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Physical and Chemical Characteristic Study of Tungabhadra River Water

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ABSTRACT: This is a project based on evaluating the chemical and physical properties of river water subjected to pollution from industries. In this project a river is being selected where effluent from an industry is being let hence altering in its composition. Samples have been taken from the river in certain intervals and the samples have been tested in the laboratory (chemical and physical composition). After collecting the values from the tests conducted and comparing them with Indian standard codes, the further decisions are made and conclusion has been given.

KEY WORDS: Pollution, Indian Standard Code

I.INTRODUCTION

Water is one of the most important substances on earth. All plants and animals must have water to survive. Water pollution is contamination of water bodies, usually as a result of human activities. Due to increase in urbanization and industrialization a large quantity of inadequately treated water is left into natural water bodies which can lead to degradation of aquatic eco system. This can lead to public health problems for people leaving downstream and leading worldwide cause of death and disease. Nowadays water treatment is mandatory process before releasing the effluents outside the factory directly to the river. Major steps are taken in the treatment of water hence improving the quality of water to make it more acceptable for specific endues.

Fig 1.1 Effluent outlet from the factory directly to the river source

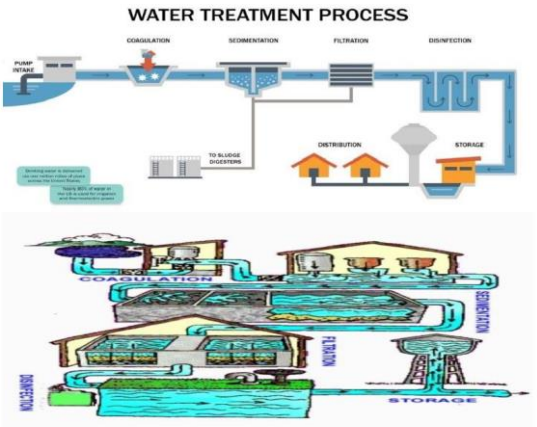

Fig 1.2 Sewage water treatment

II. SIGNIFICANCE OF THE SYSTEM

The main objective is to determine the physical and chemical components present in river water sample. To check the quality of discharged water from the industry by conducting some laboratory tests by the obtained river water samples. To ensure that water is safe for drinking, fit for domestic use and harmless for aquatic life. If any physical or chemical quantity found to be in varying limits compared with the Indian standard codes then proper treatments should be suggested.

Industry: Davangere District
River: Tungabhadra River

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III. PROPOSED SYSTEM

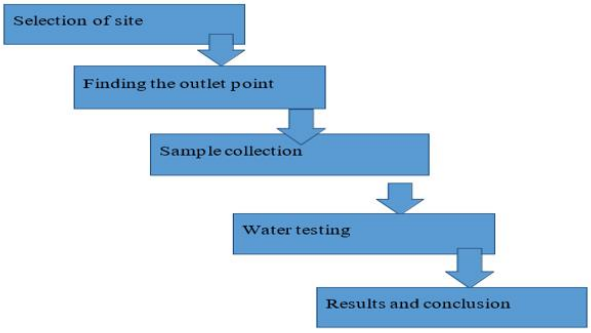

Fig 3.1 Flowchart of the proposed methodology

IV. METHODOLOGY

A. SELECTION OF SITE

Site selection is done by considering the factors such as distance of the factory, discharge Site selection is done by considering the factors such as distance of the factory, discharge quantity from the factory, mass production of factory and considering the number of villages present near the factory which consume the water were the outlet of the factory is placed.

A.1 FINDING THE OUTLET POINT

After selection of factory the discharge outlet point is traced by following the water source present near the factory along with the foul odors and traces of color change in water

A.2 SAMPLING

The process of taking a sample of water for analysis and other testing.

A.3 INTEGRATED SAMPLING

It is defined as the collection of water samples at different radius and at different intervals of time. In this project we have considered preproduction time and production time of industry at different kilometre radius at different intervals of time

A.4 TESTS TO BE CONDUCTED

- Acidity
- Ph
- Hardness (total hardness, calcium)
- Dissolved oxygen
- Alkalinity
- Iron
- Turbidity
- Colour
- Odour

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V. RESULTS AND DISCUSSIONS

A. ACIDITY TEST

Sample 1:- GROUND WATER.

Total Acidity:-

SL.NO	IBR	FBR	ML(Used)
1	0	2.3	2.3

Table 1.1: Total Acidity

Mineral Acidity:-

SL.NO	IBR	FBR	ML(Used)
1	Nil	Nil	Nil

Table 1.1: Total Acidity

Total Acidity:

T=V*N*50*1000/Volume sample taken

T= 2.3*1000/50

T = 46 Mg/$CaCo_3$

Sample 2:-RIVER WATER

Total Acidity:-

SL.NO	IBR	FBR	ML(Used)
1	0	10	10

Table 2.1: Total Acidity Table

Mineral Acidity:-

SL.NO	IBR	FBR	ML(Used)
1	Nil	Nil	Nil

Table 2.1: Mineral Acidity Table

Total Acidity:
T=V*N*50*1000/Volume sample taken
T= 10*1000/50
T=200 Mg/CaCo3

B. P.H.TEST

Sample 1:-GROUND WATER
Litmus Paper: - NO COLOUR CHANGE (RED COLOUR) PH – METER:- PH-METER = 6.9 PH
 UNIVERSAL INDICATOR PH Value = 6.5(Acidic)

