Physico-Chemical Analysis of Drinking Water from Different Area of Wani Taluka of Maharashtra State

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ABSTRACT

Water from wani area of Maharashtra state is tested for quality assessment. The environmental quality is greatly focused on water because of their importance in maintaining the human health and ecosystem. Water performs unique and indispensable activities in earth ecosystem and biosphere. Water is needed for recreation, transportation and hydroelectric power and domestic uses etc. Water quality can be determined by quantifying the Physico-Chemical parameters. Water is examined by taking physical and chemical parameters that has a major impact on human health. So for quality control physical chemical parameters of water are thoroughly examined.

Keywords: Drinking Water, Physico-Chemical Parameter, Hardness, P^H

I. INTRODUCTION

Water is one of the essential source of ecosystem on earth. It also performs unique and indispensible activities in earth ecosystem, biosphere and biogeochemical cycles [1]. Thus, high water quality is always a need for living organisms. Water is the most important component among the natural resources and is crucial for the existing of all living beings. Water is a resource that has various uses such as domestic recreation, transportation, and hydroelectric power, industrial and commercial uses [2].

Water covers 70.9% of the Earth's surface ("CIA-The world fact book" Central Intelligence Agency), and is vital for all known forms of life [3] On earth, it is found mostly in oceans and other large water bodies, with 1.6% of water below ground in aquifers and 0.001% in the air as vapour, clouds (formed of solid and liquid water particles suspended in air), and precipitation (water vapours in the climate system, Special Report, [AGU], December 1995).

Water is also present in the atmosphere in solid, liquid and vapour states. It also exists as ground water in aquifers. Water plays an important role in the world economy, as it functions as a solvent for a wide variety of chemical substances and facilitates industrial cooling and transpiration. Approximately 70% of freshwater is utilized by agriculture [4]. Fresh water is a finite resource, essential for agriculture, industries and even human existence, without fresh water of adequate quantity and quality, sustainable development will not be possible.

Now a day, fresh water deteriorates by human activity. So, restriction of human activity will control the pollution of fresh water. Since water quality and human health are closely related, water analysis before usage is of prime importance. Certain physical, chemical which are designed to ensure that the water is tasteful and safe for drinking before it can be described as potable. The chemical property like P^H for water should be in the range of 6.5 to 8.5 for drinking and domestic purposes. The parameters like dissolved oxygen (DO), chemical oxygen demand (COD), total hardness (TH) were analysed using standard procedures.

II. METHODS AND MATERIAL

Water samples were collected from wani Area from Anand nagar, Vittal wadi and WCL area. Various

experimental procedure used for the analysis of water [5].Temperature is measured by dipping a well calibrated mercury thermometer in the sample up to the level of mercury in capillary column and then noting the temperature. Colour identification of water sample by visualization. Odour of water sample was determined by taking a smell of water. Conductivity was measured with conductivity meter (Wenser ISO 900: 200 Certified). Total solid was estimated by evaporating about 50 ml unfiltered water sample in a pre weighed porcelain dish. The porcelain dish after evaporation was cooled and weighed again. The difference between the two weights gives the amount of total solids present in well water sample. P^H is measured by P^H meter (NIG33). TDS is determined by TDS meter.

Determination of acidity in water:
In 250 ml conical flask place 100 ml water sample add 1-2 drops 0.1 N $Na_2S_2O_3$ solution then add few drops of methyl orange indicator to it. If the solution turns yellow then methyl orange acidity is absent but solution turns pink then titrate against 0.05N NaOH solution until the pink coloured change to yellow. Note the volume of NaOH then add few drops of phenolphthalein indicator to yellow solution then titrate with 0.05 N NaOH Solution until the pink colour produced for few seconds. Note the volume of NaOH.

Alkalinity:
In 250 ml conical flask place 100 ml well water sample add 3-4 drops of phenolphthalein indicator it turns pink then titrate with 0.02N H_2SO_4 till pink colour disappears. Record the volume of H_2SO_4. Now add 2-3 drops methyl orange indicator if turns yellow then titrated with 0.02N H_2SO_4. The yellow colour solution will first change to orange and finally red. This is end point.

