Drinking Water Quality Monitoring of Sehore City (M.P.) During Monsoon Season

MOHAN TEJRAJ† and PRAVEEN JAIN*

Department of Chemistry, Govt MLB, PG Girls
Autonomous College, Bhopal, India

The study of water quality is of enormous educational value for the quality of water and is dictated by a pattern of interaction rather than by any factors operating in isolation. The present study deals with the evaluation of drinking water quality of Sehore city (M.P.) for which 10 sampling stations of different areas were chosen. The death and decay of vegetation and animals in and around the water reservoir site contributes as a major source of pollution. Physico-chemical analysis with different parameters has been done during monsoon season 1997. The pollution of ground water in Sehore City has rached to the point of serious concern and, therefore, some preventive and curative measures must be compulsory to protect regional natural water resources and drinking water quality.

INTRODUCTION

Monitoring of water quality is fundamental for understanding the water resources as it gives an insight into the consequences of its management due to the increasing public interest in water as a resource and in increasing the awareness of the need to protect water quality.

The main supply of drinking water to Sehore city is through Parbati river managed by Public Health Engineering Department of M.P. Government, which has set up an intake well in village "Kayri Kadeem" about 20 km from the city.

The physico-chemical analysis with different parameters has been done at 10 different sampling stations during the monsoon season 1997.

EXPERIMENTAL

Sehore, one of the districts of Madhya Pradesh state, is situated nearly 37 km west of the capital Bhopal at lattice latitude 22.45 N and longitude 76.30 E. The district has a population of 1,98,287. The area of Sehore district is 6,578 sq. km and gets an average rainfall of 1120 nr. annually; wind pattern is normal and north-westerly. The study has been done in the monsson season 1997; regular monitoring of tap water at different parts and stations of Sehore city has been done to understand the seasonal variations.

Physico-chemical parameters analyses were done as prescribed by APHA[1], Adoni[2], Goel and Trivedi[3]. Temperature was recorded by digital thermometer, turbidity by EI-nephlo turbidity meter, pH by digital pH-meter. DO and BOD

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†Department of Chemistry, Govt. PG College, Sehore (M.P.)

were fixed on spot by Winklers's method; free CO_2, alkalinity, hardness, phosphate, nitrate, chloride, COD analysed titrimetrically and using a spectrophotometer.

RESULTS AND DISCUSSION

The present investigation aims to assess the status of drinking water quality of Sehore district with special reference to municipal water supply. The pollution may slowly dissipate with time and transit distance. Various phenomena may play a role: sorptive material, clays, metallic oxides and hydroxides together with organic matter and they can take up most pollutants except chloride and nitrate.

The present study indicates that the transportation of water through the established system influences both the quality and quantity of water. The quality and quantity of water are interdependent notions and the economic study of pollution is an important part of management of water resources. The pollution of ground water in Sehore city has reached the point of serious concern and therefore some preventive and curative measures to protect regional natural water resources must be made compulsory through government or semi-government environment protection agencies.

pH: The pH value of drinking water is an important index of acidity and alkalinity and the resulting value of the acidic-basic interaction of a number of its mineral and organic components. High pH induces formation of trihalomethanes which are toxic in nature. pH below 6.5 starts corrosion in pipes resulting in the release of toxic metals. In the present study, pH ranged from 6.8 to 7.5 which is similar to works of Grewal[4] and Olaniya *et al.*[5].

Temperature: All metabolic and physiological activities and life processes of aquatic organisms are generally influenced by water temperature. In the present study temperature ranged from 29.5°C to 37.0°C which is similar to work of Shrivastava *et al.*[6].

Electrical Conductivity: Electrical conductivity which gives the amount of ionised material is an important measure of total dissolved solids. In the present study, the electrical conductivity ranged from 130.00 Mhos/cm to 269.00 Mhos/cm which is similar to observations of Narayana and Suresh[7] and Shrivastava *et al.*[8]

Turbidity: The turbidity of drinking water may be either due to suspended inorganic substances or due to planktonic organisms. In the present study, turbidity ranged from 0.00 to 2.00 NTU which is similar to reported work[9].

Nitrites: Nitrites represent an intermediate form during identification, and nitrification is retained in water. In the present study nitrites ranged from 0.011 to 0.037 mg/L, which is similar to work of Katariya[10].

Nitrates: Nitrogen is one of the major constituents of organisms along with carbon and hydrogen as amino acids, proteins and organic compounds. In the present study nitrates ranged from 0.024 to 32.5 mg/L, which is similar to works of Trivedi *et al.*[11] and Burman *et al.*[12].

Free CO_2:   It is essential for photosynthesis and it's concentration affects the aquatic fauna and it's productivity. In present study the free carbon dioxide ranged from 10.80 to 26.50 Mg/L which are similar with Singh and Safa observations[13].

