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Drinking water monitoring of SBCET campus

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ABSTRACT

The present study "Drinking water monitoring of Shri Balaji college of Engineering and Technology", through tap, which includes tests for temperature, pH, turbidity, TDS, TSS, DO, BOD, total hardness, alkalinity and chloride. Jaipur is the Capital of Rajasthan and having large Industrial area. Jaipur has a hot semi arid climate receiving over 650 millimeters of rainfall annually 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 27.56 °C, 7.39, 2.418 NTU, 156 mg/l, 2.718 mg/l, 8.772 mg/l, 3.6 mg/l, 42.57 mg/l, 99 mg/l and 21.1 mg/l respectively. The results obtained from the water quality criteria parameter are within the drinking water standard. (IS: 10500).

KEYWORDS: Monitoring, IS: 10500, Water Quality.

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INTRODUCTION

Our Earth's surface is nearly 71% water, only 3% of it is fresh. Of these 3% about 75% is tied up in glaciers and polar icebergs, 24% in groundwater and 1% is available in the form of fresh water in rivers, lakes and ponds suitable for human consumption[1]. The demands of water supply have been increasing due to increasing industrialization and population. According to the scientists of National Environmental Engineering Research Institute, Nagpur, India, about 70 % of the available water in India is polluted [2]. Study on Contamination of nitrate and manganese [3, 9], mine waste[4], Chemical fertilizer[5,6] are some study which have been carried out earlier

Ground water

It is the major source of drinking water in both urban and rural India. It is also an important source of water for the agricultural and the industrial sectors. India possesses about 432 bcm of groundwater replenished yearly from rain and river drainage, but only 395 bcm are utilizable. Of that 395 bcm, 82% goes to irrigation and agricultural purposes, while only 18% is divided between domestic and industrial. Total static groundwater available is approximately 10,812 bcm[7].

Due to increasing population and urbanization the groundwater is not being recharge as per requirement. The average groundwater recharge rates of India's river basins is 260 m3/day. Heavy taping of Ground water in urban cities cause a major problem to sustainable environment, Salinity Ingress is a major problem emerges from the heavy taping of groundwater[8]. The number of wells drilled for irrigation of both food and cash crops have rapidly and indiscriminately increased
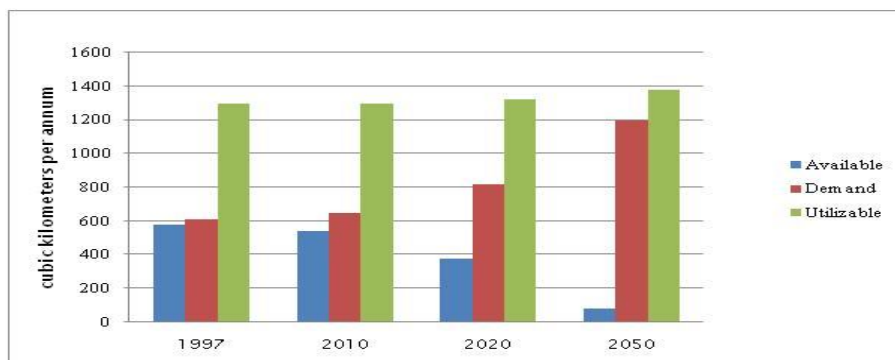

Figure1. Utilizable water, demand, and available water

Main Aim of this study is to check the quality of drinking water of SBCET Campus, Jaipur. There is no any study has been carried out till now for this campus, Hence It is a new study for this area. Water sample has been taken from different portions of the campus and analyze in Environmental lab of the College in Civil Engineering Department. This work has been carried out for 2 months from 5 July 2012 to 5 September 2012.

Study area

Shri Balaji College of Engineering and Technlogy is located at 75.74 E longitude and 26.95 N latitude in Jhotwara Jaipur at an elevation of about 442 meters above mean sea level. The. Total area of jhotwara is 568.79 sq km 274.21 sq km area of jhotwara is under cultivation, Number of Irrigation Wells is 6131. Top 20 industries running in the indusjtrial area are: Krishna Sariya Rolling Mill, Maya Metal, Sharma Sariya, Kamani Ind. Amno Metal, Anand Lamps, etc.

