"Physicochemical Quality monitoring of Water Sample From Dongargaon Village, Tal. Mulshi and PCMC Area, Pune, Maharashtra, India".

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Abstract: The degree of hardness of drinking-water is important for aesthetic acceptability by consumers and for economic and operational considerations. Many hard waters are softened for those reasons using several applicable technologies, and the mineral composition will be significantly affected. Present study deals with analysis of few physicochemical parameters of water samples from different sites of Dongargaon village, Mulshi Pimpri Chinchwad Corporation area, District Pune, Maharashtra, India was conducted for their few parameters viz. Temperature, pH , Acidity/ Alkalinity , Conductivity, Total Dissolved Solids(TDS) , Chlorine and Hardness . Acidity/ Alkalinity was tested by pH paper and pH meter also. Conductivity was measured by Conductivity meter. TDS of water sample is measured by the TDS meter. Presence of Chlorine was tested by chemical methods. Hardness of water sample is measured by titrimetric/ Volumetric method. The portability and other uses of Sewage Water of Chemistry laboratory, Bore Water, Sangavi, Bore Water from Pimpale Nilakh, River water from Dongargoan, Swimming Tank Water, Pimpale Saudagar PCMC area.

It is necessary to check more parameters of waters for its portability for human being and animals .

Key words: water parameters, India, Portability, acidity , hardness, Conductivity.

- **Introduction**

With two thirds of the earth and 39% surface covered by water and the human body consisting of 75 percent of it, it is evidently clear that water is one of the prime elements responsible for life on earth. Water circulates through the land just as it does through the human body, transporting, dissolving replenishing nutrients and organic matter, while carrying away waste material. Further in the body, it regulates the activities of fluids, tissues, cells, lymph, blood and glandular secretions.

An average adult body contains 42 liters of water and with just a small loss of 2.7 liters people can suffer from dehydration, displaying symptoms of irritability, fatigue, nervousness, dizziness, weakness, headaches and consequently reach a state of pathology.

Need of Water Analysis:-

Our drinking water today, far from being pure, contains some two hundred deadly commercial chemicals. Add to that bacteria, viruses, inorganic minerals (making the water Hard) and Water, whether for a pubic municipality, water facility or business or home, must be tested regularly to keep the source safe and free of potential health/environmental risks. The necessary water test can be impacted by factors such as local and other regulations, location, climate/weather, infrastructure, etc. For the evaluation of water pollution ,water quality parameters are used for the provision of either drinking ar for agricultural or other purpose.

The Physical parameters like colour, odour, temperature, Total Dissolved solids etc and chemical parameters like pH, Biological Oxygen demand BOD, Organic carbon, Chlorides, hardness and Sulphide and Sulphates and other heavy metals and Biological Coli and viruses are necessary to test .Out of which some Physical and Chemical parameters of Samples from PCMC Pune area India was selected for testing as it is so much populated and so many industries are located in this area. PCMC area is located at the heat of Pune City which Dongargaon is also located in Mulshi near Pune.

Basically, the pH value is a good indicator of whether water is hard or soft. The pH of pure water is 7. In general, water with a pH lower than 7 is considered acidic, and with a pH greater than 7 is considered basic. It's considered an aesthetic quality of water. However, the agency recommends that municipal drinking water suppliers keep their water supply at a pH of 6.5 to 8.5. Water with a very low or high pH can be a sign of chemical or heavy metal pollution. Two other important chemical parameters to understand in water quality monitoring are conductivity and hardness. Conductivity is a measure of a solution's ability to conduct electricity, and therefore a measure of the water's ionic activity and content. The more dissolved salts in water, the higher its ionic content, or conductivity. Conductivity is a good measure to reflect the amount of dissolved solids (total dissolved solids or TDS) or salinity of a water source. The presence of free chlorine (also known as chlorine residual, free chlorine residual, residual chlorine) in drinking water indicates that: a sufficient amount

of chlorine was added initially to the water to inactivate the bacteria and some viruses that cause diarrheal disease; and, the water is protected from recontamination during storage. The presence of free chlorine in drinking water is correlated with the absence of most disease-causing organisms, and thus is a measure of the potability of water. If using completely clean water with no contaminants, the chlorine demand will be zero, and since there will be no inorganic or organic material present, no combined chlorine will be present [5]. Chlorine is used to combat microbial contamination, but it can react with organic matter in the water and form dangerous, carcinogenic Trihalomethanes. While chlorine and chloramines are great tools for disinfecting water, they need to be filtered out eventually.

