

Comparative study of Physico-chemical parameters of different Water samples at Aligarh

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Abstract : Water is the most important for human health. Water is a tasteless, transparent, a colorless and odorless, chemical substance. water is affected by various contaminants which present in it and essential for all life. It is composed of two hydrogen atoms and one oxygen atom, with the chemical formula H_2O . Water is the most important natural resources on earth. Water is important in food production and economic development of country. There are many harmful substance present in water due to which quality of the Drinking Water becomes poor. Contaminated water cause serious health problems in the community. poor quality of water causes many diseases in the humans and animal so that the quality of the water must be tested for both the chemical as well as for the microbial contaminants. During the study of potable water and habitate water and compared with that suggested by BIS (1991) and world health organization(WHO) 1971. It was found that physico-chemical parameters of water have maximum according to desirable limit. Physico-chemical and bio-chemical aspects of the water have been investigated to assess the quality of water. The objective of the research is to get information about the physico-chemical parameters of Potable water, pond, lake and canal water.

(Keywords : Pond, canal water, Aligarh, Physico-chemical, Potable water ,Investigation, ecological studies, Comparative studies)

Introduction.

Water is the most important natural resources on the earth. All living organisms on the earth need water for their survival and growth. As of now only earth is the planet having about

70 % of water. Freshwater bodies are important wetlands located in and around human³. Water, a transparent, tasteless, odorless, and nearly colorless chemical substance, is a vital component of all known life forms. Water is indispensable for life, forming the basis of biological systems. It serves as a solvent for biochemical reactions, a medium for transport within organisms, and a key component of cellular structures. Water shapes ecosystems and habitats, influencing climate patterns and supporting biodiversity. water is used for cooling, cleaning, and manufacturing processes. Access to clean, safe drinking water is essential for public health and sanitation. The infrastructure for introducing potable water into communities is a cornerstone of modern civilization. Top The safety of drinking water is affected by various contaminants which included chemical and microbiological. Such contaminants cause serious health problems. Due to these contaminants quality of drinking water becomes poor. Sometimes such poor quality water causes many diseases in the humans, so that quality of water must be tested for both the chemical as well as for the microbial contaminants. The management of water resources, including its equitable distribution, sustainable use, and protection from pollution, is a global priority. The major water quality parameters considered for the examination in this study are pH, Odour, Colour, Taste, Temperature, Turbidity, Total Dissolved Solids (TDS), Dissolved oxygen (DO), Dissolved carbon dioxide, Metals and

Metalloids, Total Hardness, Alkalinity, fermentation.

2. Sample Collection:

Potable water sample was collected from four different areas of Aligarh: Processed water, Civil line Water Sample, City water sample, Harduaganj water sample. Habited water sample was collected from four different lakes of Aligarh: Harduaganj pond, Water Quarsi lake, Water Sample, Harduaganj canal sample, Quarsi canal water sample.

Experimental

3. Material and Methods

The present study was carried out for four different areas and lakes, pond and canal located in Aligarh city. In the present study the sampling was done during morning hours and all water samples were collected in the polyethylene bottles. For lake water sample collection the closed bottle was dipped in the lake at the depth of 0.6 to 10 m, and then a bottle was opened inside and was closed again to bring it out at the surface.

The samples were collected from three different points and were mixed together to prepare an integrated sample. From the time of sample collection and to the time of actual analysis, many physical and chemical reactions would change the quality of water sample therefore to minimize this change the sample were preserved soon after the collection. The water samples were preserved by adding chemical preservatives and by lowering the temperature.

The water temperature, Odour, Taste, pH were analyzed immediately on the spot after the collection, Where as the analyses of remaining parameters were done in the laboratory. The study was carried for a period of four month (October 2023 to November 2023). The collected water samples were brought to the laboratory and relevant analysis was performed. pH was determined using pH meter, and similarly turbidity is measured by Turbidity meter. Alkalinity, Calcium, Magnesium, Total Hardness, Dissolved oxygen, Dissolved carbon dioxide was determined by method according to table.

Table – 1.1

S. No.	Water quality parameters	Description	Instrument/ method
1	Temperature	Temperature exerts a major influence on the biological activities and growth	Thermometer
2	Colour	The term colour is used to mean the true colour of water from which turbidity has been removed	Platinum cobalt (visual comparison) method
3	Odour	Odour is recognized as a quality factor affecting acceptability of drinking water.	Wide mouth glass stoppered bottle
4	Taste	Taste of water ranging from agreeable to disagreeable.	By Tasting
5	pH	The major of acidity (hydronium ion, H ⁺) in the water.	pH meter
6	Turbidity(NTU)	Turbidity in water is the reduction of transparency.	Turbidity meter
7	TDS	The measure of the amount of particulate solids that are in the water	TDS meter
8	Dissolved oxygen	The amount of oxygen available in the water.	Titrimetric method
9	Dissolved carbon Dioxide	The amount of carbon dioxide in the water.	Titrimetric method
10	Alkalinity	Alkalinity of water is its quantitative capacity to react with a strong acid to a designated pH.	Titrimetric method
11	Total hardness	Measurement of calcium and magnesium in water	Titrimetric method (complexometric)
12	Calcium	Measurement of Calcium amount in water	Titrimetric method
13	Magnesium	Measurement of Magnesium amount in water	Titrimetric method