MATERIALS AND METHODS

Water sampling procedure and analysis

Plastic bottles of 1.5 liter capacity with stopper were used for collecting samples. Each bottle was washed with 2% Nitric acid and then rinsed three times with distilled water. The bottles were then preserved in a clean place. The bottles were filled leaving no air space, and then the bottle was sealed to prevent any leakage. Each container was clearly marked with the name and date of sampling[7,9,11].

Sampling points

1. Water tap near Library

2. Water tap of canteen

3. Water tap near chemistry department

4. Water tap of boys hostel

5. Water tap of mess

Water quality parameters

The results of the analyzed parameters of tap water of the different locations of SBCET Jaipur are compared with the related standards for drinking water prescribed by IS:10500 and USPHS. The drinking water standard is given in the table

Table No. 1 Drinking Water Standard

Sl.No.	Parameters	Permissible Value	Standard
1	pH	6.5-7.5	IS: 10500
2	Turbidity (MAX NTU)	5	IS: 10500
3	TDS	500	IS: 10500
4	TSS	5	USPHS
5	BOD	Nil to 5	USPHS
6	DO	4.0 to 6.0	USPHS
7	Total Hardness	300	IS: 10500
8	Chloride	250	IS: 10500
9	Alkalinity	120	USPHS

(Except pH and turbidity other parameters are in mg/l) USPHS stands for United States Public Health Service.

RESULTS AND DISCUSSIONS

Temperature

It is found that the temperature of the water supplied to the hostels, canteens and the institute building are within the permissible limit as per IS:10500. As the result in figure 4.1 shows the temperature of the tap water collected from hall 2, hall 5, Homi Bhabha hall of residence, hexagon canteen and institute building during winter
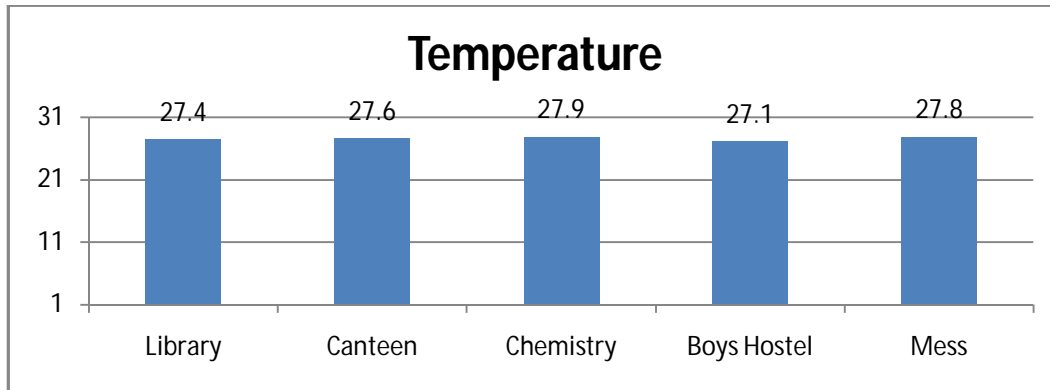
Fig. 2 Average Temperature of tap water from different areas during winter.

pH value

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 affect 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.
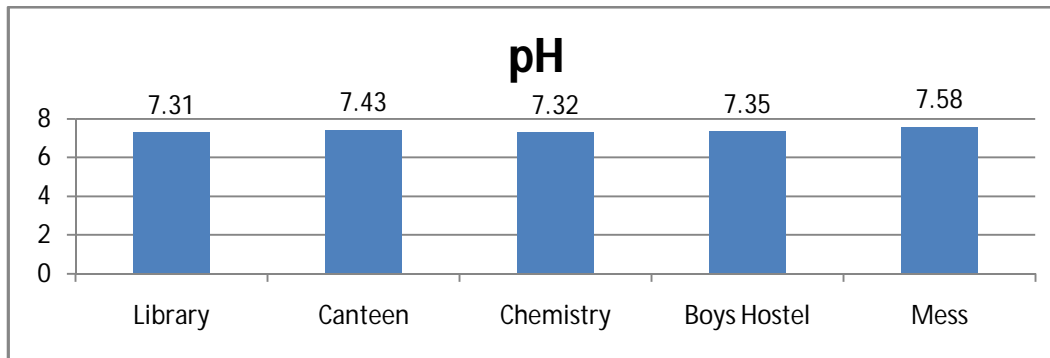

Fig.3 Average pH of the water samples from different areas.

