

# **Physico – Chemical Studies of Sankey Tank Lake Water, Bangalore, India.**

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**ABSTRACT:** The physico-chemical properties of lake water (Sankey Tank) were studied and analysed. The study was based on the determination of the pH, alkalinity, TDS, Hardness, Mg<sup>2+</sup>, Ca<sup>2+</sup> ions etc. Their excessive presence in water affects the quality of water adversely for use. Many physico-chemical properties of lake water were found to have great variations from their prescribed limits. The study suggests that a careful monitoring of lake water by performing continuous analysis of the lake water on a regular basis may be very helpful to protect the water resources and keep the impurities under check. This will also create awareness among the people living near the lakes to save and keep clean the environment.

**KEYWORDS:** Sankey Tank, Total hardness, Alkalinity, TDS, Electrical Conductivity, Impurities.

## **I. INTRODUCTION**

Lakes are very useful for man-kind as it serves many purposes, such as fishing, water transport, irrigation, industrial water supplies, beautification etc. Lakes are highly valued for their recreational, aesthetic and scenic qualities, and the water they contain is one of the most treasured of our natural resources. Lakes constitute important habitats and food resources for a diverse array of fish, aquatic life, and wildlife. Preservation of our lakes for their beauty and recreational benefits, as well as for their value as habitats for fish and wildlife is of paramount importance hence it is highly essential to maintain its quality. Several authors have studied the effects of various parameters on the quality of the lake water [1-10] and have given useful suggestions. Present study is a step further towards this direction. In the present study the samples were collected before and after the onset of the monsoon to have a detailed picture of the impurities in the water.

## **II. MATERIALS AND METHODS**

Samples were collected before the monsoon and after the monsoon as per standard procedures. Sample-1(S<sub>1</sub>) before the monsoon and Sample-2 (S<sub>2</sub>) after the monsoon. The various Physico-chemical parameters were studied and the results obtained were compared with the WHO and ISI standards [11]. Chemicals employed for analysis were of AR grade and glass distilled water was used for the preparation of the reagents. pH and Electrical Conductivity were determined using Digital Systronics pH – meter and Systronics-Conductometer respectively. The water quality parameters studied were pH, Conductivity, Alkalinity, Total dissolved solids, Calcium ions, Magnesium ions, Total hardness, Temporary and Permanent hardness, etc. Temperature of the samples was noted at their sampling points. Standard methods were employed for the determination of the various parameters [12]. The WHO and ISI standards are listed in Table 1.

## **III. DETERMINATION OF WATER QUALITY PARAMETERS**

The parameters studied are compared with WHO and ISI standards. The conclusion was drawn after a careful and thorough comparison of the present data with the standard values. The determination of Total hardness, Temporary hardness, Permanent hardness, Alkalinity, Total dissolved solids, Calcium, Magnesium and Chloride ions etc were done using Standard methods.

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### IV. RESULTS AND DISCUSSION

The water quality of Sankey Tank lake water was studied. Sample  $S_1$  was collected before, and  $S_2$  after the monsoon. The results of these samples are tabulated in table 2 and are compared with the WHO and ISI Standards tabulated in table 1.

1. Temperature

Temperature is very important because it affects the chemical and biochemical reactions. Rise in temperature of water not only increases the rate of chemical reactions in water, but also decreases the solubility of gases in the water. The temperature of the water for both the samples  $S_1$  and  $S_2$  were in safe limits. Table- 2

2. pH

pH is defined as the negative logarithm of hydrogen activity in moles per litre. The pH of natural water is generally between 6 and 8. Variations in pH values are mainly due to hydrolysis of salts of strong bases and weak acids or vice versa. Dissolved gases such as carbon dioxide, Hydrogen sulphide, ammonia etc also affect the pH of the water. The pH of  $S_1$  and  $S_2$  were found well within the safe range hence not a matter of concern. Table2 Fig. 1

3. Alkalinity

Alkalinity is a measure of capacity of water or any solution to neutralize acids. Alkaline compounds in the water such as bicarbonates, carbonates and hydroxides remove  $H^+$  ions and increase the pH of the solution/water. Alkalinity in streams is influenced by rocks and soils, certain plant activities and also due to industrial waste water discharges. Both the sample  $S_1$  and  $S_2$  showed very high alkalinity which is quite alarming and should be taken care off on a routine basis. Table2 Fig. 1

