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Pre-Treatment Testing & Analysis of Sub Tropical Climate Zone River Water

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Abstract: ***Water used for processing fish, washing fish or making ice is supposed to meet drinking water standards if it is to be considered safe. Reason: contaminated water is the main cause for pathogen-loading of fish, posing a serious health hazard to its consumer. This paper presents various engineering test carried out before construction of water treatment plant of sub-tropical climate zone in India. The present research work approaches to present a comparative analysis of water quality measures & IS 10500:2012 standards before and after treatment phases at "Ugaikhera water treatment plant, India". Before filtration or treatment of the raw water sourced from "Pahuj River-M.P.", various quality monitoring standards were analyzed and recorded as, PH of the river water - 7.4 (average value) Alkalinity- 7; Hardness- 146 mg / lit; Dissolved oxygen - 4.6; PH of solid waste - 7.13; Organic carbon - 18.47; Nitrogen at 10 days was 1.03 and 0.33 after 30 days.***
Keywords: subtropical climate zone water treatment plant, water quality monitoring, IS10500:2012.

I. INTRODUCTION

Every organism we know of needs water to survive. In fact, without water, life on Earth would have never begun. Acting as a medium in which organic compounds could mix with one another, water facilitated the formation of the planet's first life forms, possibly even protecting them from the sun's radiation. Qualitative and quantitative measurements are needed from time to time to constantly monitor the quality of water from the various sources of supply. The harbour-master should then ensure appropriate water treatment within the fishery harbour complex as well as initiate remedial measures with the suppliers when water supply from outside is polluted.

II. WATER SAMPLING

Generally the water sampling may be divide as :

A. Water tanks and reservoirs
B. Municipal mains
C. Borewells
D. Harbour basin water

Water sampling and analysis should be done by ISO-certified laboratories. Wherever laboratories available locally are not ISO-certified, it is advisable to get their quality assessed by an ISO-certified laboratory by carrying out collaborative tests to ensure that variation in the accuracy of results is sufficiently small.

III. WATER TESTING

Testing procedures and parameters may be grouped into physical, chemical, bacteriological and microscopic categories.

A. Physical tests indicate properties detectable by the senses.
B. Chemical tests determine the amounts of mineral and organic substances that affect water quality.
C. Bacteriological tests show the presence of bacteria, characteristic of faucal pollution.

IV. OBJECTIVE OF INVESTIGATION

The main objective of this research or investigation is to measure all the engineering properties of the raw water sourced from Pahuj river before entering to the "Ugaikhera water treatment plant of M.P.". The quality measurement and monitoring of the water will be comparable to the standards of IS10500:2012.

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V. LITERATURE REVIEW

Jayashree DhoteSangita, Pradeep Ingole, Dr. Arvind Chavhan (2012), The use of aerobic waste water treatment as a reductive medium is receiving increased interest due to its low operation and maintenance costs. In addition, it is easy-to-obtain, with good effectiveness and ability for degrading contaminants. This paper reviews the use of waste water treatment technologies to remove contaminants from wastewater such as halogenated hydrocarbon compounds, heavy metals, dyes, pesticides, and herbicides, which represent the main pollutants in wastewater.[1]

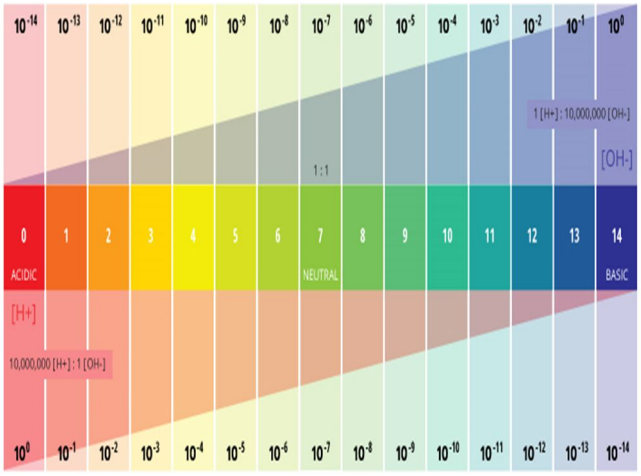
Moses Kolade David (2016), This paper reviewed five (5) researches on industrial wastewater treatment processes, the methods employed in these researches are aerobic, anaerobic or the combination of both methods. The paper tried to briefly discuss the motives of the researchers, their instrumentations and results.[2]

