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STUDY OF ASSESSMENT AND IMPACT OF THE QUALITY OF WATER – REVIEW

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Abstract : The present study the quality of drinking water supplied to the (a) Nanded Multispeciality Hospital (b) Madhuvanti Society (c) Oracle College (d) Sarang Society (e) Anlmc Church at Nanded City, through tap, which includes tests for temperature, pH value, total solids, total suspended solids, hardness, acidity, alkalinity, chloride, chlorine, jar test, BOD and DO. Pune is one of the most important city in the state of Maharashtra which has near to Mumbai. A water quality standard is a rule or law comprised of the uses to be made of a water body or segment and the water quality criteria necessary to protect that uses. The average temperature, concentration of pH, turbidity, TDS (Total Dissolved Solids), TSS (Total Suspended Solids), DO (Dissolved Oxygen), BOD (Biochemical Oxygen Demand), total hardness, alkalinity and chloride are found to be 27.38 °C, 7.37, 2.438 NTU, 156.8 mg/l, 2.653 mg/l, 42.156 mg/l, 3.6 mg/l, 8.65 mg/l, 102.3mg/l and 21.2 mg/l respectively. The results obtained from the water quality criteria parameter are within the drinking water standard. (IS: 10500).

Keywords: water quality, IS: 10500, pH, hardness, total solids, total suspended solids, residual chlorine, alkalinity, turbidity, BOD, dissolved oxygen, chloride.,

I. INTRODUCTION

Water quality criteria of various groundwater has been studied from different sources e.g. Tube well, Dug well, Bore well etc. by a number of Researchers, It has been reported that well water in the study area was not suitable for drinking due to high contamination of Total and Fecal coliforms and moderate contamination by nitrate and manganese. It has been reported that the level of Electrical Conductivity, Total Solids, Colour, Chloride, Chemical Oxygen Demand, Sodium, Copper and Lead in the groundwater of wells located adjacent to the disposal site were higher than the other areas. Nitrate pollution of groundwater in 14 cities of Northern China due to nitrogen fertilizer has been reported.

Pesticides are very complex in their structure and are well known for their stable and non-degradable nature in the environment. Utility of pesticides in India and the other parts of the world was found in agriculture, grain storage, soil conditioning, public health and building materials. Their application in agriculture in different modes viz. spray, wet powder, dust, smoke, leads to their accumulation in all parts of the environment i.e. atmosphere, lithosphere and hydrosphere.

II LITRATURE REVIEW

Madzin et al. (2016) assessed the concentration of heavy metals in the soil of the area near iron ore mines, viz., active Kuala Lipis Mine and abandoned Bukit Ibam Mine in Pahang, Malaysia. The water bodies were also evaluated for various physicochemical parameters for determining the WQI.

Singh (2016) computed the Canadian Council of Ministers of the Environment-Water Quality Index (CCME-WQI) to assess the overall water quality scenario in the limestone mining area of Meghalaya. The CCME WQI value ranges between 0 to 100 indicating poor to excellent water quality and has been widely used by the researchers for quality assessment.

Essalhi et al. (2016) suggested that the violation of environmental regulations causes harmful effects on the surrounding environment of the mining area. They studied the mining areas near the Little Atlas mountain ranges in Morocco. They showed four key adverse impacts, viz., the effect on the natural beauty, safety, human health and the rate of recovery

Al Obaidy et al. (2016) studied and assessed the WQI based on Weighted Arithmetic Index to evaluate the water quality of the Tigris River for drinking. Water quality deterioration in surface water was the effect of human activities because of the rapid industrialisation.

Hoseinzadeh et al. (2014) analysed the water quality of the river Aydughmush using National Sanitation Foundation Water Quality Index (NSF-WQI), Forestry Water Quality Index (FWQI), and River Pollution Index(RPI), by evaluating various parameters, viz., DO, temperature difference, BOD, faecal coliform bacteria, turbidity, TDS, pH, phosphate in addition to 22 other parameters.

Aikins et al. (2015) worked on physicochemical quality of ground and surface waters from Bibiani, Ghana determined whether physical, chemical and trace metal contamination of water sources as a result of mining or geochemical and biochemical processes within the environment.