4. Electrical Conductivity ( EC )

Conductivity of water is the measure of ability of water to conduct electrical current. Conductivity in water is affected by the presence of inorganic dissolved solids such as chloride, nitrate, sulphate and phosphate ions or sodium, magnesium, calcium, iron and aluminium ions , it is also affected by temperature. The Electrical Conductivity in both  $S_1$  and  $S_2$  were within the tolerance limits hence not alarming. Table2 Fig. 1

5. Total, Temporary and Permanent hardness

The dissolved salts of calcium and magnesium such as bicarbonates, chlorides and sulphates are responsible for causing the hardness in the water. Hardness was found to be quite high in both  $S_1$  and  $S_2$  samples according to the WHO standards but were within the tolerance limits according to the ISI standards. This suggested a regular monitoring of the hardness producing minerals to be kept under check so as not to loose foreign guests and tourists. Table2 Fig. 1

6.  $Ca^{2+}$  and  $Mg^{2+}$  ions

The presence of calcium and magnesium ions result into the hardness of water and its excess may lead to deposition of these minerals in the soft tissues of the living bodies. This deposition may result to cause various kinds of illnesses such as stone formation in gall bladder, irritation in digestive tract and even cancer. The presence of  $Ca^{2+}$  ions in  $S_1$  were found to be in the safe limits, but in  $S_2$  towards the higher side. Similarly  $Mg^{2+}$  ions were found to be within the safe limits according to WHO standards in both the samples but high according to ISI standards, especially  $S_2$  was found to be extremely high and  $S_1$  was also reported to be slightly higher than the ISI tolerance limits which is a matter of concern. Table2 Fig. 1

7. Total Dissolved Solids (TDS)

The sum of all the chemical ions dissolved in the water is called total dissolved solids i.e carbonates, bicarbonates, sulphates, chlorides, nitrates, phosphates, iron, calcium, magnesium, sodium etc. It is due to the

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dissolution of rocks, soil, gypsum etc. The amount of TDS was well within the permissible range of the said standards in both the samples, S<sub>1</sub> and S<sub>2</sub>. Table2 Fig. 1

TABLE 1.  
Water Quality Parameters and Their WHO & ISI Standards.

SL.No	Parameters	Method	WHO Standards	ISI Standards
1	Temp.	Thermometric	-----	-----
2	pH	pH metery	7.0 – 8.0	6.5 – 8.5
3	Electrical Conductivity	Conductometry	1400	-----
4	Total Dissolved Solid	Filtration Method	1000	500
5	Total Hardness	EDTA titration	100	300
6	Temporary hardness	EDTA titration	-----	-----
7	Permanent hardness	EDTA titration	-----	-----
8	Calcium	EDTA titration	75	75
9	Magnesium	EDTA titration	150	30
10	TA	Titration Method	120	200

TABLE 2.  
Water Quality Parameters of Sankey Tank lake

SL.No	Parameters	Method	Sankey Tank lake	
			S <sub>1</sub>	S <sub>2</sub>
1	Colour	-	Pale green with turbidity	Pale green with turbidity
2	Temp.	Thermometric	24 <sup>0</sup> C	24.5 <sup>0</sup> C
3	pH	pH metery	7.37	7.28
4	Electrical Conductivity(µs/cm)	Conductometry	430	390
5	Total Dissolved Solid(mg/L)	Filtration Method	98	276

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6	Total Hardness (mg/L)	EDTA titration	95	190
7	Temporary hardness(mg/L)	EDTA titration	37	30
8	Permanent hardness(mg/L)	EDTA titration	58	160
9	Calcium(mg/L)	EDTA titration	50	67
10	Magnesium(mg/L)	EDTA titration	45	123
11	Alkalinity (mg/L)	Titration Method	180	207

S<sub>1</sub> and S<sub>2</sub> are samples collected from Sankey Tank Lake water