Albert A. Koelmans (2019), Microplastics have recently been detected in drinking water as well as in drinking water sources. Thispresence has triggered discussions on possible implications for human health. However, there have beenquestions regarding the quality of these occurrence studies since there are no standard sampling,extraction and identification methods for microplastics. Accordingly, we assessed the quality offiftystudies researching microplastics in drinking water and in its major freshwater sources. This includes anassessment of microplastic occurrence data from river and lake water, groundwater, tap water andbottled drinking water. Studies of occurrence in wastewater were also reviewed.[3]

Rahul Kumar, Abhishek Sharma (2016), The purpose of this paper is to decorative a model of investigating the impact of waste water from railway industry, to recommend a treatment method of those and to study the effect of the treatment of the industrial waste waters. For this, the waste waters from the locomotives repair industry and the method of treatment named dissolved air flocculation (DAF) are two of object of study.[4]

VI. INVESTIGATION STANDARDS

This subtropical conditioned raw water of “Pahuj River” has been tested to measure all the pre standards of IS10500:2012. Likewise,



VII. RESULTS AND DISCUSSIONS

This subtropical climate raw water were tested before treatment on various quality standards and all the necessary data has been recorded as**,**

1) Potential of Hydrogen (pH), the pH is a determined value based on a defined scale, similar to temperature. This means that pH of water is not a physical parameter that can be measured as a concentration or in a quantity.

Table 1.1 Potential of Hydrogen (pH)

pH	Fresh(ppm)	Discharge (ppm)
Sample 1	7.4	7.37
Sample 2	7.35	7.33

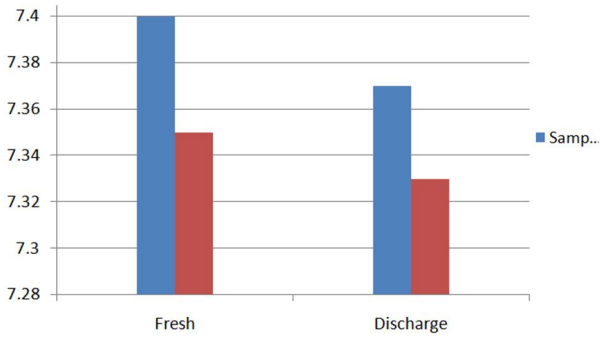


Fig. 1.1 Potential of Hydrogen (pH)

2) Phenolphthalein Alkalinity, Alkalinity is a measure of the capacity of water to neutralize acids. Alkaline compounds in the water such as bicarbonates, carbonates, and hydroxides remove H+ ions and lower the acidity of the water.

Table 1.2 Phenolphthalein Alkalinity

P-Alkanity	Fresh(mg/l)	Discharge(mg/l)
Sample 1	6	8
Sample 2	6	8

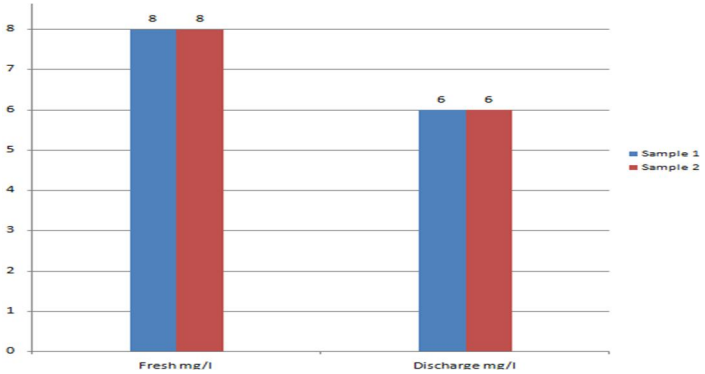


Fig. 1.2 Phenolphthalein Alkalinity

3) Total Alkalinity, Total alkalinity is the sum of phenolphthalein alkalinity and methyl orange alkalinity. Alkalinity is a measure of the capacity of water to neutralize acids (see pH description).