Hoseinzadeh et al. (2014) analysed the water quality of the river Aydughmush using National Sanitation Foundation Water Quality Index (NSF-WQI), Forestry Water Quality Index (FWQI), and River Pollution Index(RPI), by evaluating various parameters, viz., DO, temperature difference, BOD, faecal coliform bacteria, turbidity, TDS, pH, phosphate in addition to 22 other parameters.

III METHODOLOGY

The details of experimental site, experimental set up, procedures adopted and material used for experimentation are described below.

3.1 Experimental Site

Pollution is commonly regarded as the result of the industrial revolution. Environmental quality of the area deteriorates mainly as a result of the increasing industrial activity. In order to find out the current status of the pollution in the area, due to the increasing trend in the industrial activities, it is very much essential to identify the various sources of pollution. Water is essential for the survival of any form of life. On an average a human being consume about 2 liter of water everyday during his whole life period. The exploding population, increasing industrialization and urbanization causes water pollution. The water pollution by agricultural, municipal and industrial sources has become a major concern for the welfare of mankind. The following is the list of few industries which are the main sources of pollution generating unit in the area

The water samples were analyzed for various parameters in the laboratory of Environmental Engg. Various physical and chemical parameters like Temperature, pH, Turbidity, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Hardness, Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), Residual Chlorine, Chloride, Alkalinity have been monitored for the tap water of different locations



The pH value is determined by measurement of the electromotive force of a cell consisting of an indicator electrode (an electrode responsive to hydrogen ions such as a glass electrode) immersed in the test solution and a reference electrode (usually mercury/calomel electrode), Contact between the

test solution and the reference electrode is usually achieved by means of a liquid junction, which forms part of the reference electrode. The electromotive force is measured with a pH meter, that is, a high impedance voltmeter calibrated in terms of pH. 2.1.1 Several types of electrodes have been suggested for electrometric determination of pH value. Although the hydrogen gas electrode is recognized as primary standard the glass: electrode in combination with calomel electrode is generally used with reference potential provided by saturated calomel electrode. The glass electrode system is based on the fact that a change, of 1 pH unit produces an electrical change of 59.1 mV at 25°C. The active element of a glass electrode is a membrane of a special glass. The membrane forms a partition between two liquids of differing hydrogen ion concentration and a potential is produced between the two sides of the membrane which is proportional to the difference in pH between the liquids.



1. Sample Tubes - The sample tubes should be of clear and colorless glass.

2. Turbidimeter- The turbidimeter shall consist of a nephelometer with a light source for illuminating the sample and one or more photo electric detectors with a readout device to indicate the intensity of light scattered at right angles to the path of the incident light. The turbidimeter should be so designed that little stray light reaches the detector in the absence of turbidity and should be free from significant drift after a short warm-up period.

