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POTENTIA HYDROGENI OF POND WATER, BISAR POND, GAYA

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Key words : Potentia Hydrogeni, Phytoplankton, Physio-chemical

Potentia hydrogen! (pH) is one of the chief physicochemical parameters of pond water, which has been observed round the year 2017 in Bisar Pond, Gaya. It has been observed that a pH range of 8.03 to 8.63, which is alkaline range, is indicative of fairly good medium for growth of phytoplanktons. The pH remained in limit throughout the period of investigation and no trend towards acidity has been observed.

INTRODUCTION

Potentia hydrogeni(pH) is the measure of intensity of acidity or alkalinity as well as concentration of hydrogen ions. In the present investigation this has been observed in the pond water of Bisar Pond, New Area, Gaya during the year 2017

MATERIAL & METHODS

The principal material is Bisar Pond, New Area, Gaya, pH of the water was calculated by pH Meter(Systronics) following the instruction written in its operation manual. In this context, the alkalinity which is acid neutralizing capacity of water has been estimated by titrimetric method using mixed indicator i.e. Phenolphthelein & methyl orange. Other chemicals are sodium carbonate, 0.1 N ($Na_2CO_{3)}$ and Hydrogen chloride, 0.1N (HCL).

Calculation has been done as per the method given below,(ALPHA,1989):

$$\text{P.A as } CaCO_3, mgl^{-1} = \frac{\text{Ax Normalcy of HCL} \times 1000 \times 50}{\text{ml. of sample}}$$

$$\text{T.A. as } CaCO_3, mgl^{-1} = \frac{\text{B} \times \text{Normalcy of HCL} \times 1000 \times 50}{\text{ml. of sample}}$$

Where, A = ml of HCL used with phenolphthelein

B = ml of HCL, used with Phenolphthelein & methyl orange

PA = Phenolphthelein Alkalinity

TA = Total Alkalinity

OBSERVATION

	Jan	Feb	Mar	Apr	May	Jun	Jul	Agu	Sep	Oct	Nov	Dec	Avg
pH	8.18	8.23	8.63	8.18	8.63	8.03	8.03	8.03	8.08	8.1	8.2	8.2	8.21
Alkalinity (mg)	139	129	133	134	141	140	128	140	133	133	137	139	135

RESULT AND DISCUSSION

pH of pond water was found to be alkaline, overall a minimum pH of 8.03 was observed in July and August, while maximum was 8.63 in March and May with an average of 8.21= 0.73.

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Hydrogen ion concentration (pH) expresses the intensity of an acid/ alkali depending upon its dissociation as well as the total amount that is present. This does not fall smoothly as contamination proceeds; this may either drop or rise erratically, depending on various other factors including carbon dioxide concentration and presence of other solutes, both inorganic and organic.The alteration of pH of water is accompanied by change in other physicochemical aspects of the medium. Edmondson(1959) pointed out that certain sessile Rotatoria are very likely excluded from lake by high bicarbonate concentrations, but not necessarily by high pH. Husainy(1967) and Verma and Shukla(1970) believed that pH would prove to be an ecological factor of major importance in controlling the activities and distribution of aquatic flora and fauna. Some workers (Mehra, 1986; Sreenivasan; 1968a, b Rai and Dutta Munshi,1979) suggested that pH of the environment has little or no importance. Similar findings have been reported by Islam(1989). The present investigation is suggestive of that the effect of pH is not very significant with reference to other physico-chemical as well as biological features, rather it is limited and variable.

Alkalinity (mg. :L^{-1}) was recorded as 128 during July as lower value and 141 as higher value in May with an annual average of 135 ± 1.69.

Alkaline water has high buffering capacity. It has been observed that the utilization of bicabonates and dissolved cabondioxide from the bicarbonate/carbonate buffer system resulted in rise in pH value. Lakshminarayan (1965 a, b) has pointed out that bicarbonate utilization in river Ganges was also evident by the increase of pH values. Similar observation were also made by Prowse and Tailing (1958); Osterlind, (1947) and Kratz and Myers (1955), pH fluctuations due to bicarbonates/carbonate utilization has been emphasized by Hutchinson (1932) and Singh and Mahajan (1987). It has also been recorded that a maxima of pH was in summer months and minima in winters with slight advancement in monsoon months. Similar trends have been reported by Vijayaranghvan (1971). 0n site wise analysis a comparatively low pH state was observed, where human activities were low; this is in agreement with Zutshi and Vass (1973) and Singh (1986). These changes in carbondioxide and hardness also tend to change the pH of the water. The pH rises as the algae increase their photosynthetic activity during day light hours. The pH then decreases at night when the algae are not carrying on photosynthesis but are releasing carbondioxide in respiration (Palmer,1980). Alkalinity of water, as usually interpreted, refers to the quantity and kinds of compounds present which collectively shift the pH to the alkaline side of neutrality. The property of alkalinit is usually imparted by their presence of bicabonates, carbonates and hydroxides and less frequently in inland waters by borate, silicate and phosphates (Wetzel, 19383).

The $CO_2 – HCO_3CO_3$ equilibrium system is the major buffering mechanism in fresh water. Alkalinity over 150 mg L^{-1} has been found to be conducive to higher production (Ball, 1949). In the present observation the annual average of alkalinity (mg L^{-1}) was 136.14 ± 1.69, which reflects the good productive nature of water boyd. Moyle (1949) and Soresen (1948) have classified water bodies into nutrient status based on alkalinity levels according to which Bisar Poind was also containing hard water, as per classification of Moyle (1949) and confirmation of Yadav et al. (1987). Rise in total alkalinity in warmer months (141.98 in May & June) may be accounted for the depletion in water level (Sana and Choudhary, 1985 and Dudani *et al.,*1986). Carbondioxide is essential for Photosynthesis. A direct correlation between free CO and bicarbonate alkalinity has been reported by Mandal and Hakim (1975) in a fresh water pond at Bhagalpur. Similar observations have also been made by Atkins (1926), Pearsal (1930), Howland (1931), Pringsheium (1946), Zafar (1964), However, Singh (1960) claimed that the high alkanility of sheets of water in Uttar Pradesh does not seem to be affected by oxygen or carbondioxide. The present study showed a fall in the amount of total alkalinity during monsoon months as compared to the summer months especially in June, when the highest value was observed, the same can be attributed to heavy monsoon showers which result in dilution of water. These observations are also in accordance with the results obtained by Chakrabarty *et al.* (1959), Micdhael (1969) and Marshall and Falconer (1973) where they have also recorded a change in the levels of total alkalinity in rainy season.

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