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.
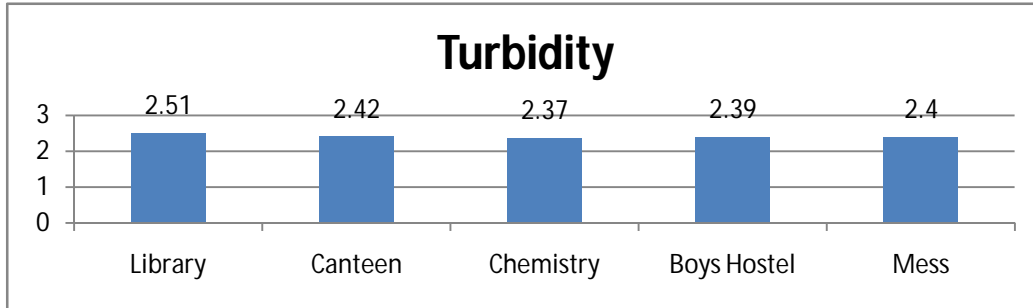
Turbidity

Library	Canteen	Chemistry	Boys Hostel	Mess
2.51	2.42	2.37	2.39	2.4

Fig.4 Average Turbidity of the water samples from different areas.

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, Sodim, 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.
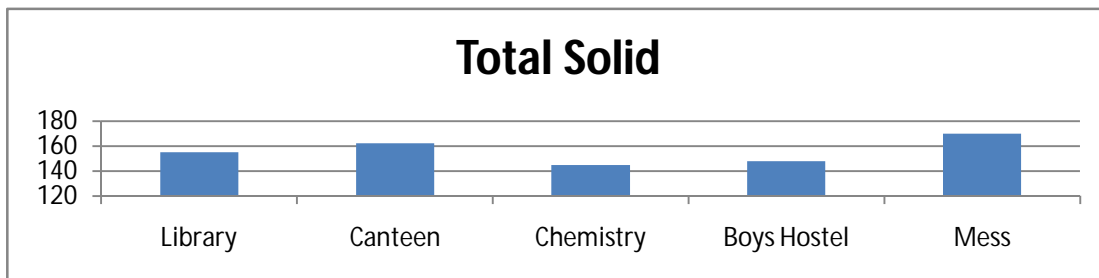
Total Solid

Fig.5 Average Total solids in the water samples from different area
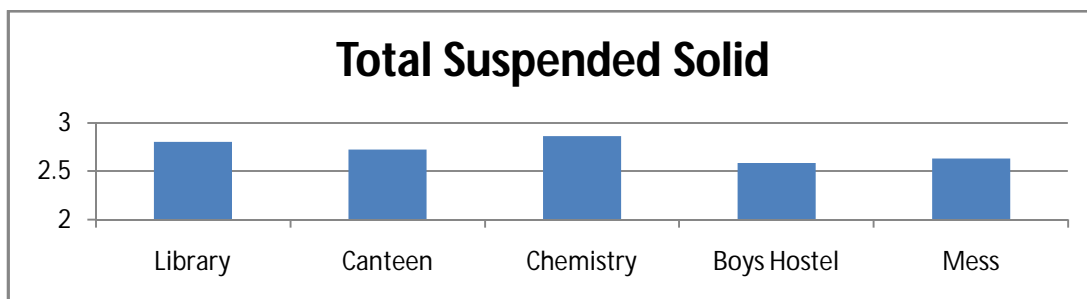
Total Suspended Solid

Fig.6 Average Total suspended solids of the samples from the different area

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 No. 2 - Classification of the water according to hardness.

