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Assessment of water quality by physico-chemical parameters

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ABSTRACT

An effective water purification method for the community is the key to human survival and development, as water management is a current global concern. Water is the basic resource necessary for sustaining all human activities, so its provision in desired quantity and quality is of utmost important. Contaminated water is the main source of infectious disease viz. Amoebiasis and Malaria, Cholera, Dysentery, Paratyphoid, Fever, Typhoid, Jaundice. The WHO (World health organization) report that one sixth of the world's population (1.1billion people) does not have access to safe water. Due to use of contaminated water, human population suffers from water borne diseases. Therefore it is necessary to check the water quality at regular interval of time. An assessment on the basis of temperature, pH, Turbidity can also provide an indication about water quality. The present cross-sectional study is focused on measuring the quality of drinking water, soil water, and laundry wastes water in rural areas of Pune district of Maharashtra state and its effect on human health in these areas. Various analyses including physical and chemical assessment were carried out on the water sample collected from the village. The different samples were showing variations in physicochemical properties. At that time water quality was also questionable in most of the cases as majority of people living in these areas. The people were not safe from various water borne diseases.

The principal sources of water are lakes, river and relatively shallow ground water of dam and the study argues about the need and importance of water purification and water management systems in current times. In this review, we are assessing the water pollution to sustainable use of water and try to ensure the highest protection of water from all pollutants.

Keywords: Water Pollutant, Water quality, Infectious diseases, Water treatment, Filtration, Activated charcoal.

INTRODUCTION

Water is sustenance of the life cycle. It must be protected and preserved from all type of pollutant. It is the fundamental right of every individual to get pollution free water, but man disturbing water bodies viz. rivers, wells, stream, and seas. Water pollution occurs when undesirable effluents disperse in water system it results into change in water quality. The natural water system is being polluted by addition of industrial wastes, urban wastes, pesticides related pollutant as well as domestic sources that are primarily sewage, laundry wastes generated in house, apartments, and other dwellings. Pervious as well as impervious surfaces collect hundreds of pollutants such as animal waste, bacteria, oil, grease, sediment, pesticides and deposits from airborne pollutants. These hazardous materials can easily enter in our commercial water sources making water unsafe for human use. Urban sewage is handled by established government agencies as they can usually be effectively controlled [1].

Most of people do not seem to realize how important water is to our progress. Everyone in country use it for their benefits that affect all aspects of water leading to decrease in water quality. There is no other source to target but water to tackle this issue. This cannot be possible until local, state, and national storm water regulations are allow to altered changes in our lifestyle [2].

Water pollution can be prevented by stopping pollutants from contaminating nearby water sources. There are a number of water treatments to prevent pollution and water quality such as biological filters, chemical additives and sand filters. These simple technique cost money to maintain, but prevention is much cheaper than cleaning up water pollution that has already occurred [3].

Keeping the above fact in mind, this study was carried out to assess the physical and chemical parameters of water.

Objectives

The study covers the following objectives for research work

1. To check physicochemical characteristics of four different type of water.
2. Assessment of physicochemical characteristics after filtration (with the help of activated charcoal).
3. To evaluate and forecast the water quality after water treatment.

METHODOLOGY

The different water samples for the study have been collected from nearby villages of Hon. B.J. College Ale village of Junnar Tahsil. (Pune, Maharashtra).

Table 1: Main Source of Drinking Water in Junnar Tahsil of Pune.

Main Source of drinking water	In Numbers			In Percentage		
	Total	Rural	Urban	Total	Rural	Urban
Tap water from treated source	31,745	26299	5446	38.4	34.2	97.3
Tap water from un-treated source	7244	7165	79	8.8	9.3	1.4
Covered well	2282	2274	8	2.8	3.0	0.1
Un-covered well	24372	24338	34	29.5	31.6	0.6
Hand pump	6814	6813	1	8.2	8.8	0.0
Tube well/Borehole	8343	8326	17	10.1	10.8	0.3
Spring	398	394	4	0.5	0.5	0.1
River/Canal	485	482	3	0.6	0.6	0.1
Tank/Pond/Lake	351	350	1	0.4	0.5	0.0
Other sources	572	566	6	0.7	0.7	0.1

Source: Junnar Collector Office Pune 2011.

