

## **PHYSICO-CHEMICAL PARAMETERS OF DRINKING WATER - BHUBANESWAR (ORISSA)**

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It is well known that 70% to 80% of all illnesses in India are related to water contamination. The women and children are particularly more susceptible to this contamination. The quality and availability of water is fast deteriorating. Considering these facts the author has made a study on the quality of drinking water of some areas of Bhubaneswar city. It was found that the water is unsuitable for drinking without further processing as it contains high level of inorganic salts and Coliform.

### **INTRODUCTION**

**A** very large section of the population uses raw water from surface and ground water sources for human consumption. Most ground and surface water contains natural dissolved salts. These salts originate from the contact of the liquid water moving in the hydrological cycle with various rocks and soil minerals. Once foreign chemical or biological material has been introduced in the environment it becomes a possible ground water pollutant. Contamination of drinking water is major health hazard as more than seventy percent of diseases are water borne in a country like India. The contaminated water requires permanent remedy otherwise it will affect the health and hygiene of the consumer.

The present study was conducted keeping this fact in mind to determine the quality of water of some areas of Bhubaneswar. A few Physico-Chemical Parameters were studied and quality was determined. It was found that water is fit for irrigation, fish culture, cloth washing but unfit for drinking purpose without any elementary treatment.

### **MATERIALS AND METHODS**

**T**he three grab samples were collected from each site during the first week of every month for a period of one year, in clean screw-capped plastic bottles. Labelled samples were usually collected in the morning hours, *i.e.*, 8.00 A.M. to 10.00 A.M. from various sampling station. They were brought to the laboratory and tested for pH. Electrical conductance and dissolved Oxygen within six hours of collection. The Physico-Chemical Parameters were estimated as APHA [1] and ICMR [7] methods.

### **RESULTS AND DISCUSSION**

**S**ite-I, site-II and site-III's Physico-Chemical Parameters clearly indicate that the water is slightly polluted due to high coliform value and may be used for drinking purpose only after

treatment. The results obtained are depicted in table I, II and III. pH value varies from 7.21 to 7.74, 7.09 to 7.89 and 6.80 to 7.31 in site-I, II and III respectively through out the year. This shows that water is alkaline. This may be due to the fact that contaminant and other foreign element present in environment or used by humans find their way into surface and under ground water. Secondly, the Coliform number is mostly high in all the three samples. In site-I, the Coliform value varies from 3 MPN/100 ml to 1100 MPN/100 ml, in site-II, this value varies from 4 MPN/100 ML to 1100 MPN/100 ML and in site-III, the Coliform value varies from 8 MPN/100 ML to 249 MPN/100 ML. While the permitted value is 4 MPN/100 ML (WHO, 1993). This could be due to broken pipelines. Presence of high number of Coliform at all sites indicates that water will have to be pretreated before drinking otherwise the consumer will suffer from water borne disease. On survey it was found that most people suffer from Amoebiosis, Jaundice and Hepatitis. Other parameters as observed from the table were within the recommended range through out the year.

**Table 1 : Physico-Chemical Characteristics of 'Site-I' (Dunduna)**

**(All values are in Mg/L except pH, EC, and Coliform)**

S. No.	Name of Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov	Dec.
1.	pH	7.45	7.64	7.38	7.28	7.69	7.63	7.55	7.75	7.58	7.58	7.68	7.28
2.	Chloride	29	31	25	32	35	29	28	28	25	25	29	29
3.	Fluoride	1	1	1	1	1	1	1	1	1	1	1	1
4.	Total Hardness	140	150	150	150	180	140	140	150	140	130	130	130
5.	Ca-Hardness	89	109	87	78	99	69	78	78	76	76	78	76
6.	Mg-Hardness	68	56	79	82	92	81	76	84	74	63	63	68
7.	Nitrate	11	12	16	16	18	10	9	9	8	8	8	7
8.	Iron	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9.	Sulphate	12	12	18	10	10	13	13	10	11	12	12	10
10.	Total Solid	368	329	369	425	483	485	485	489	469	518	519	410
11.	Total Dissolved Solid	236	380	336	393	446	348	348	446	338	479	370	380
12.	Total Suspended Solid	34	25	35	34	34	36	33	33	33	39	39	39
13.	Alkalinity	310	329	319	335	315	325	330	330	330	319	310	219
14.	Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
15.	Dissolved Oxygen	7.8	7.3	7.2	7.4	7.3	7.3	7.6	7.6	7.9	7.3	7.2	7.2
16.	Biological Oxygen demand	3.2	3.2	2.8	3.3	3.3	3.3	3.9	3.5	3.4	3.4	3.2	3.2
17.	Electrical Conductance	486	409	580	566	440	440	649	650	580	673	670	500
18.	Coliform (MPN/100ML)	ND	ND	ND	81	ND	86	ND	100	ND	ND	ND	103

### SUGGESTIONS

- (i) People should be made aware.
- (ii) District Authorities should repair the broken pipelines as soon as possible.