Potable Water result**TABLE 3.1**

Sr. No.	Test	Processed Water Sample	Civil line Water Sample	City water Sample	Harduaganj Water sample
1	Temperature(°C)	29	28	28	30
2	Colour(Unit)	<1	<1	<1	<1
3	Odour	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste	Agreeable	Agreeable	Agreeable	Agreeable
5	pH	6.9	7.2	7.2	6.1
6	Turbidity(NTU)	0.2	0.1	0.1	0.6
7	TDS(ppm)	150	165	170	159
8	Dissolved oxygen(ppm)	6.1	6.2	6.2	6.3
9	Dissolved carbon dioxide(ppm)	38	36	36	40
10	Alkalinity(ppm)	8	9	9	10
11	Total hardness(ppm)	4	4.9	4.9	5.5
12	Calcium	6.2	7	7	8
13	Magnesium	2.2	3	3	3.5

Pond, canal and Lake Water result**TABLE 3.2**

Sr. No.	Test	Harduaganj Pond Water Sample	Quarsi lake Water Sample	Harduaganj canal sample	Quarsi canal water sample
1	Temperature(°C)	29	30	31	32
2	Colour(Unit)	<4	<3	<2.5	<2
3	Odour	Disagreeable	Disagreeable	Disagreeable	Disagreeable
4	Taste	Disagreeable	Disagreeable	Disagreeable	Disagreeable
5	pH	8.3	8.6	8.7	8.8
6	Turbidity(NTU)	8	9	11	10
7	TDS(ppm)	900	735	946	987
8	Dissolved oxygen(ppm)	5.7	5.9	4.4	5.0
9	Dissolved carbon dioxide(ppm)	6.9	7.0	6.6	6.1
10	Alkalinity(ppm)	170	150	168	164
11	Total hardness(ppm)	279	343	321	280
12	Calcium	73	72	68	67
13	Magnesium	32	15.2	7.8	8.2

4. Discussion

For Potable water, Dissolved carbon dioxide observed 36 to 40, Dissolved oxygen were found to be 6.1 and 6.3 respectively. Parameters like Temperature, Odour, Taste & Colour was agreeable of potable water.. In Harduaganj water, observed higher Turbidity than other area. The pH range of drinking water should far between 6.5 to 7.5 and water pH observed 6.1 to 7.2. So it complied with the acceptance criteria of pH range & it was found to be healthy

for human use.. The general ISI standard for Drinking water's Turbidity is <0.1 NTU. Turbidity >5 NTU is considered unhealthy. In Different area Turbidity of water the ranging from 0.1 NTU to 0.6 NTU. TDS of drinking water sample showed range below 300 ppm & it complied with Bureau of Indian standard(BIS) and WHO.

Minerals like Calcium, Magnesium are essential for body. Tests of these minerals were

performed on potable water sample. The results complied with the given range of Test for Minerals. Alkalinity & Total Hardness of potable water should less than or equal to 10 and 300 ppm respectively. Results were complied with the given limits of both tests. Habited water is generally used by animals & birds & aquatic life. The disturbance in this biological system & ecological system may affect health of animals & birds & aquatic life. The amount of Total dissolved solid recorded ranges from 745 ppm to 987 ppm of habitate. High value of suspended solid can lower the primary Productivity of system by covering the algae and Macrophytes, at times leading to almost their complete removal. Water Temperature may be depending on the season, geographic location and sampling time. More difficult for aquatic life to get sufficient oxygen due to water Temperature increases. Thermal pollution can cause shifts in the community structure of aquatic aquatic life. Some are naturally highly turbid but human activities have increased the levels of suspended solids in many habitats. The low oxygen level was recorded during summer mainly due to

removal of free oxygen through respiration by bacteria and other animals as well as the oxygen demand for decomposition of organic matter. DO is the single most important gas for most aquatic organism. If the amount of free oxygen go below then 2.0 mg/l for few day in the lake containing aquatic organism it would lead the killing of most of the biota in the aquatic system. Higher value of free carbon dioxide generally coincided with minimum dissolved oxygen. After physicochemical analysis we found that the sample of habited water is not free from pollution.

5. Conclusion

The result of Potable water and Habited water obtained during study were compared with Bureau of Indian standard (BIS) and WHO. Potable water is safe to be consumed by humans or used with low risk of immediate or long term harm while Habited water is not fit to animals & birds & aquatic life. After physicochemical analysis we found that the sample of Potable water and Habited water are not free from pollution.

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