solution to the zero level.
2. Take 50ml sample water in flask. If sample having high Calcium content then take smaller volume and dilute to 50ml.
3. Add 1ml Ammonia buffer.
4. Add 5 to 6 drop of Ericrome black – T indicator. The solution turns into wine red colour.
5. Note the initial reading.
6. Titrate the content against EDTA solution. At the end point colour change from wine red to blue colour.
7. Note the final reading and record it. Repeat the

process till we get concordant value.

8. Take 50ml sample in another flask and boiled it. (Add distilled water to get final volume of water.)
9. Repeat step 3-7.

BOD :

- Biochemical oxygen demand is an analytical parameter representing the amount of dissolved oxygen consumed by aerobic bacteria growing on the organic material present in a water sample at a specific temperature over a specific time period.

Procedure :

1. Collect the water sample.
2. Carefully fill a BOD bottle with sample water without making air bubbles.
3. Add 2ml of manganese sulfate to the BOD bottle carefully by inserting the pipette just below the surface of water. So that you can avoid the formation of air bubbles.
4. Add 2 mL of alkali-iodide-azide reagent in the same manner.
5. Close the bottle and mix the sample by inverting many times. A brownish cloud will appear in the solution as an indicator of the presence of Oxygen.
6. Allow the brown precipitate to settle out to the bottom.
7. Add 2ml of Conc. H_2SO_4 carefully without forming air bubbles.
8. Close the bottle and mix the solution well to dissolve the precipitate.
9. Keep the bottle in BOD incubator for 5days of incubation.
10. After incubation, titrate 50 ml of sample water with 0.025N Sodium thiosulpHate to a pale yellow color.
11. Then add 2ml of starch solution. So the sample turns blue in color.
12. Continue the titration till the sample gets clear and note the readings.
13. The concentration of dissolved oxygen in the sample is equivalent to the number of milliliters of titrant used.

EXPERIMENT RESULTS

Results And Discussion On Raw Water Alkalinity

Determination of the Phenolphthalein end point

s.no	Water sample (ml)	Initial value	Final value	Ml of sulpHuric acid uses
1	50	0	0	0

Determination of the methyl orange end point

s.no	Water sample	Initial value	Final value	Ml of sulpHuric acid used
1	50	0	20	20
2	50	0	19.5	19.5
3	50	0	20.5	20.5

Total alkalinity = **10 mg/L**

Results And Discussion On Raw Water Hardness

S.NO	WATER SAMPLE	INITIAL VALUE	FINAL VALUE	ML OF EDTA
1	20	0	12.2	12.2
2	20	0	12	12
3	20	0	12.4	12.4

Total Hardness in form of calcium carbonate = 0.9516*50 = **47.58 mg/l.**

Result Of Bod Test : BOD of the water sample passing through gravel as a filtration membrane = 2.25 mg/l.

Results And Discussion On water passing through sugarcane waste as a filtration membrane

Determination of the Phenolphthalein end point

s.no	Water sample (ml)	Initial value	Final value	Ml of sulpHuric acid uses
1	50	0	0	0

s.no	Water sample	Initial value	Final value	Ml of sulpHuric acid used
1	50	0	2.5	2.5
2	50	0	2.5	2.5
3	50	0	2.5	2.5

Alkalinity related to the methyl orange indicator = 0.000025*50*1000 = 1.75mg/l

Total alkalinity = 1.25 mg/L

Hardness

S.NO	WATER SAMPLE	INITIAL VALUE	FINAL VALUE	ML OF EDTA
1	20	0	4.5	4.5
2	20	0	4.4	4.4
3	20	0	4.6	4.6

Total Hardness in form of calcium carbonate= 0.000351*50*1000 = 17.55 mg/l

BOD of the water sample passing through sugarcane as a filtration membrane = **1.25 mg/l**

Results And Discussion On Water Passing Through Coconut Shell

Alkalinity

Determination of the Phenolphthalein end point

s.no	Water sample (ml)	Initial value	Final value	Ml of sulpHuric acid uses
1	50	0	0	0

Determination of the Methyl orange end point

s.no	Water sample	Initial value	Final value	Ml of sulpHuric acid used
1	50	0	1.5	1.5
2	50	0	1.4	1.4
3	50	0	1.6	1.6

Alkalinity related to the methyl orange indicator = 0.000015*50*1000 = 0.75 mg/l

Total alkalinity = 0.75 mg/L

Hardness :

S.NO	WATER SAMPLE	INITIAL VALUE	FINAL VALUE	ML OF EDTA
1	20	0	3	3
2	20	0	3	3
3	20	0	3	3

Total Hardness in form of calcium carbonate = 0.000234*50*1000 = 11.7 mg/l.