Table 1.3 Total Alkalinity

Total Alkanity	Fresh (mg/l)	Discharge(mg/l)
Sample 1	98	96
Sample 2	180	184

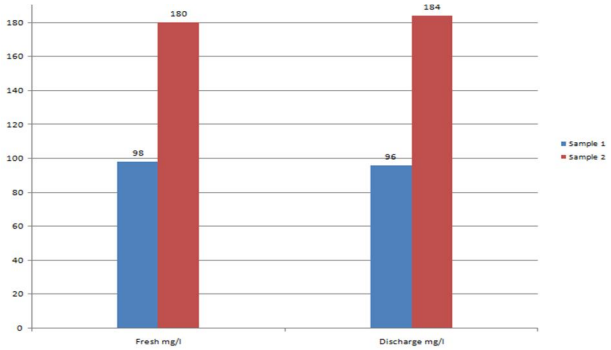


Fig. 1.3 Total Alkalinity

4) Water Hardness. The simple definition of water hardness is the amount of dissolved calcium and magnesium in the water. Hard water is high in dissolved minerals, both calcium and magnesium.

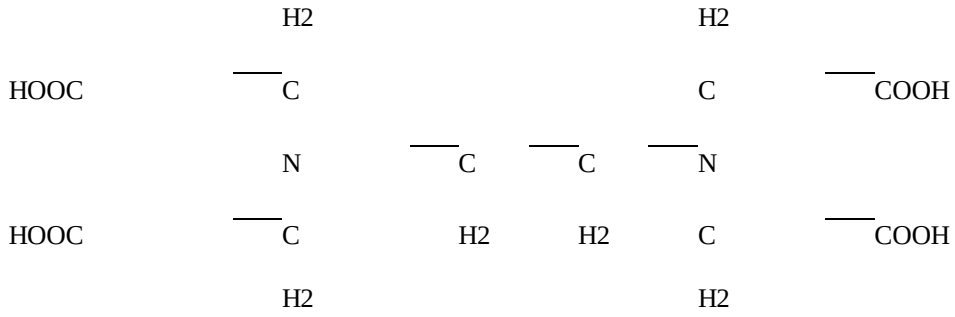


Table 1.4 Water Hardness

Hardness	Fresh (mg/l)	Discharge (mg/l)
Sample 1	148	144
Sample 2	24	20

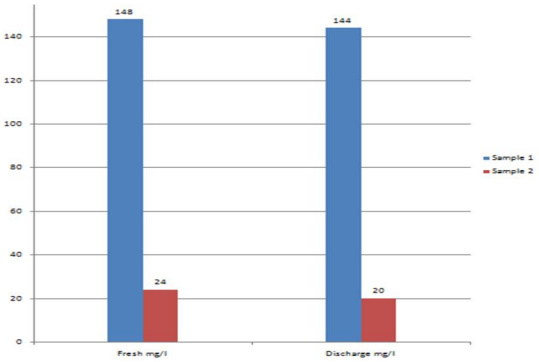


Fig. 1.4 Water Hardness

5) Dissolved Oxygen, pH Of Solid Waste, Organic Carbon, Nitrogen (Jackson, 1967) and other WHO & IS Code Provisions were also accounted.

Table 1.5 Dissolved Oxygen

DO	Fresh(mg/l)	Discharge(mg/l)
Sample 1	4.4	4.8
Sample 2	2	2.7

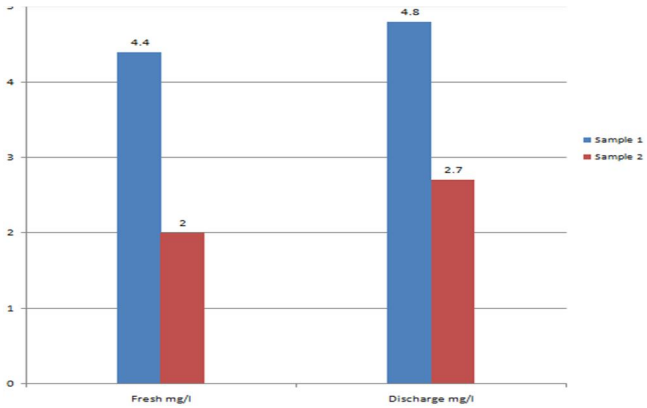


Fig. 1.5 Dissolved Oxygen %

6) Organic Carbon, The organic carbon in the solid waste decays by first order kinetics after placed in a landfill with reported rate constants for a dry climate (0.02/yr), moderate climate (0.038/yr), and wet climate (0.057/yr.