Water Quality and Pollution

Water covers over 71% of the earth's surface and is a very important natural resource for people [4]. But only 2 to 5 % of the earth's water is fresh. India has 16 % of the world's population, has only 2.5 % of the worlds land area and 4 % of the world's water resources at its disposal. Precipitation in the form of rain and snowfall provide over 4,000 trillion liters of fresh water to India. It is prove that 80% of India's surface water is polluted. It is fundamental right of every individual to get pollution free water. Water pollution come from industry, agriculture or household, chemical wastes in the water have negative effect on living organism in water and subsequently on our health. Water pollution effects drinking water, rivers, lakes and oceans all over the world which consequently harms human health and natural environment.

Water quality parameters

PH:

PH is the measure of acidity of a solution of water. The pH scale commonly ranges from 0 to 14. The scale is not linear but rather it is logarithmic form e.g. a solution with a pH of 6 is ten times more acidic than a pure solution with a pH of 7. Pure water is said to be neutral with a pH of 7. Water with pH bellow 7 is considered to be acidic while water with pH greater than 7.0 is considered basic or alkaline since the pH of pure water is 7.

Conductivity:

Conductivity is a numerical expression of an aqueous solution's indicating a capacity to carry an electric current. This ability depends on the presence of ions, their total concentrations, mobility, valence and relative concentrations, and on the temperature of the liquid. Solutions of most inorganic acids, bases, and salts are relatively good conductors. In contrast, the conductivity of distilled water is less than 1 µmhos/cm because conductivity is the inverse of resistance, the unit of conductance.

Alkalinity:

Alkalinity is the sum total of components in the water that tend to elevate the pH to alkaline side of neutrality. It is measured by titration with standardized acid to a pH value of 4.5 and is expressed commonly as milligrams per liter as calcium carbonate (mg/L as CaCO3). Alkalinity is a measure of the buffering capacity (ability to resist changes in pH) of the water, and since pH has a direct effect on organism as well as indirect effect on the toxicity of certain other pollutant in the water, the buffering capacity is important to water quality. Commonly occurring material in water that increase alkalinity are carbonates, bicarbonates, phosphates

Table 2:

Compounds	**General Formulae**	**Odor Produced**
Ammonia	NH3	Ammonic, pungent
Amine	CH3NH2, (CH3)3N	Fishy
Chloro phenol	ClPhOH	Medicinal, phenolic
Chlorine	Cl2	Chlorine
Diamines	H2N(CH2)4NH2,H2N (CH2)5NH2,	Rotten fish
Organic	(CH3)3S, CH3SSCH3	Strong delayed cabbage
Skatole	C8H5NHCH3	Fecal, repulsive
Sulphur dioxide	SO2	Pungent, acidic

Table 3: Physical Parameter

Characteristic	**Distilled water**	**Tap water**	**Soil water**	**Laundry waste water**
Taste	Agreeable	Agreeable	Not Agreeable	Not Agreeable
Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
Turbidity	No turbidity	No turbidity	Turbid	Turbid
Appearance	Clear	Clear	No Clear	No Clear
Colour	colorless	colorless	Brownish	Turbid White
Chemical assessment pH	6.70	7.84	8.15	9.85

Table 4 : Physical Parameter

Characteristic	Distilled water	Tap water	Soil water	Laundry waste water
Taste	Agreeable	Agreeable	Not Agreeable	Not Agreeable
Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
Turbidity	No turbidity	No turbidity	No turbidity	No turbidity
Appearance	Clear	Clear	Clear	Clear
Colour	colorless	colorless	Yellow	colorless
Chemical assessment pH	7.10	7.80	7.60	7.66

and hydroxides. Limestone bedrock and thick deposits of glacial till are good sources of carbonate buffering. Lakes with in such areas are usually well-buffered.

Water quality characters including: Taste, Odour, Temperature, Turbidity, Appearance (clarity), and Colour.

Physical Properties

The vast majority of the large solids such as faces and paper have broken up into very small particles and made turbidity with visible particles of organic material. The water color becomes gray and change to yellow- brown, according to the time day.

Odour:

Wastewater (becomes anaerobic) has a musty smell that is not at all offensive. Microorganisms that produce such odour are Cyanobacteria, Oscillatoria, Moreover, certain industrial waste have distinctive odour that caused by gasses involved from decomposition of various fractions of the organic matter. The rotten eggs is the commonest odor that caused by hydrogen sulfide produced by anaerobic bacteria (reduction of sulfate to sulfide). On the other hand, volatile fatty acids odor produced during food processing treatment and storage (Table No. I) [5, 6]

WATER TREATMENT METHOD

We will present only a brief, general account of typical step.

