ESTIMATION OF PHYSICO CHEMICAL PARAMETERS WITH T- TEST FROM FARM LAKE, NANDED REGION MAHARASHTRA.

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ABSTRACT

In present investigation water samples were taken at regular monthly interval from Jan 2013 to Dec 2013 from site for analysis of physic-chemical parameters such as Temperature, Ph, Transparency, Total alkalinity, Dissolve Oxygen (DO), Free Carbon dioxide (CO2), Chloride, Hardness, Calcium, Magnesium. Average air temperature was 27.7°c and water temperature was 25.4 °c. Hydrogen ion concentration was ranged from 7.7 to 8.0. Average transparency was found (286.7cm). Average free CO_2 was (4.8 mg/L). Average dissolved oxygen content was (7.9 mg/L) in 2013. Average chloride content was (74.7 mg/L). Average value of hardness was (117.2 mg/L) Average calcium content was (40.8 mg/L). Average magnesium content was (3.6 mg/L).

Key words- farm lake, physic-chemical parameters, seasonal variations, T- test.

INTRODUCTION

Water quality analysis is one of the most important aspects in water studies and also very important for understanding the seasonal changes in aquatic ecosystem. Such result explains the favorable and unfavorable changes in aquatic ecosystem. The use of Fresh water for stocking of aquatic animals, domestic & drinking, Irrigation porpoise **(Sikoki FD & Veen F. 2004).** Physico-chemical characteristics of the aquatic environment directly affect on physical, chemical and nutrient constituents of aquatic environment.

MATERIAL & METHODS

Nanded is one of the district of Maharashtra state and situated in between 19° 38' & 29" N latitude and 77° 09' & 51" E longitude. Study area a is a farm lake located in between latitude 19° 06' & 41" N and longitude 77° 19' & 27" E and dimensions is about 29 x 14.5 x 58 m and lined by 500 micron plastic sheet and it is on the Nanded Osmannagar road, near CIDCO. Water of Farm Lake is used for drinking, agriculture and domestic porpoise.

A. Water Quality Parameters

Water is the most important resource for all kinds of life on this planet. This source is adversely affected by human activities**. (Trivedy & Goel, 1986).** During the study Physico Chemical characteristics of water such as Temperature, pH, Transparency, Total alkalinity, Dissolve Oxygen (DO), free Carbon dioxide (CO2), Chloride, Hardness, Calcium, Magnesium, and Productivity were analyzed by using slandered methods as suggested by **. Trivedy & Goel, (1986) and APHA (2000).**

Study area at Nanded Osmannagar road, near CIDCO, Nanded

a. **Temperature**

Water and air temperature was measured by using Celsius Thermometer (from 0°C - 50°C). Air temperature directly shows the reading and for water temperature bulb of thermometer was dipped in water till final reading obtained.

b. **pH**

pH was measured by using pocket pH meter (HANNA). pH meter is dipped in to the water till final reading obtained.

c. **Transparency (Light Penetration)**

Light penetration studied by immersing sacchi disc in water. Sacchi disc is a circular metal disc of 20 cm in diameter, painted alternately black and white in radial fashion. Disc immersed in water by using marked string. After taking measurement light penetration is calculated by using following formula.

Sacchi disc light penetration = $\dfrac{A + B}{2}$

Where, A = depth in cm at which Sacchi disc disappears.

B = depth in cm at which Sacchi disc reappears.

d. **Total Alkalinity**

Total alkalinity is the measure of capacity of water to neutralize a strong acid. Alkalinity in the water is generally imparted by salt of carbonates, bicarbonates, phosphates, nitrates, borates, silicates, etc. together with hydroxyl ions in free state, However most of the waters are rich in carbonates, bicarbonates, with little concentration of other alkalinity imparting ions. Total alkalinity was determined by using 0.1N Hydrochloric acid and Methyl orange and phenolphthalein as indicators as (**Trivedy and Goel, 1986).** Total alkalinity is calculated by using formula such as

TA (mg/ L) = $\dfrac{(\,B \times \text{ Normality }) \text{ of } HCL \times 1000 \times 50}{\text{ml of sample taken}}$ **mg**

e. **FREE CARBON DIOXIDE (CO$_2$)**

Free CO$_2$ is determined by titrating the sample using a strong alkali (such as carbonate free NaOH) at pH 8.3. At this pH all the free CO$_2$ converted in to Bicarbonates. Free CO$_2$ was determines by using 0.05N Sodium hydroxide and Phenolphthalein as an indicator and calculated by using formula (**Trivedy and Goel, 1986).**

Free CO2 mg/ L = $\dfrac{(\,ml \times N\,) \text{ of } NaOH \times 1000 \times 44}{\text{ml of sample}}$

f. **DISSOLVE OXYGEN (DO)**

The manganous sulphate reacts with the alkali (KOH or NaOH) to form a white precipitate of manganous hydroxide in presence of oxygen. It is oxidiesed to a brown colored compound. In the strong acid medium magnesium ions are reduced by iodide ions and get converted into iodine.

