



STUDY OF PHYSICOCHEMICAL PARAMETERS OF WATER SAMPLES FROM LAKE NEAR RATAN POWER, AMRAVATI TAHSIL, MAHARASHTRA

¹P. R. Yawale, ²N. R. Thakare, ³P. P. Chaudhary

G. S. Tompe Arts, Commerce and Science College Chandur Bazar, Dist. Amravati. Maharashtra.

Shri Shivaji Science College, Amravati, Amravati, Maharashtra.

Abstract :

Water is one of the most important resource in the nature. Maximum part of the earth is covered by the water, but only the small part of it is suitable for use. Usable water divided in to ground water and surface water. Sources of ground water are dam, lake, revere, bandhara, and ground water sources are hand pump, bore-well, Well. All above sources of water must be monitored regularly to determined whether they are in sound health or not and quality of their water must be checked before use.

Present water samples were collected from Wagholi lake and its surrounding area from Amravati tahsil, Amravati, State Maharashtra. Lake is located just to the Thermal power plant of Nandgaon peth MIDC. Water samples were collected from lake, well, Hand pump, bore-well and water tank. To evaluate the quality of water parameters like pH, EC, TDS, TH, TA, Cl⁻, CO₃²⁻, NO₃³⁻, SO₄²⁻, Na⁺, K⁺ and Ca²⁺ were considered.

Introduction

Water is the for most important object on the earth and Physicochemical parameter study of water means the study of physical and chemical properties of water. Those properties includes physical properties like state, color, odour, smell, taste, hardness, electrical conductivity, B. P., M. P., Density etc. And chemical properties includes pH, TDS, TA, Cl⁻, CO₃²⁻, NO₃³⁻, SO₄²⁻, Na⁺, K⁺, Ca²⁺, etc. Change in Physicochemical properties of water result into the change in quality of water thats why study of those properties are very important^[1,2,3]. While studying the physicochemical properties World Health Organisation (WHO), United States Public Drinking water Standard (USPH) and Indian Council of Medical Research (ICMR) have sets some standards^[4,5,6]. Results were compared with standards values.

Study Area

Present water samples were collected from Wagholi lake and its surrounding area from Amravati tahsil, Amravati, State Maharashtra. It is located at latitude -21.07473, Longitude - 77.88307 having area of about 60 acres. Wagholi lake is near about 21 KM towards North - East from Amravati District. Lake helps near about 500 acres of land for irrigation, fisheries and for domestic activities. Area is known for the Orange, Cotton, Soya-bean Farming.

Materials and Method

Samples were collected in the first week of April 2022 in a post monsoon season. Samples were collected Wagholi lake and its surrounding area. Sources of samples were lake, well, Hand pump, bore-well and water tank. One litre of sample from each location was taken and sufficient care was taken while collecting the samples. Lake and Well samples collected near about 15-20 cm below the surface water. The Physicochemical parameters were analyse by using standard procedures. All the chemicals used were AR grade quality. Double distilled water was used for the preparation of all the reagents and solutions. Glass wares were cleaned with commercial HCl followed by distilled water.

Table 1

Methods used for estimation of various parameters

S. No.	Parameters	Method
1	pH	pH Metrically
2	Electrical Conductivity (EC)	Conductometrically
3	Total Alkalinity (TA)	Titration Method
4	Calcium (Ca ²⁺)	Titration Method
5	Total Dissolved Solid (TDS)	TDS = 1.56 * E. C. * 10 ⁶
6	Total Hardness (TH)	Titration Method
7	Carbonate (CO ₃ ²⁻)	Calculation from pH and alkalinity
8	Sulphate (SO ₄ ²⁻)	Spectrophotometrically
9	Nitrate (NO ₃ ⁻)	Spectrophotometrically

Result and Discussion :

S.No.	1	2	3	4	5	6	7	Permissi ble Limit	Maxi mum limit
Locati on	NEAR PERIF ERI OF SOFI YA PLAN T	NEAR WAGOLI	TAKA PUR	-	WAGHO LI	LAKE SAMP LE	-	-	-
Source	DW	DW	DW	TANK WATE R	HP	LAKE SAMP LE	BW	-	-
Latitud e	-	21.072103 3	21.072 439	21.077 08	21.07701	17.536	21.08092 666	-	-
Longit ude	-	77.890135	77.870 4849	77.893 836	77.83371 33	73.045 88	77.88671 166	-	-
pH	7.2	7.4	7.3	7.2	7.1	7.4	7.2	6.5 to 8.5	9.2
EC (μ S)	1276.9 2	901.5384	972.30 76	1030.7 692	360.75	832.30 76	550.8196	250	2000
TA (ppm)	268	192	350	300	248	200	196	200	600

Ca ²⁺ (mg/l)	28.8	22.4	20.8	24	11.2	8	6.4	75	200
TDS (mg/l)	813	586	632	670	555	541	336	500	2000
TH (ppm)	472	196	208	212	200	312	96	200	600
CO ₃ ²⁻	40	---	326	268	---	---	---	30	400
SO ₄ ²⁻ (mg/l)	21	14	18	15	10	16	8	200	400
NO ₃ ⁻ (mg/l)	28	25	20	24	18	22	18	45	150

DW - Dug Well, HP - Hand Pump, BW - Bore Well

pH: - pH is important and frequently used for the test in water chemistry i.e. water supply and waste water treatment i.e. acid base neutralization, water softening, precipitation, coagulation, disinfection, Corrosion control. values are ranges from 7.1-7.4. All pH values are within a Permissible limit.