Free chlorine = Total chlorine measurement – Combined chlorine measurement) The typical dietary contribution of calcium and magnesium is over 80% of the total daily intake. Of this, approximately 30% of calcium and 35% of magnesium will be absorbed. The bio-availabilities of calcium and magnesium from milk and water are on the order of 50% (Ong, Grandjean & Heaney, 2009). For calcium and magnesium, the typical contribution from water is 5–20% (WHO, 1973; National Research Council,1977; Neri & Johansen, 1978).

The principal natural sources of hardness in water are dissolved polyvalent metallic ions from sedimentary rocks, seepage and runoff from soils. Calcium and magnesium, the two principal ions, are present in many sedimentary rocks, the most common being limestone and chalk. They are also common essential mineral constituents of food. As mentioned above, a minor contribution to the total hardness of water is also made by other polyvalent ions, such as aluminum, barium, iron, manganese, strontium and zinc. It is not caused by a single substance but by a variety of dissolved polyvalent metallic ions, predominantly calcium and magnesium cations, although other cations (e.g. aluminium, barium, iron, manganese, strontium and zinc) also contribute. Both calcium and magnesium are essential minerals and beneficial to human health in several respects. Inadequate intake of either nutrient can result in adverse health consequences. Recommended daily intakes of each element have been set at national and international levels .(Fourth Edition of Hardness Final April 2011.doc).so to measure hardness of water is very important parameter to measure. Exposure to hard

water has been suggested to be a risk factor that could exacerbate many diseases like eczema(Langan SM (2009)[6].

Hardness is most commonly expressed as milligrams of calcium carbonate equivalent per litre. Water containing calcium carbonate at concentrations below 60 mg/l is generally considered as soft; 60–120 mg/l, moderately hard; 120–180 mg/l, hard; and more than 180 mg/l, very hard (McGowan, 2000). Although hardness is caused by cations, it may also be discussed in terms of carbonate (temporary) and non-carbonate (permanent) hardness.

Water hardness is caused by divalent ions, especially Ca^{2+} and Mg^{2+}.

The measure for water hardness is 1°d (=10mg CaO/L water).

- Classification:
- 0 – 60 mg/l …. very soft water
- 60–120 mg/l …. moderately hard
- 120–180 mg/l, …. hard water
- over 180 mg/l …. very hard water

Total dissolved solids (TDS) is the term used to describe the inorganic salts and small amounts of organic matter present in solution in water. The principal constituents are usually calcium, magnesium, sodium, and potassium cations and carbonate, hydrogencarbonate, chloride, sulfate, and nitrate anions. Organoleptic properties The presence of dissolved solids in water may affect its taste. The palatability of drinkingwater has been rated by panels of tasters in relation to its TDS level as follows: excellent, less than 300 mg/litre; good, between 300 and 600 mg/litre; fair, between 600 and 900 mg/litre; poor, between 900 and 1200 mg/litre; and unacceptable, greater than 1200 mg/litre.

Thus water Quality monitoring is very essential for safely life.

- **Materials and Methods**

For the collection of water sample from Dongargaon ,Tal Mulshi and PCMC Area, Pune, We have collected water samples form in plastic bottles and recorded the particular parameters within 24hrs and after that we kept that samples in refrigerator. These samples were randomly collected from 5 different locations.

Following parameters were checked by using respective instruments/equipments :

1. Temperature :

Temperature of water samples is checked by using thermometer and noted.

2. pH :

pH : pH is criteria of acid-ness and base-ness of water.

- pH = -log $[H_30^+]$
- $[H_30^+] > 10^{-7}$ => pH < 7 (acidic)
- $[H_30^+] = 10^{-7}$ => pH = 7 (neutral)
- $[H_30^+] < 10^{-7}$ => pH > 7 (basic)

pH of water samples was measured by pH meter and pH paper and noted the observations.

3. Acidity / Alkalinity :

Acidity / Alkalinity of water samples is determined from the observed pH values.