3.3.3.3. PROCEDURE

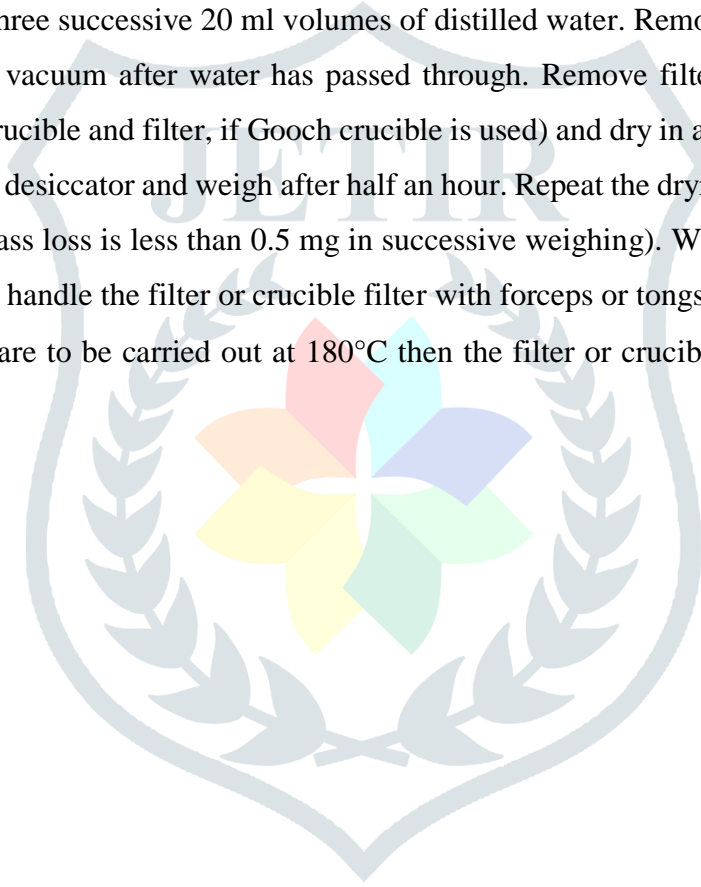
Turbidimeter Calibration-Follow the manufacturer's operating instructions. Measure the standards on turbidimeter covering the range of interest. If the instrument is already calibrated in standard turbidity units, this procedure will check the accuracy of calibration.

Turbidity less than 40 units - Shake the sample to disperse the solids. Wait until air bubbles disappear. Pour sample into turbidimeter tube and read turbidity directly from the instrument scale or from calibration curve.

3.3.4. METHODOLOGY FOR MEASUREMENT OF TOTAL SOLIDS

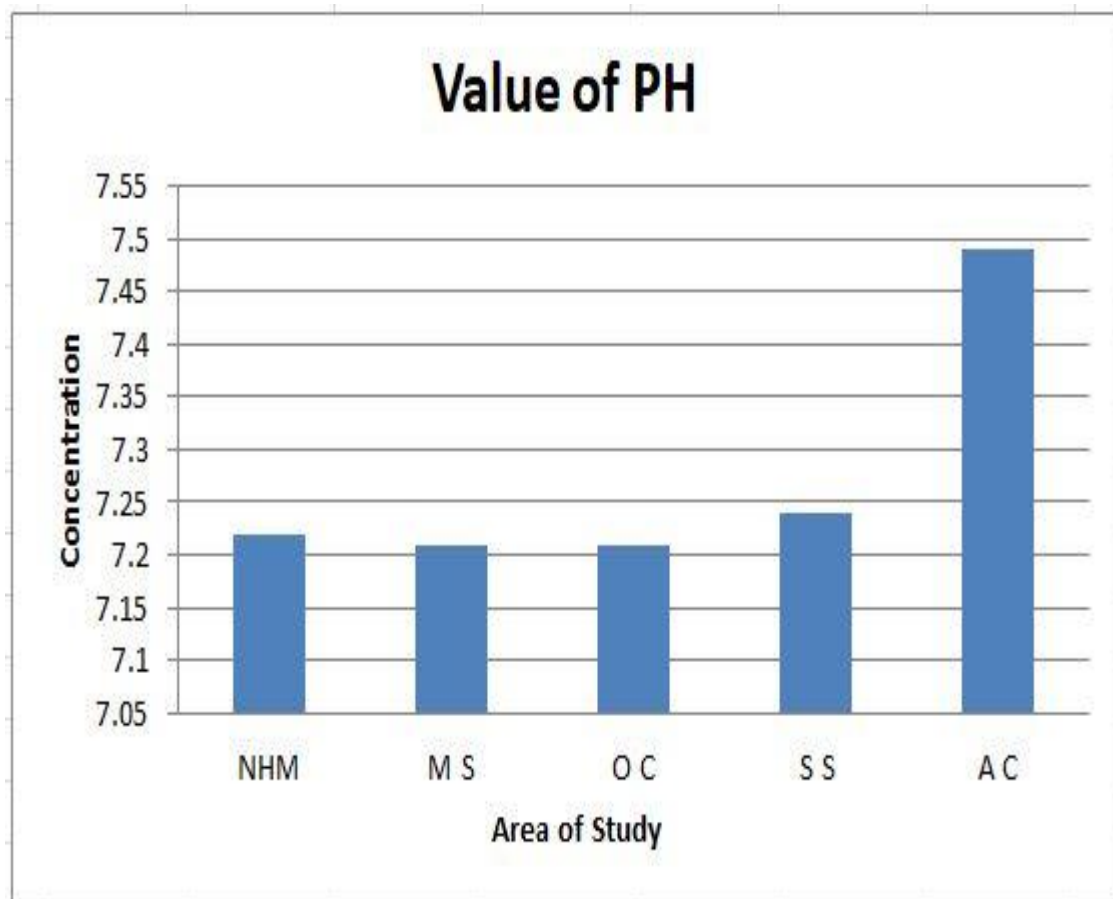
Preparation of Glass Fiber Filter Disc- Place the glass fiber filter on the membrane filter apparatus or insert into bottom of a suitable Gooch crucible with wrinkled surface up. While vacuum is applied, wash the dish with three successive 20 ml volumes of distilled water. Remove all traces of water by continuing to apply vacuum after water has passed through. Remove filter from membrane filter apparatus (or both crucible and filter, if Gooch crucible is used) and dry in an oven at 103-105°C for 1 hour. Transfer to a desiccator and weigh after half an hour. Repeat the drying cycle until a constant mass is obtained (mass loss is less than 0.5 mg in successive weighing). Weigh immediately before use. After weighing, handle the filter or crucible filter with forceps or tongs only.