(iii) Better water management by the Government of Community can help in conserving water.

(iv) Through strict implementation of the Government's water treatment programme water can be rendered safe for drinking.

**Table 2 : Physico-Chemical Characteristics of 'Site-II' (Bapuji Nagar)**

(All values are in Mg/L except pH, EC, and Coliform)

S.No.	Name of Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1.	pH	7.43	7.28	7.38	7.28	7.28	7.90	7.67	7.19	7.60	7.43	7.68	7.68
2.	Chloride	86	79	92	91	93	92	60	89	82	79	98	92
3.	Fluoride	0.23	0.21	0.56	0.29	0.28	0.25	0.26	0.28	0.25	0.40	0.65	0.62
4.	Total Hardness	319	295	305	299	278	285	260	245	255	236	242	299
5.	Ca-Hardness	220	260	189	180	180	170	110	119	119	125	125	165
6.	Mg-Hardness	120	120	120	145	160	130	160	135	160	120	129	135
7.	Nitrate	10	20	20	20	25	20	20	20	20	15	25	25
8.	Iron	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9.	Sulphate	7	8	6	6	8	6	11	11	9	8	9	8
10.	Total Solid	434	475	494	548	697	693	640	576	440	715	800	508
11.	Total Dissolved Solid	564	548	460	610	628	728	516	615	505	684	740	760
12.	Total Suspended Solid	36	39	35	22	65	55	39	40	35	39	49	48
13.	Alkalinity	355	345	365	335	280	230	260	250	250	350	360	360
14.	Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
15.	Dissolved Oxygen	7.5	6.0	6.2	6.3	7.5	7.4	7.3	7.2	6.9	6.3	6.4	6.2
16.	Biological Oxygen demand	2.4	2.8	2.4	3.6	3.5	2.8	3.5	3.5	3.4	3.3	3.3	3.4
17.	Electrical Conductance	820	740	800	780	940	940	940	980	820	1130	1300	900
18.	Coliform (MPN/100ML)	23	11	18	ND	1100	26	39	360	143	160	160	246

**Table 3 : Physico-Chemical Characteristics of 'Site-III' (Old Town)**

(All values are in Mg/L except pH, EC, and Coliform)

S.No.	Name of Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1.	pH	7.11	7.15	6.90	6.85	7.28	7.22	7.15	7.15	7.41	7.20	7.30	7.25
2.	Chloride	75	65	89	74	84	84	75	75	76	71	71	60
3.	Fluoride	0.25	0.45	0.32	0.4	0.29	0.35	0.32	0.45	0.35	0.42	0.39	0.41
4.	Total Hardness	340	290	235	280	290	340	260	260	280	280	280	239
5.	Ca-Hardness	250	260	160	160	160	150	120	120	130	240	250	190
6.	Mg-Hardness	80	105	80	115	95	75	120	120	110	100	100	90
7.	Nitrate	28	28	28	15	15	15	15	30	30	20	20	15
8.	Iron	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9.	Sulphate	9	15	15	11	11	14	14	13	13	12	12	14

10.	Total Solid	475	535	649	466	749	854	843	776	650	664	668	653
11.	Total Dissolved Solid	348	509	610	628	785	684	785	738	716	738	738	716
12.	Total Suspended Solid	39	36	34	48	55	65	50	57	49	46	45	46
13.	Alkalinity	380	365	335	360	360	350	320	330	310	360	360	370
14.	Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
15.	Dissolved Oxygen	7.9	7.3	7.5	7.4	7.3	7.2	7.5	7.5	7.5	6.9	6.8	6.9
16.	Biological Oxygen demand	2.8	3.1	3.1	3.3	3.3	3.4	3.4	3.4	3.2	2.9	2.9	2.8
17.	Electrical Conductance	680	730	780	1050	1130	1130	920	1040	1180	940	940	980
18.	Coliform (MPN/100ML)	29	140	25	35	140	249	8	8	33	53	29	34

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