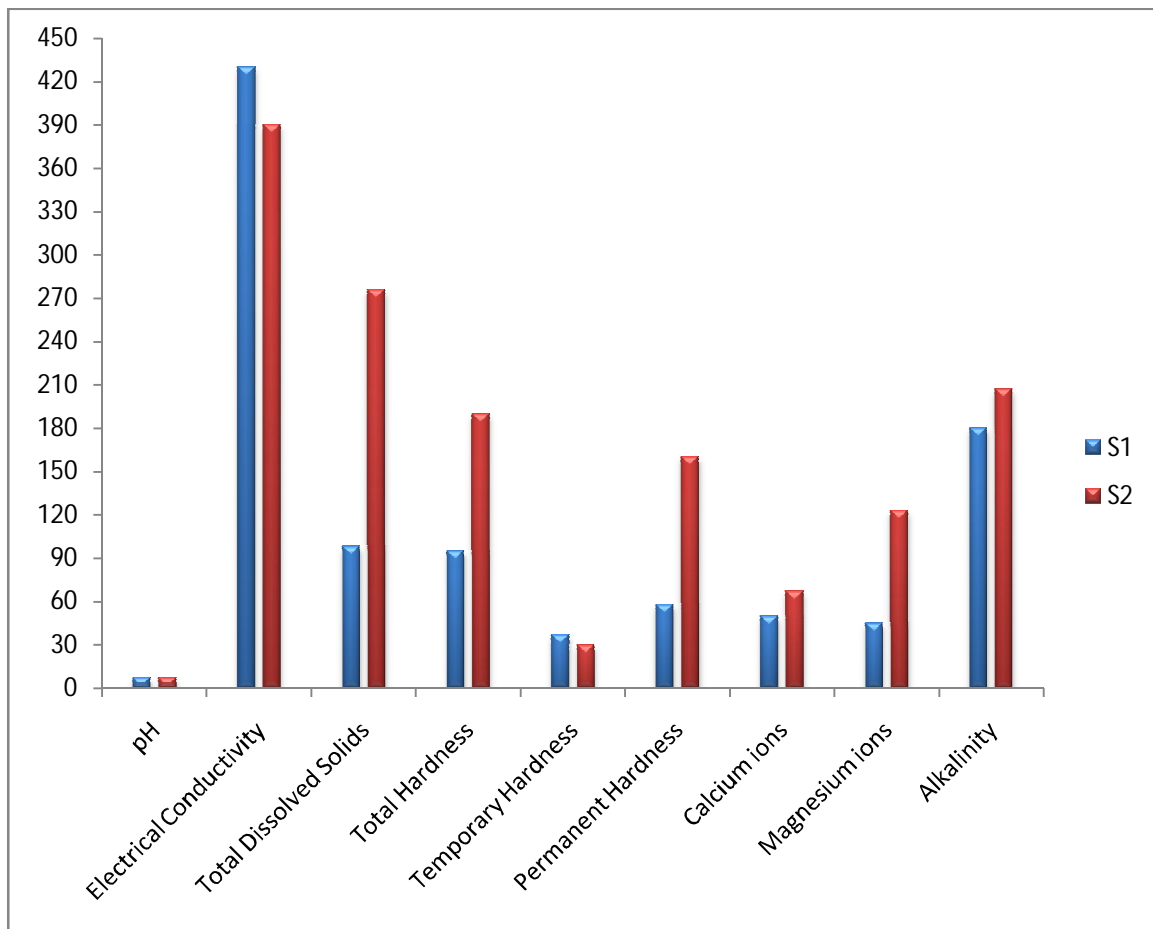


Fig 1 Graphical representation of various parameters for S<sub>1</sub> and S<sub>2</sub>

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### V. CONCLUSION

The present study suggests that many parameters are though within the permissible limits but some are to be addressed immediately as if they get worsen the life of many aquatic animals will be at stake, also it will lead to eutrophication. The increase in Mg content can be a result of the faecal matter and droppings of the migratory birds which can only be kept under check by its regular cleaning. Though the lake water at present is not used for drinking and irrigation purposes but as a matter of fact one should always be prepared for the crisis especially if the source is there, the only thing required is to maintain its cleanliness and monitor it properly.

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