i. If determinations are to be carried out at 180°C then the filter or crucible/filter shall be dried at 180°C.



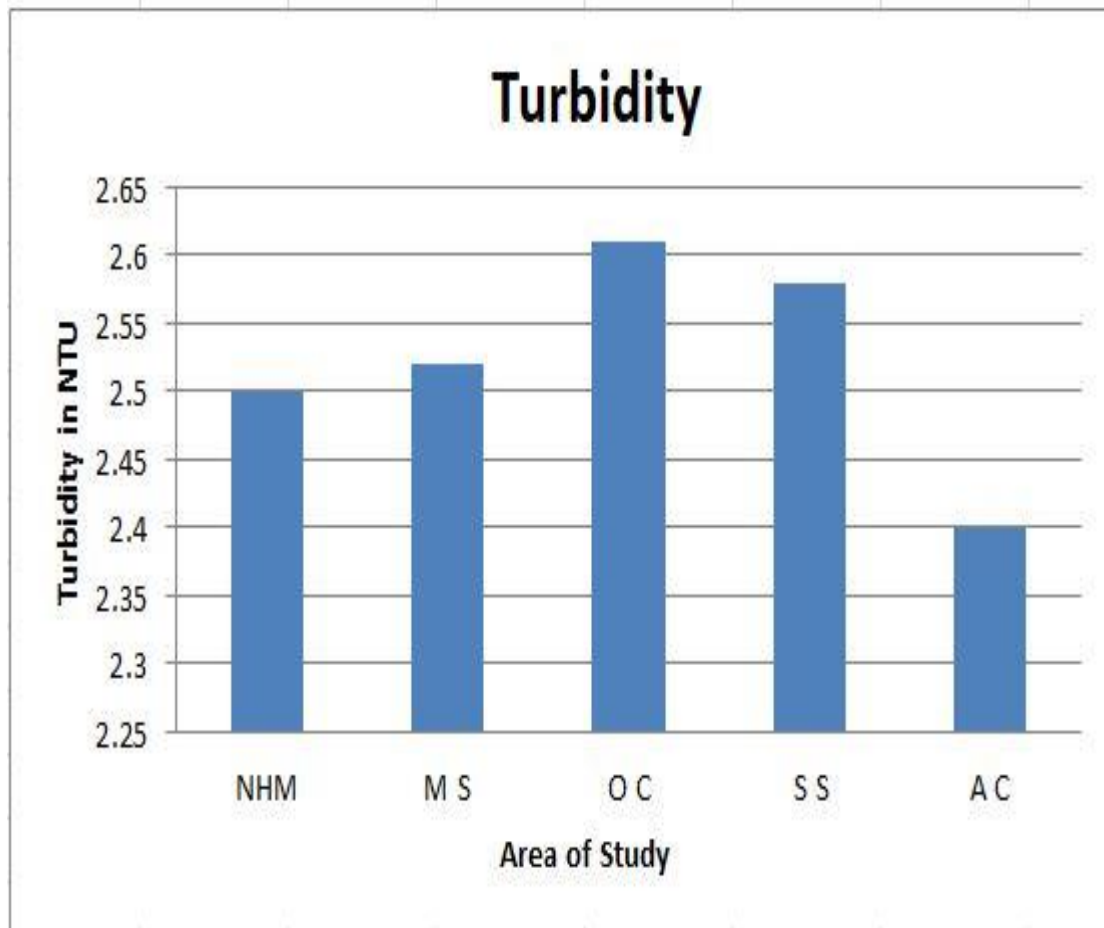
RESULT

The pH is a measure of the intensity of acidity or alkalinity and measures the concentration of hydrogen ions in water. It has no direct adverse effect on health, however, a low value, below 4.0 will produce sour taste and higher value above 8.5 shows alkaline taste. A pH range of 6.5 – 8.5 is normally acceptable as per guidelines suggested by ISI. In the present study, the fluctuation of pH in the samples is from 7.32 to 7.53.