Equivalent to the original concentration of oxygen in the sample. The iodine can be titrated against sodium thiosulphate using starch as an indicator. DO was estimated by Winkler's method (**Trivedy and Goel, 1986)** and calculated by using formula such as.

DO (mg/ L) = $\dfrac{(\text{ml} \times \text{N}) \text{ of titrant} \times 8 \times 1000}{V_2 \left(\dfrac{V_1 - V}{V_1} \right)}$

Where, V1 = Volume of sample bottle after placing the stopper.

V2 = Volume of the part of the contents titrated.

V = Volume of MnSO4 and KI added.

g. CHLORIDES

Chlorides occur naturally in all types of waters. In natural fresh waters however its concentration remains quite low and is generally less than that of sulphate and bicarbonates. The most important source of chloride in the water is the discharge of domestic sewage. Chloride concentration serves as an indicator of pollution. It is harmless up to 1500 mg/ L concentration but produces a salty taste at 250-500 mg / L level **(Trivedy and Goel, 1986).** Chloride estimated by treating 0.02N Silver nitrate, with potassium chromate solution. and Calculated by using the formula such as.

Chloride (mg/ L) = $\dfrac{(\text{ml} \times \text{N}) \text{ of AgNO}_3 \times 1000 \times 35.5}{\text{ml of sample}}$

h. HARDNESS

Hardness is the property of water which prevents the lather formation with soap and increases the boiling point of water. Principal actions imparting hardness are calcium and magnesium. However other such as strontium, iron and magnesium also contribute to the hardness. The anions responsible for hardness are mainly bicarbonates, carbonates, sulphates, chlorides, nitrate and silicates, etc. the hard water is also not suitable for domestic use in washing, cleaning, and laundering. The hardness may be advantageous in certain conditions. Hardness is estimated by EDTA method and calculated by using the formula. **(Trivedy and Goel, 1986).**

Hardness (mg/ L) = $\dfrac{\text{ml of EDTA used} \times 1000}{\text{ml of sample taken}}$

i. CALCIUM

Calcium is one of the most abundant substances of the natural waters. It present in high quantities in rocks. It is leached from there to contaminate water. The quantities of calcium in natural waters varies from 10 mg / L to 100 mg/ L depending upon the types of the rocks. Disposal sewage, Industrial waste is an important source of calcium. Concentration of calcium is reduced at higher pH due to its precipitation as $CaCO_3$. Calcium is the one of the important nutrients required by the organism and is estimated by EDTA method **(Trivedy and Goel, 1986)** by using and calculated by formula such as.

Calcium (mg/ L) = $\dfrac{x \; X \; 400.8}{ml \; of \; sample \; taken}$

Where, x = Volume of EDTA used.

j. MAGNESIUM

Magnesium also occurs in all kinds of natural waters with calcium but its concentrations remain generally lower than the calcium. Principal sources in natural water are various kinds of rocks. Sewage and industrial waste is an important contributor of magnesium. Like calcium, the concentration of magnesium also depends upon exchange equilibria and presence of ions like sodium. Concentration as high as 500 mg/ L impart an unpleasant taste to the water. Magnesium is calculated by using following formula

Magnesium (mg/ L) = $\dfrac{y - x \; X \; 400.8}{Vol. of \; sample \; X \; 1.645}$

Where, y = EDTA used in hardness determination.

x = **EDTA used in calcium determination for same volume of the sample.**

Statistical Analysis

T- Test was used to test the significant difference monthly; It was carried out with the help of **MINITAD** software.

RESUT AND DISCUSSION

1. TEMPERATURE

The maximum air temperature was found in May (35°c) and minimum in December (22°c). Maximum water temperature was found in May (32°c) and minimum in December (19°c). Range of variation of air temperature is 13°c and water temperature is 13°c. Average air temperature was 27.7°c and water temperature was 25.4 °c in the year 2013. (Table No. 1.1).

T-test for Air Temperature

T-test for Air Temperature showed that the average air temperatures are same in the year Jan to Dec 2013 ((Table No. 1.2).

T-test for water Temperature

T-test for Air Temperature showed the average water temperatures are same in the year Jan to Dec 2013. (Table No. 1.2).

2. HIGHEST HYDROGEN ION CONCENTRATION

Highest hydrogen ion concentration was observed in March (8.0) and lowest in January (7.7). Range of variation was 0.3 in the year Jan 2013- Dec2013. (Table No. 1.1)

T-test for hydrogen ion concentration

The average hydrogen ion concentrations are found same throughout the year Jan to Dec 2013 (Table No. 1.2).

3. WATER TRANSPARENCY

Water transparency was maximum in January (430 cm) and minimum in June (200 cm). Average transparency was found (286.7cm) during the year 2013. (Table No 1.1)

T-test for transparency

The average transparencies are same throughout the year January 2013 to December 2013 (Table No 1.2).