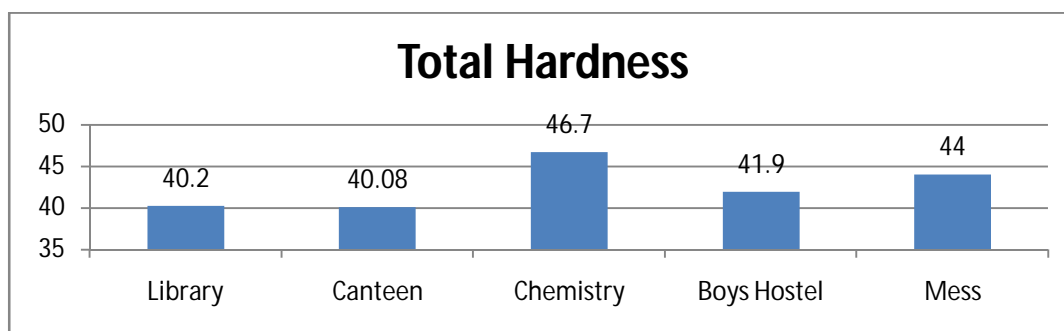| TDS Range	Description
0-60	Soft
61-120	Moderately hard
121-180	Hard
>180	Very hard

Fig.7 Average hardness of the water samples from different areas.

Biochemical oxygen demand (BOD)

BOD gives a quantitative index of the degradable organic substances in water and is used as a measure of waste strength. The low BOD value in all samples showed good sanitary condition of the water. It is found that all the water supplied to the institute is within the permissible limit.(ie;3 to 4 mg/l)
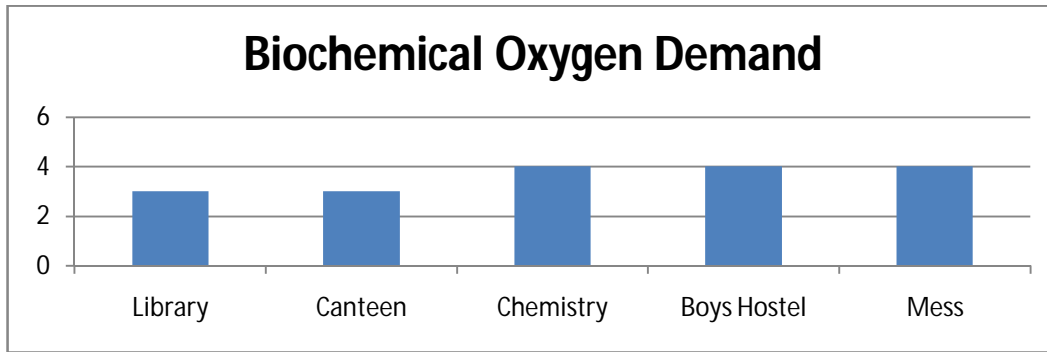.

Fig.8. Average BOD of the water samples from different areas.

Dissolved oxygen (DO)

Dissolved oxygen content in water reflects the physical and biological processes prevailing in water and is influenced by aquatic vegetation. Low oxygen content in water is usually associated with organic pollution. DO is ranged from 8.61 to 8.96 mg/l in the study area, where as the prescribed limit for DO is 5.0 mg/l.
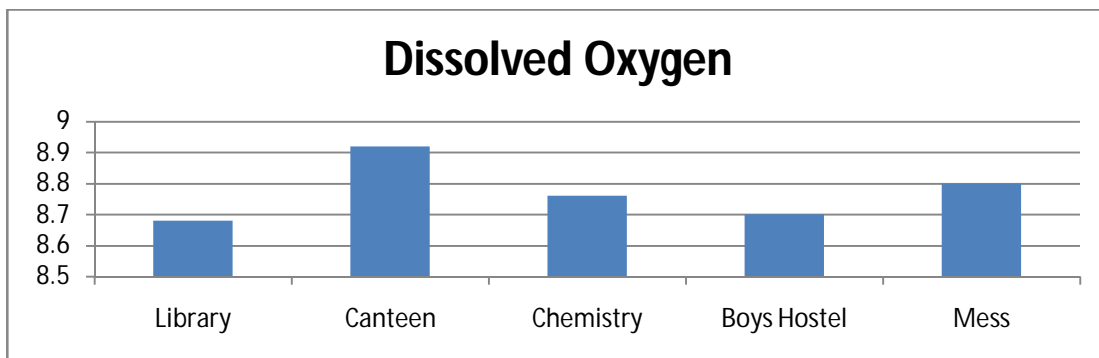

Fig.9. Average DO of the samples from different areas.