TABLE-1

PHYSICO-CHEMICAL ANALYSIS OF DRINKING WATER OF SEHORE CITY DURING MONSOON SEASON-1997

(SEASONAL MEAN VALUE)

Parameters	Unit	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	SS-9	SS-10
pH		7.5	7.5	7.1	7.3	7.00	6.80	7.5	7.2	6.90	7.15
Temperature	°C	32.00	37.00	33.00	31.00	33.00	34.00	31.00	32.50	30.00	29.50
Conductance	µMhos/cm	210.00	215.00	130.00	205.00	145.00	182.00	210.00	220.00	181.00	269.00
Turbidity	mg/L	2.00	3.00	2.00	1.00	2.00	3.00	2.00	3.00	2.00	1.00
Nitrite	mg/L	0.028	0.032	0.034	0.021	0.025	0.014	0.020	0.013	0.011	0.020
Nitrate	mg/L	12.90	12.60	11.20	12.30	0.24	28.00	15.20	31.50	28.50	32.50
Free CO_2	mg/L	25.50	17.5	25.0	25.70	26.50	13.50	17.20	13.00	16.50	10.80
Chloride	mg/L	198.00	165.00	125.00	195.90	20.50	191.00	130.00	102.00	70.90	92.50
Total alkalinity	mg/L	295.00	430.00	435.00	360.00	452.00	78.00	272.00	274.00	179.00	275.00
Phosphate	mg/L	0.098	0.082	0.12	0.092	0.130	0.080	0.085	0.10	0.11	0.11
COD	mg/L	12.60	9.20	20.20	3.80	10.53	11.50	3.90	14.20	11.20	17.90
BOD	mg/L	2.60	2.90	3.00	2.20	3.59	2.99	2.85	2.45	3.20	3.85
DO	mg/L	2.80	1.52	2.27	2.42	2.51	1.95	2.50	2.13	2.00	1.65
Mg hardness	mg/L	72.00	65.00	90.00	170.00	85.00	74.00	140.00	139.00	125.00	122.00
Ca hardness	mg/L	202.00	195.00	140.00	200.00	165.00	192.20	199.50	142.00	162.00	122.00
Total hardness	mg/L	274.00	260.00	230.00	370.00	250.00	266.20	339.50	281.00	287.00	244.00

Chloride: The most important source of chloride in the water is the discharge of domestic sewage. In present study chloride ranged from 20.50 to 198.00 Mg/L. Which are similar with Kalita *et al.*[14] report.

Total Alkalinity: Total alkalinity is caused by bicarbonates and carbonates. In the present study total alkalinity ranged from 78.00 to 435.00 mg/L, which is similar to Afoz *et al.*[15] and Singh[16] observations.

Phosphate: Phosphate is recognised to be the most critical single factor in the maintenance of fertility. In the present study phosphates ranged from 0.080 to 0.130 mg/L, which is similar to Gandhi and Khopkar[17] work.

COD, BOD and DO: BOD is a measure of the degradable organic matter present in the drinking water. COD is a measure of organic matter which estimates the carbonaceous factors of organic matter. Oxygen is the most vital factor for living beings to maintain the metabolic process and reproduction. In the present study COD, BOD and DO ranged from 3.80 to 20.20, 2.20 to 3.85 mg/L and 1.52 to 2.80 mg/L which are similar to Chacko and Ganapati[18] and Bulusu *et al.*[19] observations.

Magnesium Hardness: Magnesium is absolutely essential for chlorophyll-bearing algae and plants. In the present study magnesium hardness ranged from 65.00 to 170.00 mg/L which is similar to work of Kalita *et al.*[14].

Calcium Hardness: Calcium normally occurs in combination with carbonate ions. In the present study calcium hardness ranged from 122.00 to 202.00 mg/L.[14]

Total Hardness: Hardness in principle is the total of soluble calcium and magnesium salts present in water expressed in terms of calcium carbonate. In the present study total hardness ranged from 250.00 to 370.00 mg/L which is similar to works of Mittal *et al.*[20] and Kalita *et al.*[14] (1988).

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TABLE-2

PARAMETERS FOR WATER QUALITY CHARACTERIZATION AND
STANDARD DOMESTIC WATER SUPPLIES

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Parameters	USPH Standard	ISI Standard (ISI) 2296–1963
pH	6.0–8.5	6.0–9.0
Specific conductance	300 Mho/cm^{-1}	—
DO	4.0–6.0 ppm	3.0
Chloride	250	600
Nitrate + nitrite	10	—
Phosphate	0.1	—
COD	4.0	—
BOD	5.0	6.0n (WHO Standard)
Calcium hardness	75.00	—
Turbidity	5 NTU	—
Free carbon dioxide	4.5	—
Mg hardness	30.00	—
Total hardness	500	—

TABLE-3
DESCRIPTION OF SAMPLING STATIONS

Sampling station	Sampling area
SS-1	Bus Stand Chouraha
SS-2	Namak Chouraha
SS-3	Hospital Chouraha
SS-4	Saray Area
SS-5	Kotwali Chouraha
SS-6	Bhopal Naka
SS-7	English Pura
SS-8	Ichawar Road
SS-9	Paltan Area
SS-10	Badhai Area

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