Dissolved oxygen (DO):
The Mn^{2+} salt in solution is precipitated by KOH to $Mn(OH)_2$. It is rapidly oxidised by DO present in the sample to form trivalent or higher valency hydroxide. Iodide ions are added and acidified which reduce tetravalent hydroxides back to their stable divalent state thereby liberating equivalent amount of iodine. This iodine is equivalent to dissolved oxygen present in the sample.

Chemical Oxygen Demand (COD):

In a 500 ml RB flask 50 ml of well water sample was reflux and then added 1gm of mercuric sulphate to it. Shake the mixture and add 25ml of H_2SO_4 and reflux for 2 h. Then cool and wash inside portion of condenser with 10-15 ml distilled water. Dilute the reaction mixture by adding 150ml of distilled water to it. Pipette out 20 ml of 50 ml and titrate against ferrous ammonium sulphate using 2-3 drops of ferrous in indicator. At the end point the colour of solution changes from blue green to reddish brown.

Chloride ion concentration:
Pipette out 50 ml of filtered sample in large porcelain dish, add 3-4 drops phenolphthalein indicator. If pink colour develops then add dilute H_2SO_4 until pink colour just disappears. If pink colour is not obtained then add 3-4 drops methyl orange indicator to get red colour solution. Add 0.02N Na_2CO_3 until colour of solution changes to orange. If yellow colour is obtained by adding methyl orange indicator then does not add Na_2CO_3. Transfer the resultant solution in 250 ml conical flask add 1 ml potassium chromate indicator. Titrate against 0.02N $AgNO_3$ solution, white precipitate of AgCl obtained. Continue the addition red colours will appears which disappears on shaking. Now add $AgNO_3$ drop by drop until permanent reddish brown colour obtained.

Total Hardness:
Take 100 ml water sample in 250 ml conical flask. Add 10 ml buffer solution and 5-6 drops of ferrochrome black T indicator. Titrate the solution against EDTA solution until the colour changes from wine red to blue.

Temporary and Permanent hardness:
Take 250 ml hard water in 500 ml beaker and boil an hour. Then cool the water sample and filter. Measure the 100 ml of filtered hard water sample in conical flask. Add 10 ml of buffer solution and 5-6 drops of Ferrochrome black T indicator. Then titrate against EDTA solution until colour changes from wine red to blue.

III. RESULTS AND DISCUSSION

Quality of water is characterized by various physical and chemical studies [6,7,8,9]. Various observations

obtained during experimental work are tabulated in following table.

IV. CONCLUSION

Water samples tested are slight alkaline in nature. All physical properties such as colour and odour are found to be colourless and odourless. The chemical parameters like P^H, DO, COD, total solid, total dissolved solid shows higher value than permissible range. Hence it is concluded that water samples are not safe for drinking purpose.

Table 1. Physico-Chemical Parameters of water samples

SN	Parameter	Limit	Anand Nagar Wani	Vittal Wadi Wani	WCL Water Wani
1.	Color	--	Colorless	Colorless	Colorless
2.	Odor	--	Odorless	Odorless	Odorless
3.	pH	6.5-8.5	7.83	7.2	7.73
4.	Conductivity	<800	531μm/cm	4000μm/cm	510μm/cm
5.	TDS	<500	345.1ppm	2600ppm	331.57ppm
6.	Turbidity	<10	1NTU	1NTU	72NTU
7.	D.O	--	6%	7.5%	5.5%
8.	Free CO_2	<50	8.8ppm	26.4ppm	8.8ppm
9.	BOD	--	8%	4.7%	3.7%
10.	COD	--	62ppm	69.05ppm	9.05ppm
11.	Alkalinity	<200	200ppm	1600ppm	150ppm
12.	Chloride	<250	42.5ppm	1000ppm	59.55ppm
13.	Total Hardness	<300	210ppm	1100ppm	200ppm
14.	Ca Hardness	<75	95ppm	500ppm	140ppm
15.	Mg Hardness	<30	116ppm	600ppm	60ppm
16.	Total Solid	<20	24.4ppm	28.4ppm	11.2ppm
17.	TSS	<20	1ppm	1ppm	53ppm
18.	Sulphate	<200	6ppm	41ppm	9ppm
19.	Phosphate	<1	0.5ppm	0.03ppm	0.1ppm
20.	Nitrate	<45	1.06ppm	5ppm	15.04ppm
21.	Iron	<0.33	0.5ppm	0.06ppm	9.72ppm

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