

Sustainable Development Water Purification Technology in Vadange

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Abstract:- In order to understand the experimental result, we found that it was essential to include treatment of van der Waals interaction for water purification & in general it is always the dominant contribution to the adsorption energy. Charcoal is the outcome of pyrolysis carbonaceous source material & had excellent adsorption capacity. It makes this filter unique is the use of chemical adsorption of charcoal which is not commonly used in water purification.

Keywords:- Charcoal; Filter cloth; Sanitation; Micro-porosity; van der Waals interaction; Chemical adsorption.

I. INTRODUCTION

The development that needs of the present generation without compromising the ability of future generation to meet their own needs. The strong understanding in sustainable is that it is equal for all of us. The adverse change in physical, chemical, and biological properties of nature water due to addition of pollutants causing adverse effects on aquatic life and other living organisms. The risk of disease is very high when clean water & adequate sanitation are not available. Contaminated water contains bacteria & virus that causes diseases & many contain poisonous chemicals. Suspended solid, small particles of dust or earth that make water cloudy or brown are likely to carry such pollutants are therefore, undesirable. It is not a problem on a massive, global scale, but locally it is not difficult to solve. Using sustainable technique cheap and clean water can be provide easily.

This project of water purification using charcoal can be affordable and technique that is easy to use and does not need expert handling. Local people can set it up themselves and maintain it with local available materials. Considering a system or technique for purifying water, some basic concepts are taken into account. A good sustainable technique also needs to be cheap and reliable without endangering the environment.

II. CHARCOAL EFFICIENCY AND PROPERTIES

Charcoal is very good adsorbent. Charcoal was consisting of elemental carbon in its graphite configuration. Carbon is having small; low volume pores are available for adsorption. It has high degree of, micro-porosity. Carbon has high surface area per volume: 1gm of charcoal has a surface area in excess of 3,000 m² (32,000 sq. ft.) as determined by gas adsorption. Non polar organic molecules are strongly attracted to the surface of charcoal & binds due to van der Waals interactions. It is the collection or accumulation of organic impurities and harmful elements from water on the surface of charcoal due to physical forces. When the heat of adsorption is high, chemical adsorption is

formed. It is specific as it takes place only when chemical bond is formed. Larger the surface area of charcoal, greater is the adsorption. Adsorption is exothermic process. It is irreversible process. Also unimolecular layer of adsorbate is formed. It is due to residual or unsatisfied valencies.

Charcoal is finely divided or rougher or porous surface so its adsorptive power is high. These charcoals are produced by carbonaceous source of materials such as bamboo, coconut husk and willow peat, wood etc. Extremely high temperature are important for preparation of charcoal because erode (corrosion) the internal surface of the carbon material & produce micro-porous structure to increase internal surface area higher the power of adsorption. If charcoal is gradually prepare then may exhibit in capacity of aqueous contamination, low grade charcoal will form. WHO (World Health Organization) & several academic studies identify charcoal as the best available technology in drinking water.

III. WATER IN VADANGE LAKE



Fig 1:- Domestic waste in lake



Fig 2:- Water polluted by washing clothes, vesicles, etc.



Fig 3:- Eutrophication in Lake

Vadange is a village located in Kolhapur district of Maharashtra state, India. Vadange is blessed with lake. Water is enough, but it is extremely polluted. The quality of water is decreasing day by day at local, regional & global level. For domestic purpose people use treated water for washing vehicles, clothes, disposal of solid waste containing wooden rags, household refuse, plastics, decrease the aesthetic beauty of water body & leads to spread of waterborne diseases. Modern agricultural practices cause bioaccumulation and bio magnification of chemical pesticides and heavy metals during water run-off. Excessive richness of nutrients in lake frequently due to run-off from the land, which causes a dense growth of plants life. Increase in eutrophication of lake, water becomes green and smelly. River water is supplied to village which comes in week or sometimes once in two weeks. Village has to suffer water disaster. We have tried to find solution for this problem, treating lake water and making it potable in very cheap, easy and affordable way.

IV. METHODOLOGY (PURIFICATION PROCESS)

The process done with 1 lit. water sample from lake water & 0.5 gm. Piece of any type of charcoal. Boil water; insert charcoal in water & boil it for 15 min. Temperature is up to 100⁰ C measures by thermometer. Cool water in water bath and filter with cloth. Visible changes like change in color & also change in odor is seen.

V. RESULT

S.NO	Parameters	Value
1.	pH	8.07
2.	E. Conductivity	778
3.	Alkalinity	156
4.	Total hardness	156
5.	Permanent hardness	124
6.	Temporary hardness	32
7.	Calcium	16
8.	Magnesium	28
9.	Carbonate	Nil
10.	Bicarbonate	190
11.	Chlorides	116
12.	Turbidity	2.2

13.	Color	5
14.	Odor	Odorless
15.	Most probable Number	Nil
16.	Escherichia coli	Nil

Table 1. Flirted water sample testing for Portability

S.NO	Parameters	Value	Limits
1.	pH	6.5-8.5	May be relaxed up to 9.2 according to IS 10500:2012
2.	E. Conductivity	<3100	-
3.	Alkalinity	<500	-
4.	Total hardness	200	May be extended up to 600
5.	Permanent hardness	-	-
6.	Temporary hardness	-	-
7.	Calcium	75	May be extended up to 200
8.	Magnesium	30	May be extended up to 100
9.	Carbonate	Nil	Nil
10.	Bicarbonate	<610	-
11.	Chlorides	250	May be extended up to 1000
12.	Turbidity	1	May be relaxed up to 2.5 according to IS 10500:2012
13.	Color (Hazen units)	5	May be extended up to 15
14.	Odor	Odorless	Odorless
15.	Most probable Number	Nil	Nil
16.	Escherichia coli	Nil	Nil

Table 2. Indian standard for drinking water (ISO 9001-2008):

VI. ADVANTAGES OF PURIFIER.

- It is very cheap method of purification.
- There is no need of electricity.
- It is simple method.
- Charcoal effectiveness.
- There is no wastage.
- Less time consumption.
- Better smell and test of water.
- Any type of charcoal is reliable.

VII. CONCLUSION

For purifying water on a smaller scale in Vadange Lake a filter such as “charcoal”, they are cheap & simple & able to clean out the elements like bacteria and viruses that are problem in Vadange Lake. The result analysis of the water sample, are clearly shown the filter’s efficiency. Educate people on the importance of sanitation of lake and teach them how to get filtered water from lake and also to use this simple filtration technique well in working order. So we can get potable water. Mostly importantly, we can clearly see the efficiency of charcoal when the heat is applied. Chemical adsorption or we can also say activated adsorption or chemisorptions is forms. The result has shown the purified water from charcoal shows very nice activity against microorganisms and makes water bacteriologically potable.

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