Electrical Conductivity (EC): - Electrical conductivity is measure of water capacity to convey electric current. Conductivity of water is directly proportional to the dissolved mineral Matter. Conductivity shows significant correlation with ten parameters such as pH value, chemical oxygen demand, alkalinity, total hardness, temperature, calcium, total solids, total dissolved solids, chloride and iron concentration of water. EC Values ranges from 360.75 - 1276.92. All Values are greater than Permissible limit.

Total Alkalinity (TA): - Alkalinity is primarily due to carbonate (CO₃²⁻) and bicarbonate; it acts as a stabilizer for pH. Alkalinity, pH and hardness affect the toxicity of many substances in the water. It is determined by simple dilute HCl titration in presence of phenolphthalein and methyl orange indicators. TA values ranges from 192-350. Values of 21.0721033-77.890135, 17.536-73.04588, 21.08092666-77.88671166 location are within the permissible limits while all others are above the permissible limits.

Calcium (Ca²⁺): - Calcium is responsible for the hardness of water. Calcium can be reduced by chemical softning treatment, revers osmosis, electro-dialysis and ion exchange processes. Present samples shows Calcium between the range 6.4-28.8. All values are below the permissible limit.

Total Dissolved Solid (TDS): - The presence of dissolved solids in water may affect its taste. The palatability of drinking water has been determined from the TDS levels. Water with extremely low concentrations of TDS may also be unacceptable because of its flat, insipid taste. TDS 336-813, Values are above the permissible limit.

Total Hardness (TH): - Total hardness of water is caused by the presence of Calcium and, Magnesium salts. Hardness has no known adverse effect on health. TH values are ranges from 96-472. Maximum values are above the permissible limit^[7].

Carbonate (CO₃²⁻): - Calcium and Magnesium ions mainly forms the carbonates, carbonates are responsible for the increase of alkalinity of water I. e. increase of pH in summer days, thats mainly due to decrease of calcium and magnesium level than the sodium. Carbonate values in present samples were above the permissible values.

Sulphate (SO₄²⁻): - Sulphates are toxic in nature. The number of studies conducted to determine the toxicity of sulphate. Excess intake of Sulphate containing water could pron to diarrhoea. The presence of sulphate has less effect on the taste of water compared to the presence of chloride.

Values ate ranges from 8-21. which are very much lower than the permissible level^[8].

Nitrate (NO_3^-): -Nitrate in water is due to domestic activities and agricultural runoff which dissolved in rain water leaches into the wells. The concentration of different forms of Nitrogen gives a useful indications of the level of micronutrients in water and hence their ability to support for plant growth. Values are ranges from 18-28. All values are below the permissible limit^[9].

References

1. Birgit C. Gordalla, Margit B. Müller and Fritz H. Frimmel, Physicochemical properties of water and their relevance for life, *Online: www.klima-warnsignale.uni-hamburg.de*.
2. Umesh Chaudhary, Sunil Kondulkar, Atul Wanjari, Nitin Wanjari, Analysis of water quality using physicochemical parameters from various dams of amravati district, maharashtra, india, international journal of scientific engineering and applied science(IJSEAS,8(2), August-2016.
3. Basavaraji Simpi, S. M. Hiremath, KNS Murthy, K. N. Chandrashekarappa, Anil N Patel T. Puttiah, Analysis of water quality using physicochemical parameters Hoshali tank in shimoga district, Karnataka, India, Global journal of Science frontier research, 3(11), version 1.0, May-2011.
4. Guidelines for Drinking - Water Quality, Fourth Edition.
5. Central Pollution Control Board (CPCB, 1995). Pollution control, acts, rules a modification issued thereunder, PCLS/02/2021-2022, New Delhi.
6. Indian Standard, DRINKING WATER- SPECIFICATION, Second Revision, IS 10500 : 2012.
7. U. E. Chaudhary, Physico-Chemical parameters Assesment of dam water in different sites of warud region, *Rasayan J. Chem.*, 2(7), 156-160, April-June-2014.
8. S. D. Jadhav and M. S. Jadhav, "Analysis of water quality using physico-chemical parameters of Krishna River at Karad, Dist -Satara, (Maharashtra)," *International Research Journal of Advanced Engineering and Science*, 1(3), 125-126, 2018.
9. S.D. Jadhav1 , M.S. Jadhav, Analysis of some Physico-Chemical Parameters of Mula- Mutha River at pune, (Maharashtra), A Case Study, *International Journal of Research in Advent Technology*, 2(5), February-2017.

