Research Article

Evaluation of Selected Physico-Chemical Parameters of Drinking Water from Hotels of Amravati City, Maharashtra State (India)

Abdul Wajid and Madhuri P. Bhise

Govt. Vidarbha Institute of Sci. & Humanities, Amravati, Maharashtra, India.

ABSTRACT

Most of ill health in the underdeveloped countries is largely due to lack of safe drinking water. The provision of safe community water supply is one of the most effective and permanent health technologies for improving the public health. Since the beginning of the century, when international co-operation in public health began, safe water has been a major concern. There has always been a dearth for potable water in our country. For a multitude of reasons governmental agencies and municipal corporations have failed in making availability of safe drinking water to all sections of population.

Amravati city is an important city because of natural resources available around it. In order to understand the quality of drinking water used by the customer in hotels, physico-chemical parameters like pH, D.O., Free CO_2, B.O.D., potassium, fluoride, etc. were studied. Thus present study deals with the analysis of variations in the physico-chemical characteristics of different water samples from various hotels of Amravati city. The samples were collected from eleven sampling locations away from each other by 500 meters. Results revealed that there were significant variations in some physico-chemical parameters. The drinking water is polluted with reference to almost all the water quality physico-chemical parameters studied.

Keywords: Physico-chemical parameters, potable water, Amravati city, Hotels, B.O.D.

INTRODUCTION

Potabilty of drinking water in Hotels and restaurants is associated with poor hygienic environment. Water may become contaminated at any point between collection, storage, serving or handling in hotels. General sources for drinking water in hotels are bore water, corporation, dug well. Some selected branded hotels are also directly available in hotels.

The safety of drinking water is an ongoing concern within the global village[1-2]. Only 1% part is available on land for drinking, agriculture, domestic, power generation, industrial consumption, transportation and waste disposals[3-6]. The quality of water usually described to its physical, chemical and biological characteristics. Due to use of contaminated water human population suffer from water born diseases[7].

Many congenital diseases such as goiter, cancer, etc. have been associated with presence of high concentration of chemicals. Currently about 20% of world's population lacks access to safe drinking water, and more than 5 million people die annually from illness associated with safe drinking for or inadequate sanitation.

EXPERIMENTAL (FIG.1)

Amravati city is located in east Maharashtra on the latitude of 20°56 north and 77°46 east. It is the main centre of west Vidarbha. It has an important city because of natural resources available around it. There are various existing industries. In proper Amravati district different types of hotels, road site tapries (stalls) and canteens are present.

Preparation of water samples

Samples were collected from following eleven locations. The sample were collected from all the stations at 11.00 am to 12.00 for physico-chemical examinations, different methods of collection and handling were adopted based the standard procedures[7]. The samples were collected in plastic canes of

five liters capacity without any air bubbles. The instruments were used of accuracy. The temperatures of the samples were measured in the field itself at the time of sample collections.(Table1).

RESULTS AND DISCUSSION

Mean value of selected chemical properties of water in the distribution (L = location).(TABLE.2)

Chemical analysis

Chemical analysis of water supplies was necessary to guarantee the quality, efficiency of operation of water treatment, plants and distribution criteria.

1.Temperature(T) in ^{0}C

Temperature is an important biologically significant factor, which plays an important role in the metabolic activities of the organism. The temperature was ranging from 29.0°Cto 32.0°C during the study period. Lowest water temperature was observed in the L2 was 29.0 °C. It is the property of water, that with change in temperature, its density varies and it becomes less with warming. [8]

2. Free CO_2

Almost all natural waters contain some carbon dioxide which they gain in several ways. Carbon dioxide gas (CO) is present in the air to the extent of 0.03 percent by volume and 0.05 percent by weight. As rain falls through the air, it absorbs some of this gas. Samples from L9 and L11 locations showed somewhat higher free CO_2.

3. Dissolved Oxygen (DO) in mg/l

Dissolved oxygen is important parameter in water quality assessment and reflects the physical and biological processes prevailing in the water.9 The DO values indicate the degree of pollution in water bodies. DO values varied from 2.4 to 7.4 mg/l. The sampling points L6 and L7 showed high DO values.

4. COD

The amount of chemical oxidation required converting organic matter in water and waste water to carbon dioxide is called as chemical oxygen demand (COD). This test involves measuring the amount of oxidizing agent such as permanganate i.e. consumed when the organic matter in a water sample is oxidized completely to carbon dioxide. All the samples shows COD in normal range.

5. Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand (BOD) is the measure of the degraded organic material present in a water sample, and can be defined as the amount of oxygen required by the microorganisms in stabilizing the biologically degradable organic matter under aerobic condition. Hence, BOD approximates the amount of oxidizable organic matter present in the solution and the BOD value can be used as a measure of waste strength. It is highly important to know the amount of organic matter present in the waste treatment system and that the quantity of oxygen required for its stabilization.

6. Potassium (K^+) in mg/l

The major source of potassium in natural fresh water is weathering of rocks but the quantities increase in the polluted water due to disposal of waste water[9]. Potassium content in the water samples varied from 0.3 mg/L to 0.8 mg/L. It is found that the contents of potassium in L1 is higher i.e. 0.80 mg/l, whereas for sites L4 to L10 is zero.

7. Chloride concentration serves as an indicator of pollution by sewages. People accustomed to higher chloride in water are subjected to laxative effects[10]. Higher chloride concentration was observed from L7 site.

8. Fluoride (F -) in mg/l

Probable source of high fluoride in Indian waters seems to be that during weathering and circulation of water in rocks and soil. Excess intake of fluoride through drinking water causes fluorosis on human being. In the present analysis, fluoride concentration was found in samples sites in Amravati hotels from L3 to L11.It was found 0.1 for L1 and L2 locations.

9. Sulphate (SO_4^{2-}) in mg/l

Sulphate occurs naturally in water as a result of leaching from gypsum and other common minerals[11]. Discharge of industrial wastes and domestic sewage tends to increase its concentration. The sulphate concentration varied between 0.1 mg/L and 0.9 mg/L. and found within the prescribed limit.

10. Nitrate

Nitrate is a form of nitrogen that plants can easily use. High concentrations of nitrate in drinking water can cause methemoglobinemia (blue baby syndrome) in infants.[12-13] Concentrations greater than 10 parts per million can be harmful to young babies, and should be avoided by nursing mothers. The samples from locations.

CONCLUSION

Deviations were observed by some Hotel water samples in Amravati city. The sampling sites L9, L10 and L11 showed physicochemical parameters within the water quality standards and the quality of water is good and it is fit for drinking purpose. The parameters namely F^- and nitrate is found as zero for maximum locations.

Improper method of storage and handling of water especially road side hotel, uneducated/unaware workers make water contaminated. So it will cause various diseases. Therefore hotel owners and workers should maintain their hygienic conditions in order to avoid contaminations. Some water samples from L4, L6, L7 showed poor water quality by chemical analysis. I also request to Maharashtra Pollution Control Board[14] that it should take suitable precautions and actions against those hotel owners if they are not maintaining hygienic conditions properly.

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Table 1:

S.No.	Name of area	No. of samples from each area
1	Kathora naka	04
2	Praveen nagar	09
3	Shegaon naka	07
4	Gadge nagar	04
5	Panchwati	04
6	Irwin square	06
7	Canteens: 1)Govt.vidarbha institute of sci., Amravati 2)Shri shivaji college, Amravati	02
8	Rajkamal chawk	10
9	Itwara bazar	07
10	Badnera	05
11	Congress nagar	02
	TOTAL	60 SAMPLES

Table 2:

Parameters	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	WHO (Max. Std. 1993)
Temperature	31	29	31	31	31	32	31	31	32	31	31	--
Free CO_2	8.6	8.8	8.5	8.3	8.8	8.5	8.2	8.7	9.1	8.4	9.0	--
D.O.	4.9	5.0	5.4	5.0	5.0	7.4	7.3	3.4	2.7	2.5	2.8	5mg/l(ISI STD.)
C.O.D	104	107	128	210	232	236	125	152	125	107	104	Not exceed 250 mg/l
B.O.D	6.0	6.3	6.4	6.7	5.4	5.2	5.7	6.8	6.4	7.2	6.7	Not more than 8mg
K^+	0.8	0.34	0.34	00	00	00	00	00	00	00	00	--
Cl^-	47	120	48	45	69	54	257	105	109	122	59	250 mg/l
F^-	00	00	00	00	00	00	00	00	0.1	0.1	00	15 mg/l
SO_4^{2-}	0.9	0.1	0.8	0.65	0.87	0.54	0.54	0.6	0.45	0.84	0.58	500 mg/l
Nitrate	00	00	00	00	00	20	00	04	00	00	20	10ppm

Fig : Amarvati city **Fig : Maharashtra state (India)**

Fig: 1:

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