Table 1.6 Organic Carbon Percentage

Days	Carbon %
10 days	18.47
30 days	17.36

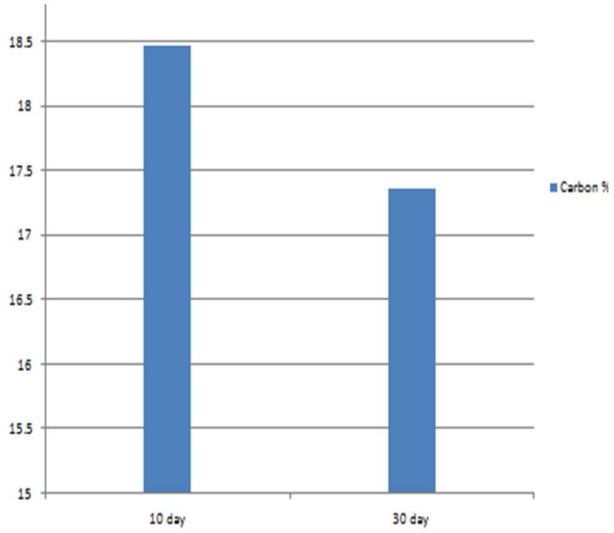


Fig. 1.6 Organic Carbon Percentage

7) TKN (Total Kjeldahl Nitrogen) is the total concentration of organic nitrogen and ammonia. The original TKN method was developed by the Danish chemist Johan Kjeldahl in 1883. Today, TKN is a required parameter for regulatory reporting at many plants but is also used to provide a means of monitoring plant operations.

Table 1.7 Water Hardness

Days	Nitrogen %
10 days	1.03
30 days	0.33

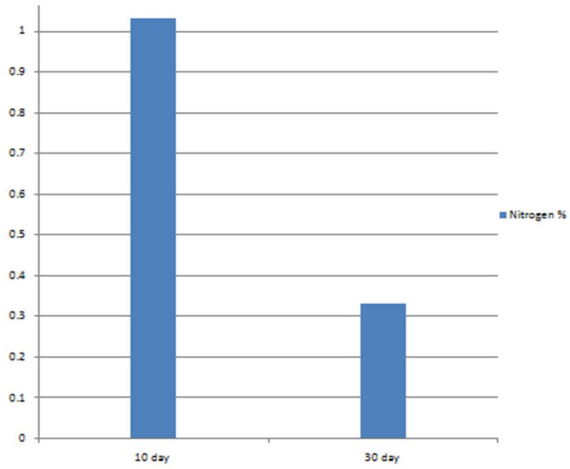


Fig. 1.7 Nitrogen Percentage

VIII. CONCLUSION

As the IS code 10500:2012 indicates to monitor the quality of the raw water to be processed for treatment, after collecting all the engineering data through pre testing, a comparative analysis between the pre-treatment testing and IS code standards were plotted, the results shows the impurities available in water of "Pahuj River" situated in subtropical climate zone of India. Table 1.8 Comparative Analysis of Water quality of Pahuj River pre treatment

Classification of impurities	impurities	Max. permissible limit in ppm	Observed value
physical	colour (on cobalt scale)	15-25	20
	turbidity (on sillica scale)	5-10	7
	temprature	10- 15.6 C	11
	odours	Nil	NIL
	tastes	no objectionable tastes	NIL
Biological	b-coli	no B-coli in 100 ml	NIL
	M.P.N,	one number in 100 ml	one
Chemical	PH value	6.6 - 8.5	7
	Total solids	500-1000	700
	Hardness	75 -115	100
	Barium	1	0.01
	Cadmium	0.01	0
	Chromium	0.05	0.01
	Selenium	0.05	0.02
	Arsenic	0.05	0.01
	Maganese	0.05	0.04
	Iron	0.3	0.121
	Lead	0.05-0.10	0.07
	Copper	1.04-3.00	2
	Zinc	15	7
	Silver	0.05	0.02
	Flouride	1.5	1
	Cyanide	0.2	0.125
	Carbonate alkalinity	120	111
	Sulphate	250	187
	B.O.D.	nil	nil
	Nitrate	45	34
	Chloride	250	200
Radiological	alpha-emitters	1 c/lit	1 c/lit
	beta-emitters	10c/lit	7c/lit

