Original Research Article

INVESTIGATIONS ON QUALITY OF RAILWAY STATION DRINKING WATER FROM PARBHANI TO NANDED ROUT

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ABSTRACT: In the present investigation, a study on drinking water quality of 7 railway stations on South Central Railway from Parbhani to Nanded rout in Maharashtra was performed. By analyzing a total of 7 samples during June 2013. The portability of water for various parameters like pH, acidity, alkalinity, Total Dissolved Solids (TDS), free CO_2 contents was tested by standard methods and recorded. It was found that most of the samples were varied from normal range and contaminated. All the samples collected were from district Nanded and Parbhani, cities stations. The analyzed values were compared with the standard values of Bureau of Indian Standards (BIS) and World Health Organization (WHO). The analysis shows that the chloride content is much higher in sample of Parbhani and Limbgaon railway stations where as it is within permissible limits for the drinking water of Nanded, Chudava, Purna, Mirkhel and Pingli railway stations. According to BIS and WHO the fluoride concentration more than 1.5 mg/l is toxic and may cause Fluorosis. Out of eight water samples six are of higher range and two comes in the permissible limits. Hence the study suggests the defluoridation of drinking water in the study area.

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1.INTRODUCTION:

Water is colorless, odorless, test less and universal, polar solvent. Water covers about 70% of the Earth surface hence Earth is known as Water planet. Water is one of the three major components of the environment; therefore, there exists a close linkage between the quality of water and the environment which bears an almost importance for eco-system. Natural bodies of water are not absolutely pure as various organic compounds and inorganic elements remain in dissolved form. Many kinds of macroscopic flora and fauna grow in different types of aquatic habitats. The physical and chemical quality of water vary according to The basin shape and size, depth, light penetration, precipitation, location, temperature, chemical nature of surrounding soil and dissolved minerals, pH, etc. and the biological components of the habitats depend upon them If all the physical, chemical and biological parameters are in optimum condition the balance between these is maintained [1]. Hydrogen ion concentration (pH) is an important factor in water analysis since it enters into the calculation of acidity, alkalinity [2]. pH is important to regulate enzyme system. Electrical conductivity is a parameter for dissolved ionic substance. Water hardness above 200mg/lit may cause scale deposition in distribution system. Water with a total 500mg/lit is considered harmful to human health. Chloride are one of the major constitute found all natural water in different concentration. High concentration of chloride gives an undesirable taste to water beverages. Higher concentration of salt especially chloride in water higher will be electrical conductivity. If chloride level exceeds 300mg/lit there is risk of change in taste of water. If chloride concentration increases, it will be impart salty taste to water [3]. Total dissolved solid values were used to determine whether water is suitable for drinking, agriculture and industrial purpose. TDS are obtained are mainly due to salt water contamination and industrial pollution. It also cause increase in level of alkalinity. The higher values of alkalinity indicate presence of bicarbonate, carbonate and hydroxide in water body. Too much of fluoride concentration leads to destruction of enamel and causes fluorosis leading to decalcification, dental disorder, mineralization of tendons, digestive and nervous system. According to WHO about 80% of all the diseases of human being are caused by water therefore, therefore water that supplied for drinking and various purposes must be of good quality [4,5]. Railway stations are the main source of drinking water for railway travelers and analysis of water is very important in the evaluating of these supplies. A large number of railway passanger consume this drinking water on railway platform and this contaminated water may be the vehicle of transmission of water born diseases [1]. Drinking water at railway stations is mainly supplied from bore wells. Most of the railway stations in India rarely have the much needed purifying technology [5]. Water quality assessment helps in identification of any contaminants and checks

the quality of water. As one of the essential amenities local government authorities provide drinking water to passengers at all the stations. But many times apathy has been observed towards the quality maintenance of water, storage tanks and particular area [6]. This work seeks to check the quality of water made available at the public transport stations on various stations between Parbhani and Nanded.

2. MATERIAL AND METHODS

The water sample (Tap water) for the present investigation was collected from seven stations namely Parbhani, Mirkhel, Pingali, Chudawa, Limbgaon, Fukatgaon, Purna and Nanded as fresh and used immediately. Autoclaved plastic bottles were used for sample collection. The water samples were brought to the Dept. of Biotechnology Laboratory (MGM College Parbhani) for analysis and quality check. A total of 7 physico – chemical parameters were analyzed including pH, acidity, alkalinity, hardness, chloride, free CO_2, TDS and temperature.

Temperature and pH -

Temperature and pH was taken at the time of sampling of water samples, readings were collected in triplicate and mean of the data was used for further analysis.

Hardness - 50 ml of water sample was added in 250ml conical flask and 1ml of ammonia buffer solution was added to it. 4-5 drops of Erichrome black T indicator was added and the sample was titrated against 0.01N EDTA and wine red color of solution turned to blue. Titrations were repeated five times.

Chloride Estimation - 50 ml of sample water was adjusted for pH at 7-8 by adding NaOH or HCl solution to it.10 ml pH adjusted water sample were poured in a conical flask and were challenged with few drops of $K_2Cr_2O_2$ colour change from colorless to yellowish was observed. Then the yellow solution was titrated against $AgNO_3$ solution and color change was observed from yellowish to dark red colour. The titration was repeated for 3 times.

Free CO_2 Estimation- 50 ml of sample was collected in conical flask, few drops of Phenolphthalein indicator was added to it. This solution was then titrated against NaOH; the color of the solution turned to pink. The other tests including acidity, alkalinity, TDS and hardness of all the water samples were analyzed in triplicates. These physicochemical parameters were determined spectrophotometric ally and titrimetrically. In the present investigation all the tests for collected samples were repeated twice by collecting fresh sample after eight days, mean of the data calculated.