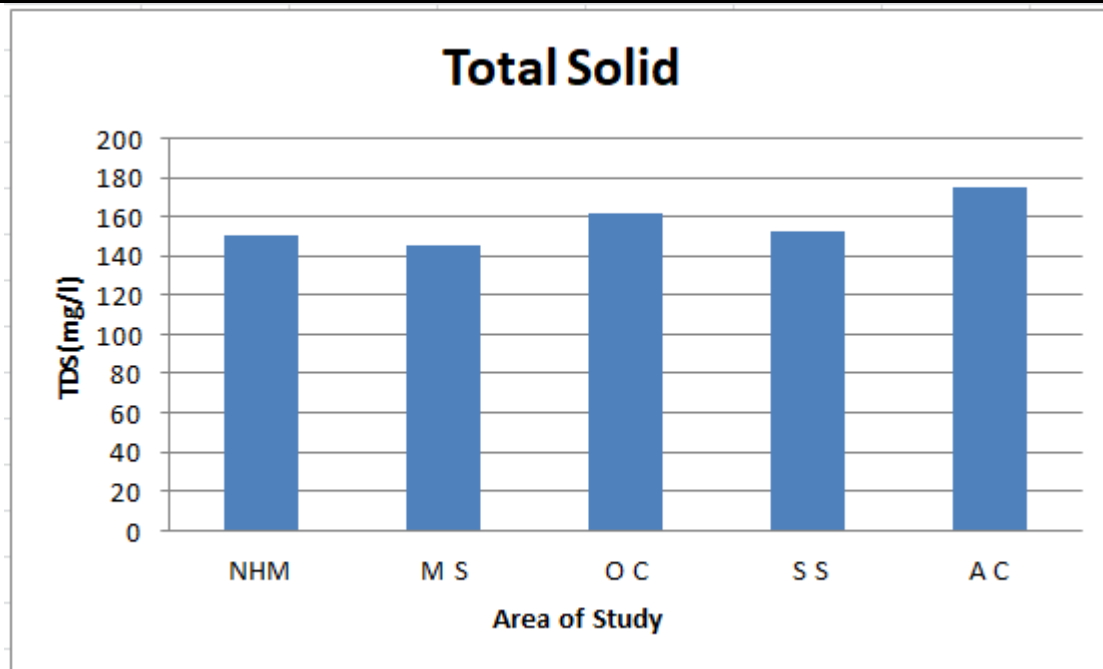
TURBIDITY

Measurement of Turbidity reflects the transparency in water. It is caused by the substances present in water in suspension. In natural water, it is caused by clay, silt, organic matter and other microscopic organisms. It ranged from 2.31 to 2.56 NTU. However the prescribed limit of Turbidity for drinking water is 5 NTU (IS: 10500). Turbidity was found within the permissible limit in all the water samples.