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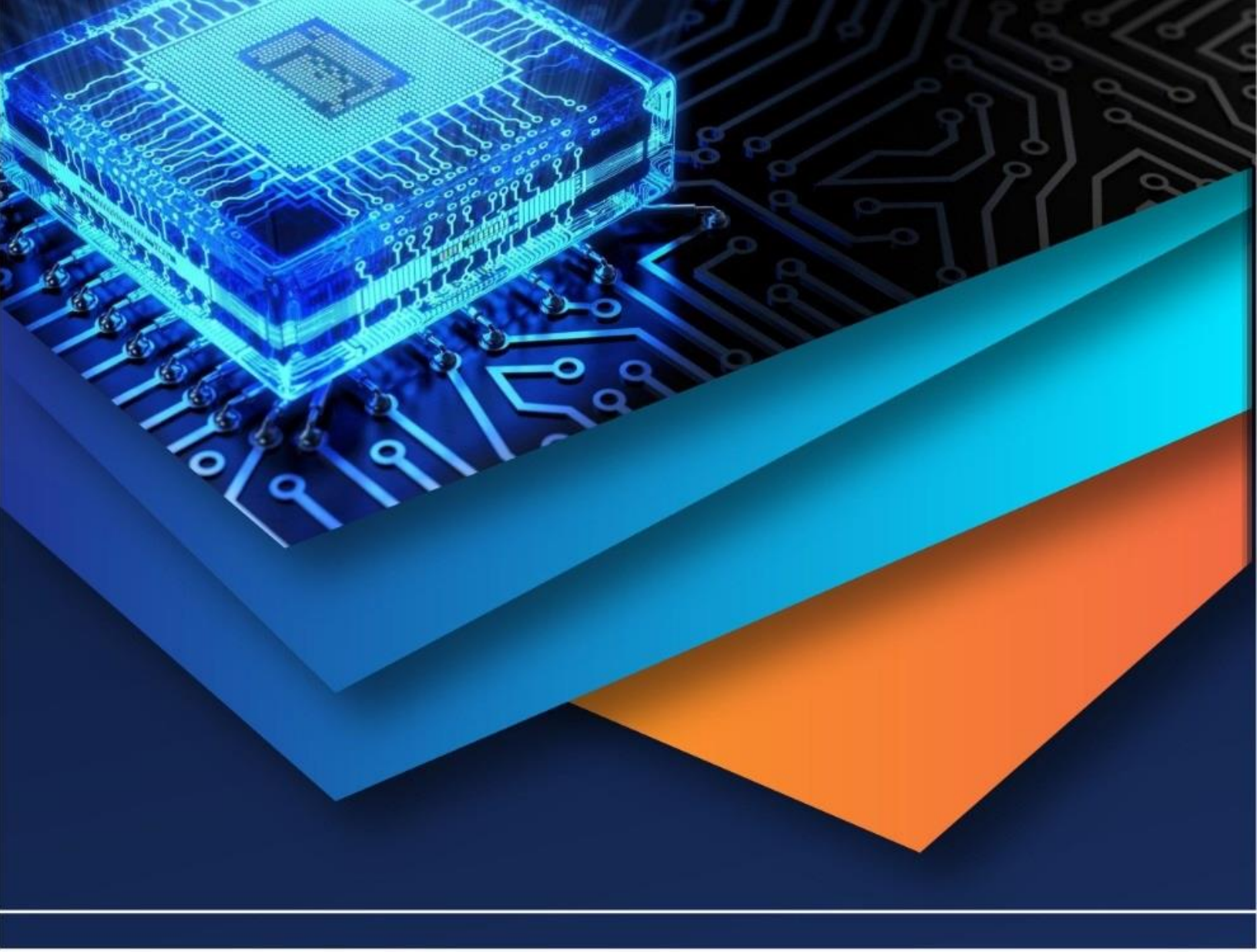

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