3. RESULTS AND DISCUSSION:

pH is the ecological factor of major importance in controlling the activities and distribution of aquatic flora and fauna and it is clear that at all seven stations, pH values are well within the range given in the

WHO recommendations except sample of Parbhani station (8.7). The permissible limit of pH in drinking water is within 6.5 to 8.5 [7]. High pH indicates the free availability of heavy metals as a result of their precipitation in hydroxide form. Alkaline range of pH may be due to occurrences of limestone in the surrounding region of sampling stations. Acid- base equilibrium is also a controlling parameter for change in pH of the sample [1]. pH values in the present study were ranged from 7.9 to 8.7. Observations reveal that the temperature of the samples ranged between 23 to 30° C. (Table 1). The maximum pH was recorded for Parbhani station and lower in Limbgaon and Chudava which found to be permissible. Alkalinity gives bitter taste to water. Higher alkalinity produces undesirable test to water [8]. Acceptable range of chlorides is 250 mg/lit by WHO standard. In this study it is also observed that water sample from Nanded station showed highest alkalinity, whereas alkalinity of sample of Mirkhel showed lowest alkalinity. Alkalinity of all the samples found within WHO permissible limit. Hardness is due to multivalent cations in solution associated with anion like chlorides, sulphate and bicarbonate. The water with hardness below 400 is in a permissible limit and beyond 400 is considered to be very hard water [1], all the water samples from seven sites showed hardness below 300 ppm. Chlorides in drinking water gives a salty taste and sometime effect on human being. Chlorides concentration varied from 11.07 to 96.53 mg/lit and higher concentration of chloride observed in Nanded station sample (Graph 1).The finding of the present study indicated that the quality of Railway Stations drinking water was not good for health because it is having lot of contaminant in water. This is harmful for human health.

4. CONCLUSION

It is concluded from the results of this study that water contains permissible amount of hardness but the quality of drinking water found to not be much good and health problem may created. The drinking water quality of public transport stations from Parbhani to Nanded was not proper. It is also concluded from the study that major study is required to be carried out routinely on the stations and care must be taken to supply potable water to the public.

Supplementary Materials: Table 1: Physico-chemical variations in drinking water samples of railway stations.

Code	Stations	pH	Temperature	Acidity	Alkalinity	Hardness	Chloride	Free CO_2	TDS
R1	Nanded	7.9	**30**	240	**302**	96	96.56	**3**	253
R2	Limbgaon	7.8	28	760	220	**160**	25.27	0.8	**688**
R3	Chudava	7.8	25	**960**	184	116	93.72	0.8	419
R4	Purna	7.9	24	760	152	96	13.34	1.3	465
R5	Mirkhel	7.9	27	480	124	64	11.07	1.7	378
R6	Pingali	8.3	23	412	128	112	73.84	0.9	325
R7	Parbhani	**8.7**	25	144	240	36	39.5	**3**	180
BIS range		**6.5 to 8.5**	--	--	200 to 600	500	200		500

A bold value indicates maximum results.
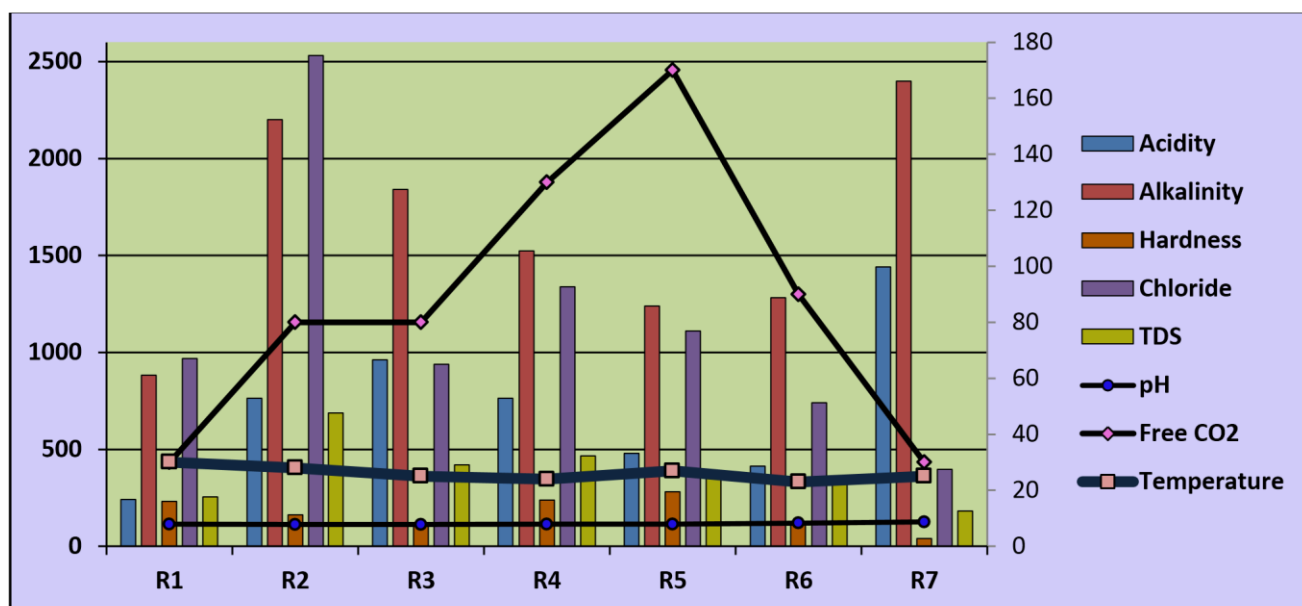
Graph 1: Variations in different test studied.

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