TOTAL SOLIDS AND TOTAL SUSPENDED SOLIDS

Total Dissolved Solids may be considered as salinity indicator for classification of groundwater. The TDS in groundwater is due to the presence of Calcium, Magnesium, Sodium, Potassium, Bicarbonate, Chloride and Sulphate ions. In the study area TDS varied from 145 to 175 mg/l. As prescribed limit of TDS for drinking water is 500 mg/l, all the water samples have TDS concentration well below the prescribed limit. Total Suspended Solids in the study area varied from 2.419 to 2.863 mg/l.

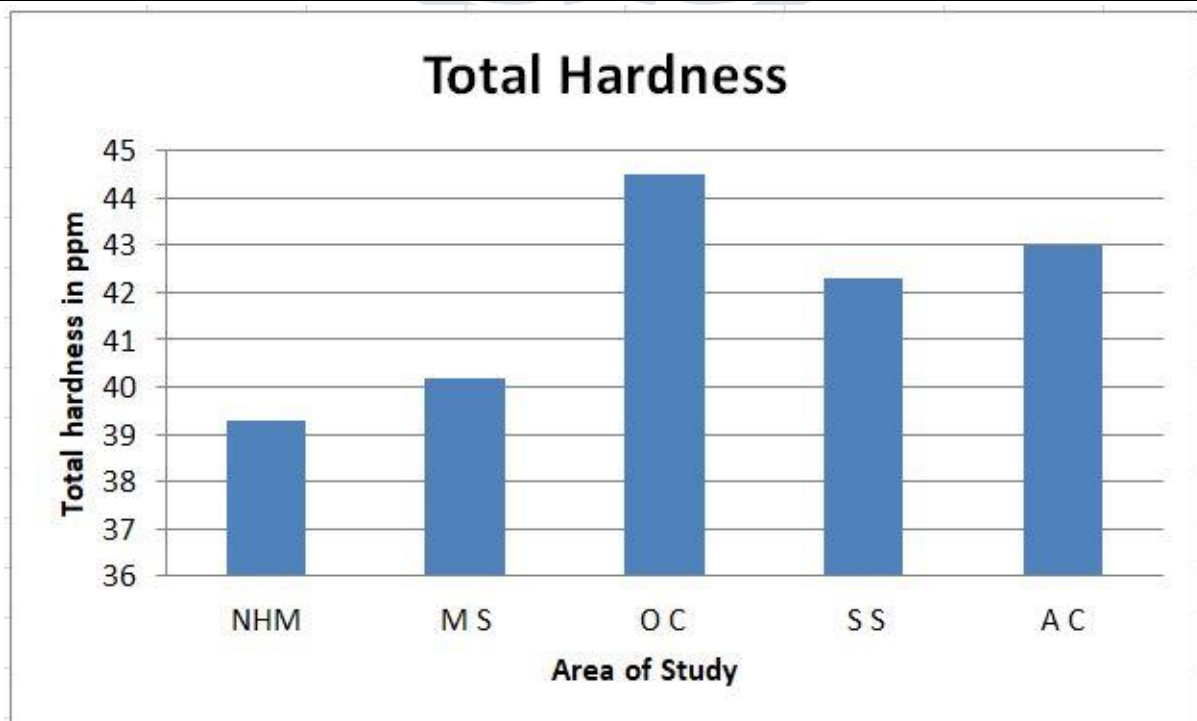


TOTAL HARDNESS

Hardness of water is objectionable from the view point of water use for laundry and domestic purposes since it consumes a large quantity of soap. Based on present investigation, hardness varied from 40.2 to 45.2mg/l. However the permissible limit of Hardness for drinking water is 300 mg/l (IS 10500). According to Hardness classification (Durfor and Backer, 1964), the no of water samples of the study area can be classified as given in table 4.1. It is found that the water supplied to the hostels, canteens and institute building is soft.

Table 4.1. Classification of the water according to hardness

TDS Range	Description
0-60	Soft
61-120	Moderately hard
121-180	Hard
>180	Very hard



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