Alkalinity

In the present study Phenolphthalein Alkalinity was absent in all samples and Methyl Orange Alkalinity was ranged from 98 mg/l to 106.3 mg/l, this indicates the absence of Hydroxyl and Carbonate and presence of Bicarbonate. However the prescribed limit for Total Alkalinity is 120 mg/l.
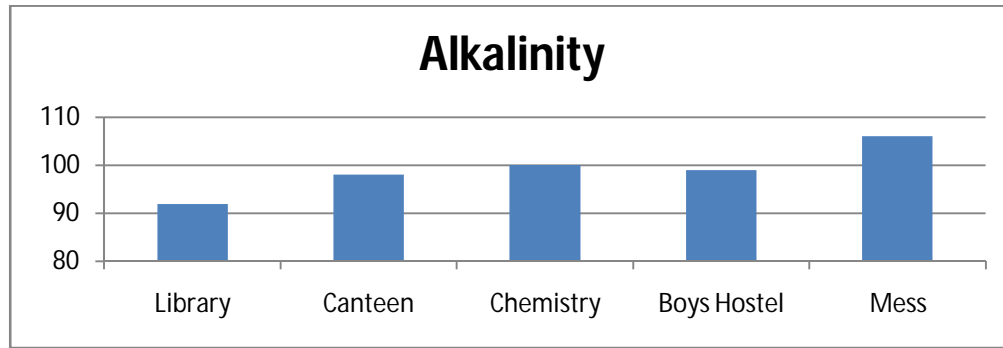
Fig.10. Average Alkalinity of the water samples from different areas.

Chloride

In the study area there is no significant change in chloride concentration and it ranged from 21.0 to 21.4 mg/l. Chloride which have been associated with pollution as an index are found below the permissible value set at 250 mg/l in most of the study area. Chloride in excess (> 250 mg/l) imparts a salty taste to water and people who are not accustomed to high Chlorides can be subjected to laxative effects.
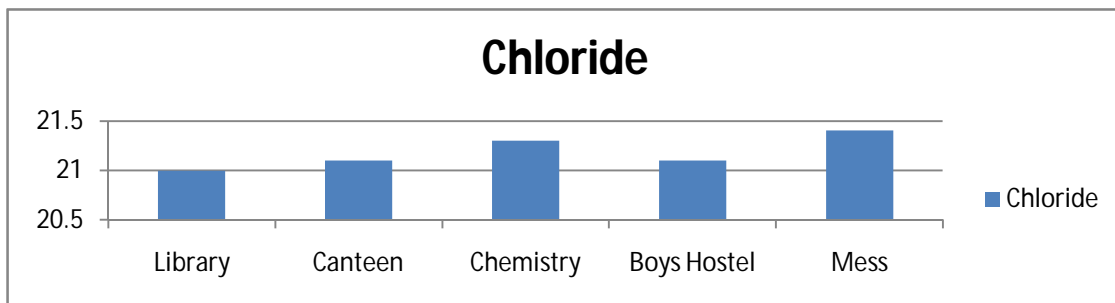

Fig.11. Average chloride present in the samples from different areas.

CONCLUSIONS

The average ranges of physical, chemical and biological characteristics of water quality are as per the ground water quality. The pH ranges from 7.32 to 7.53. The Turbidity, TDS and TSS ranged from 2.31 to 2.56 NTU, 145 to 175 mg/l and 2.419 to 2.863 mg/l respectively. The value of Turbidity was found to be within the permissible limit in all the. Hardness, ranged from 40.08 to 45.2 mg/l and it is found that the water supplied to the campus area is soft. The DO and BOD were in the range of 8.68 to 8.96 mg/l and 3 to 4 mg/l. The Chloride and Alkalinity were in the range of 21 to 21.4 mg/l and 98 to 106.3 mg/l respectively. The parameters studied resemble the drinking water quality.

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