Filtration

Filtration is any of various mechanical, physical or biological operations that separate solids from fluids by adding a medium through which only the fluid can pass. The water pumped from the settling areas into tanks that equipped with sand filters. The water is cleared from the most remaining impurities, including numerous bacteria and other microorganisms. [7]

Sedimentation

Sedimentation is used as simple pretreatment of water before starting purification treatment such as filtration and disinfection method. It removes undesirable small particulates suspended matters (sand, silt and clay) and some biological contaminants from water under the influence of gravity. The longer the water is kept for sedimentation, more the suspended solids and pathogens will settle to bottom of the container. Special chemicals or some natural coagulants can accelerate sedimentation. Commonly used chemicals are aluminum sulphate, poly aluminum chloride (PAC or liquid alum) and ferric sulphate. [8]

Analysis

In analysis first the 7pH tablet is mix with water and prepared the water solution having pH-7 in beaker. pH meter is calibrated for pH-7 by using this solution i.e. pH of that water solution is exactly 7. Samples of four different waters are places as follows respectively in first beaker filled with distilled water , second one with tap water, third with soil water and in last beaker laundry waste water is present. The physicochemical principal and chemical assessment (pH) of all types of water is done Observations are recorded in Table No-II to find out which one is pure and impure water samples.

CONCLUSION

Activated charcoal (pure carbon) chemical name is mineral carbon. It is used for emergency toxic removal purpose. The activated charcoal powder mix with

polluted water, i.e. in third and forth water sample. After filtration chemical assessment (pH value) of this water shows that it results in appearance change. (Table No.III) It is good sign for the treatment of water where as 7in absence of filtration this water is not good for human life it is turbid and pH is also high. The filtration results in decrease of turbidity, conductance and pH. The water becomes clean and clear compared to earlier one. So, this filter water can be used for various purposes but not for drinking water purposes. But still after filtration there is no growth of bacteria or pollutant is developed.

Water pollution is a serious problem in India as almost 80 percent surface water is polluted. It is contaminated by biological, toxic, inorganic and organic pollutants. This water is considered unsafe for human consumption as well as various activities. Many of researchers have tried to find out economically feasible method to treat polluted water. These methods include chemical precipitation, electrolysis, coagulation, ultra filtration, adsorption, osmosis to treat waste water. The suggested measures improve the water quality by conducting total ban on the activities that causes pollution. Result of water quality assessment clearly showed that most of the water quality parameters show positive changes with filtration process. In future we need to develop these methods to improve water quality.

Conflicts of interest: The authors stated that no conflicts of interest.

REFERENCES

1. Boyd CE and Tucker CS. Water quality management", Springer science & Business media, 2012.
2. Nesaratnam ST. Water Pollution Control," John Wiley & Sons., 2014.
3. WHO (World Health Organization). water treatment. WHO Geneva. Retrieved, 2012.
4. National Environmental Research Council (NERC). The Oceans: Scientific certainties and uncertainties. Swindon, England, 2017, 172-185.
5. Dague RR. Fundamentals of odor control," *Journal Water Pollution Control Federation*, 1972, 583-594.
6. Loan, NT, Phuong NM and Anh NTN. The Role of Aquatic Plants And Microorganisms In Domestic Wastewater Treatment," *Environmental Engineering and Management Journal*, 2014, 13, 2031-2038.
7. Cui X and Choo KH. National organic matter removal and fouling control in low-pressure membrane filtration for water treatment, *Environmental Engineering Research*, 2014, 19.1-8.
8. García LSM, Martínez CAT & DÍAZ AE. Analisis of waste water treatment plant processes (WWTP) "sedimentation"," Visión Electrónica: algo más queun estado sólido, 2014, 8
9. Almeida M, Butler D and Friedler E. At-source domestic wastewater quality, *Urban water*, 1999, 1, 49-55.
10. Barker DJ and Stuckey DC.A review of soluble microbial products (SMP) in wastewater treatment systems, *Water Research*, 1999, 33, 3063-3082.
11. Huang, M.-H., Li, Y.-M. & Gu, G.-W. (2010)."Chemical composition of organic matters in domestic wastewater," Desalination, 262, 36-42.
12. Shon H, Vigneswaran S and Snyder S. Effluent organic matter (EfOM) in wastewater: constituents, effects, and treatment," *Critical Reviews in Environmental Science and Technology*, 2006, 36, 327-374.
13. Vikranthpridhvi Y and Musalaiah M.A review on water and sewage water treatment process, 2015.
14. White EB and Sharma MN. Methods for use in water purification particularly sewage treatments," Google Patents, 1978.
15. Williams R, Neal C, Jarvie H, Johnson A, Whitehead P, Bowes M and Jenkins A. Water Quality, 2015.