4. TOTAL ALKALINITY

Alkalinity was maximum in May (316 mg/L) and minimum in November & December (32 mg/L). Average alkalinity was (139.7 mg/L) (Table No. 1.1)

T-test for total alkalinity

T-test for total alkalinity showed the average alkalinity is same throughout the year 2013. (Table No. 1.2)

5. FREE CARBONDIOXIED

Free CO_2 was maximum in May (7.0 mg/L) and minimum in December (3.0 mg/L) average free CO_2 was (4.8 mg/L) in the year 2013. (Table No. 1.1)

T-test for free carbondioxied

T-test for free carbondioxied showed the average Free CO_2 is not same throughout the year 2013. (Table No. 1.2).

6. DISSOLVED OXYGEN

Dissolved oxygen content was maximum in December (10.19 mg/L) and minimum in May (5.67 mg/L). Average dissolved oxygen content was (7.9 mg/L) in 2013. (Table No. 1.1).

T-test for Dissolved oxygen

T-test for Dissolved oxygen showed the average dissolved oxygen content is same throughout the study period. (Table No. 1.2).

7. CHLORIDE

Chloride content was maximum in May (106.5 mg/L) and minimum in December (55.22 mg/L). Average chloride content was (74.7 mg/L) during the year 2013. (Table No. 1.1)

T-test for chloride

T-test for chloride showed the average chloride content is same throughout the study period. (Table No. 1.2).

8. HARDNESS

Hardness was maximum in March (154 mg/L) and minimum in December (64 mg/L). Average value was (117.2 mg/L) during the study from January 2013 to December 2013. (Table No. 1.1)

T-test for Hardness

T-test for Hardness showed the average Hardness is same throughout the study period (Table No. 1.2).

9. CALCIUM

Calcium was maximum in March (60.1 mg/L) and minimum in December (24.0 mg/L). Average calcium content was (40.8 mg/L) from January 2013 to December 2013. (Table No. 1.1)

T-test for Calcium

T-test for Calcium showed the average Calcium is same throughout the study period (Table No. 1.2).

10. MAGNESIUM

Magnesium was maximum in July (9.74 mg/L) and minimum in April (0.48 mg/L). Average magnesium content was (3.6 mg/L) during January 2013 to December 2013. (Table No. 1.1)

T-test for Magnesium

T -test for Magnesium showed the average Magnesium is not same throughout the study period (Table No. 1.2).

Table No. 1.1- show month wise variation in water parameters from Jan- Dec 2013 from Farm lake.

Water parameters	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Air Temperature °c	24	26	28	30	35	32	30	28	27	26	25	22
Water Temperature °c	20	24	25	26	32	30	28	27	26	25	22	19
pH	7.7	7.8	8.0	7.9	7.9	7.9	7.9	7.9	7.8	7.8	7.8	7.8
Transparency (cm)	430	311	280	250	230	200	215	225	280	335	340	345
Alkalinity mg/L	40	55	265	278	316	215	176.5	115	75	60	50	32
Free CO2 (mg/L)	3.2	3.5	6.5	6.8	7.0	5.9	5.8	4.8	4.5	3.5	3.4	3.0
DO (mg/L)	9.90	9.0	6.6	6.0	5.67	6.08	7.90	8.10	8.10	8.50	9.58	10.19
Chloride (mg/L)	56.12	60.2	92.3	99.4	106.5	85.2	75.04	70.00	71.24	65.22	60.2	55.22
hardness (mg/L)	86	108	154	146	142	138	134	130	116	88	70	64
calcium (mg/L)	32.06	41.68	60.1	57.7	52.9	41.68	39.2	37.67	35.27	33.6	25.6	24.0
magnesium content (mg/L)	1.46	0.97	0.97	0.48	2.43	8.28	9.74	8.77	6.82	0.97	1.46	0.97

Table No. 1.2 - shows T- Test for water parameters at Farm lake from Jan- Dec 2013..

WATER PARAMETERS	N	MEAN	St Dev	SE Mean
Air Temperature °c	12	27.75	3.60	1.0
Water temperature °c	12	25.33	3.80	1.1
pH	12	7.8500	0.0798	0.023
Transparency (cm)	12	286.8	68.0	20
Alkalinity mg/L	12	140	105	30
Free carbondioxied (mg/L)	12	4.83	1.51	0.44
Dissolve oxygen content (mg/L)	12	7.97	1.57	0.45
Chloride content (mg/L)	12	74.7	17.3	5.0
hardness (mg/L)	12	114.7	31.0	8.9
calcium (mg/L)	12	40.1	11.6	3.4
magnesium content (mg/L)	12	3.61	3.63	1.0

N-total number, St Dev- standard deviations, SE Mean- sample estimated mean.

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