Result Of Bod Test : BOD of the water sample passing through gravel as a filtration membrane = **1.85 mg/l**

Results And Discussion On Water (Coal):

Alkalinity

Determination of the Phenolphthalein end point

s.no	Water sample (ml)	Initial value	Final value	Ml of sulpHuric acid uses
1	50	0	0	0

Determination of the methyl orange end point

s.no	Water sample	Initial value	Final value	Ml of sulpHuric acid used
1	50	0	1.6	1.6
2	50	0	1.4	1.4
3	50	0	1.8	1.8

Alkalinity related to the methyl orange indicator = 0.000016*50*1000 = 0.8 mg/l

Total alkalinity = **0.8 mg/L**

Hardness

S.NO	WATER SAMPLE	INITIAL VALUE	FINAL VALUE	ML OF EDTA
1	20	0	2.5	2.5
2	20	0	2.4	2.4
3	20	0	2.6	2.6

Total Hardness in form of calcium carbonate = 0.000195*50*1000 = **9.75 mg/l**

Result Of Bod Test : BOD of the water sample passing through gravel as a filtration membrane = **1.6 mg/l**

RESULTS AND DISCUSSION ON WATER (M-Sand)

Alkalinity

Determination of the Phenolphthalein end point

s.no	Water sample (ml)	Initial value	Final value	Ml of sulpHuric acid uses
1	50	0	0	0

Table 8.1: Table Showing Alkalinity Values.

Determination of the methyl orange end point

s.no	Water sample	Initial value	Final value	Ml of sulpHuric acid used
1	50	0	1.5	1.5
2	50	0	1.4	1.4
3	50	0	1.6	1.6

Alkalinity related to the methyl orange indicator = 0.000015*50*1000 = 0.75 mg/l

Total alkalinity = **0.75 mg/L**

Hardness

S.NO	WATER SAMPLE	INITIAL VALUE	FINAL VALUE	ML OF EDTA
1	20	0	5.9	5.9
2	20	0	6.3	6.3
3	20	0	6.1	6.1

Total Hardness in form of calcium carbonate = 0.0004758*50*1000 = 23.79 mg/l

Result Of Bod Test : BOD of the water sample passing through gravel as a filtration membrane = 1.65 mg/l.

RESULTS AND DISCUSSION ON WATER (Gravel)

Alkalinity

Determination of the Phenolphthalein end point

s.no	Water sample (ml)	Initial value	Final value	Ml of sulpHuric acid uses
1	50	0	0	0

Determination of the Methyl orange end point

s.no	Water sample	Initial value	Final value	Ml of sulpHuric acid used
1	50	0	1.6	1.6
2	50	0	1.4	1.4
3	50	0	1.5	1.8

Alkalinity related to the methyl orange indicator = 0.000015*50*1000 = 0.75mg/l

Total alkalinity = **0.75mg/L.**

Hardness

S.NO	WATER SAMPLE	INITIAL VALUE	FINAL VALUE	ML OF EDTA
1	20	0	3	3
2	20	0	5	5
3	20	0	4	4

Total Hardness in form of calcium carbonate : 0.000312*50*1000 = 15.6 mg/l

Result Of Bod Test : BOD of the water sample passing through gravel as a filtration membrane = **1.85 mg/l.**

Conclusion

In conclusion, From the above results we can say that the water which has passed through the coconut shell has the low alkalinity and the low hardness hence the alkalinity is very less it is quiet recommendable and it also protects the human health in a great manner and for the future scope as the ground water contamination and toxicity in the water is increasing in the great manner there days will come where the drinking water should have less alkalinity and hence these membranes used to have very less alkalinity these membranes can be used as the filtration membranes.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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