4. Conductivity :

Conductivity of water samples was checked by conductivity meter and noted the observation.

5. Total Dissolved Solids(TDS) :

TDS of water sample was measured by the TDS meter.

6. Presence of Chlorides :

Presence of Chlorides was tested by followed test:

Take little amount of water sample + little amount of $K_2Cr_2O_7$ and add to that few drops of Conc. H_2SO_4. Heat the mix gently and pass the evolved gas into another test tube containing lead acetate solution. If yellow ppt of lead chromate is formed then we can say that Cl present in the given water sample.

7. **Hardness :**

Hardness of water sample is measured by titrimetric/ Volumetric method. Procedure is as given below –

Take 20ml of water sample in conical flask. Add 2 drops H_2O_2 in it. Check pH up to 8, boil & cool the solution. Add 5ml of buffer solution of pH 10 & warm the solution. To this solution add 2 drops of EBT indicator, we obtain a wine red colour. Then titrate this solution against 0.01M EDTA solution till the wine red colour changes to blue.

- **Results and Discussion**

From Table 1 ,Temperature (^{0}C) of all water samples ranges form 23(^{0}C) to 29(^{0}C) . Sewage Water of Chemistry Laboratory was too much acidic (pH =1.24) while river water, Dongargoan was found to be neutral (pH =7.12.) Bore Water, Sangavi was found to be most alkaline (pH =8.92) all by pH meter) in all samples of water. Conductivity (µS/cm) of water samples ranges from 0.112(µS/cm) to 0.945(µS/cm). TDS (ppm) of water samples ranges from 116 ppm to 527 ppm. Chlorine was found in most of the samples. Hardness (ppm) of bore water samples was found to be high due to presence of minerals from ground water ranging from 178 mg/l to 350 mg/l . All the water samples are colorless and odourless except Sewage Water of Chemistry Laboratory for which water treatment is necessary for further use. Table 1. Shows the measured Physicochemiscal parameters of different sites water samples of Pune India.

- **Conclusion :**

Sewage water of Chemistry Laboratory of Sangvi, PCMC, Pune was found to be more acidic in nature hence it is not potable and not useful for gardening or farming at all as it contains lot of chemicals. Hardness of Sewage water is very higher than other water samples. It has high TDS $_{(ppm)}$ Value. Bore water of Sangavi, Pune, PCMC is alkaline in nature. Bore water of Pimple Nilakh, PCMC is Acidic therefore both samples are not used for drinking purpose. Water Treatment is necessary for further use.

pH of Dongargoan village River Water is 7 . Hence it is neutral so is potable so useful for drinking purpose. Swimming tank water, Pimpale Saudagar, PCMC is acidic in nature hence it is not used for drinking purpose.pH by pH paper is more accurate as it is instrumental measurement.

It was found to contain more chlorine which was intentionally added in swimming tank.. Hardness of swimming tank water is 96 and it is very high than other water samples. This data will be useful to provide guidelines for further studies of water analysis in Pune and PCMC and other locations.

Present study was done for study of few parameters of water samples but more parameters are necessary to check for its further use for drinking and other purpose.

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Sr.No.	Parameters	Standard Range	Name of the place from sample taken: SewageWater Chemistry Laboratory	Bore Water, Sangavi	Bore Water , Pimpale Nilakh	River water, Dongargoan, Mulshi Pune	Swimming Tank Water Pimpale Saudagar
1	**Temperature (^{0}C)**	20 - 30	**29**	**23**	24	23	24
2	pH (by pH meter)	7 - 7.8	1.24	**8.92**	6.23	7.12	5.35
	pH (by pH paper)	7 - 8	**1.00**	8	**6**	7	**5**
3	**Acidity/Alkalinity**	-	**Acidic**	Alkaline	**Acidic**	Neutral	**Acidic**
4	**Conductivity (µS/cm)**	8 - 10 µS/cm	**0.945**	0.880	0.210	**0.112**	0.786
5	**TDS (ppm)**	Below 300 ppm	**527**	**116**	254	392	356
6	**Presence of Cl**	-	Present	Absent	Present	Present	Present
7	**Hardness (mg/l)**	60 - 120 mg/l	**178**	**200**	**350**	55	96

- **Results**

Table 1: Limits of detection and observed parameters.