Sample 2:-RIVER WATER
Litmus Paper: - NO COLOUR CHANGE (RED COLOUR)
 PH – METER: - PH-METER = 5.9 PH
 UNIVERSAL INDICATOR PH Value = 5.8(Acidic)

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C. TOTAL HARDNESS TEST

Sample 1:- GROUND WATER

SL.No	IBR	FBR	V(EDTA)
1	0	29.6	29.6

Table 3.1: GROUND WATER Table

Total Hardness as mg/L=V*1000/Volume of sample taken

T=29.6*1000/50,

T=592 Mg/lt

Sample 2:- RIVER WATER

SL.No	IBR	FBR	V(EDTA)
1	0	120	120

Table 3.2: RIVER WATER Table

Total Hardness as mg/L=V*1000/Volume of sample taken

T=120*1000/50,

T=2400 Mg/lt

D. DETERMINATION OF CALCIUM

Sample 1:- GROUND WATER

SL.No	IBR	FBR	ML(Used)
1	0	14.5	14.5

Table 4.1: GROUND WATER Table

Calcium Hardness as mg/L=V*1000/Volume of sample taken

=14.5*1000/50

=290 Mg/ $CaCO_3$

Sample 2:- RIVER WATER

SL.No	IBR	FBR	ML(Used)
1	0	33.5	33.5

Table 4.2: RIVER WATER Table

Calcium Hardness as mg/L=V*1000/Volume of sample taken

=33.5*1000/50

=670 Mg/ $CaCO_3$

E. DISSOLVED OXYGEN TEST

Sample 1:- GROUND WATER

SL.No	IBR	FBR	ML(Used)
1	1.0	3.2	2.2

Table 5.1: **GROUND WATER Table**

Sample 2:- RIVER WATER

SL.No	IBR	FBR	ML(Used)
1	1.0	5.0	4.0

Table 5.2: RIVER WATERTable

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F. DETERMINATION OF IRON

Sample 1:- GROUND WATER =0.13

Sample 2:- RIVER WATER = 0.04

G. ALKALANITY

Sample 1:- GROUND WATER

Total Alkalinity:-

SL.NO	IBR	FBR	ML(Used)
1	0	23.5	23.5

Table 6.1.1: Total Alkalinity Table

Phenolphthalein Alkalinity:-

SL.NO	IBR	FBR	ML(Used)
1	Nil	Nil	Nil

Table 6.1.2: Phenolphthalein Alkalinity Table

Total Alkalinity:-

T=V*N*50*1000/Volume sample taken

T=23.5*1000/50

T=470Mg/lt

Sample 2:-RIVER WATER

Total Alkalinity:-

SL.NO	IBR	FBR	ML(Used)
1	27	54	27

Table 6.2.1: Total Alkalinity Table

Phenolphthalein Alkalinity:-

SL.NO	IBR	FBR	ML(Used)
1	Nil	Nil	Nil

Table 6.2.1 Phenolphthalein Alkalinity Table

Total Alkalinity:-

T=V*N*50*1000/Volume sample taken

T=27*1000/50

T=540Mg/lt

H. TURBIDITY TEST

SAMPLE 1:- GROUND WATER = 11 NTU

SAMPLE 2:-RIVER WATER = 22 NTU

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VI. EXPERIMENTAL RESULTS

A. PRE-PRODUCTION TIME

A.1 Sample 1: River water

a) In pH test we have obtained the values such as, 5.8 which are not within the limit hence we conclude that the water is acidic in nature .If the water is acidic in nature it can leach metals from pipes such as cooper, led and zinc and it can also cause many diseases in human beings.
b) The result obtained from the hardness test exceeds the permissible limit. Hard water can interfere with the action of soaps and detergents and can result in deposits of calcium carbonate, calcium sulphate and magnesium hydroxide inside pipes and boilers.
c) The obtained DO value is 4 mg/L hence, it is not within the limit. If dissolved oxygen level in water drops below 5 mg/L, aquatic life is put under stress. The fish and other aquatic organisms cannot survive in that water.
d) The obtained turbidity level is 22 NTU which is exceeding the permissible limit. high turbidity levels can reduce the amount of light reaching lower depths which can inhibit growth of submerged aquatic plants and species.
e) The color of water is blackish grey which is far different from actual watercolor.

f) Generally the water has no odor in it but the sample of water obtained has a rotting odour.

A.2 Sample 2: Groundwater

a) The obtained DO value is 2.2 mg/L hence, it is not within the limit. If dissolved oxygen level in water drops below 5 mg/L, aquatic life is put under stress. The fish and other aquatic organisms cannot survive in that water
b) The obtained turbidity level is 11 NTU which is exceeding the permissible limit. high turbidity levels can reduce the amount of light reaching lower depths which can inhibit growth of submerged aquatic plants and species.

B. PRODUCTION TIME

B.1 Sample 1: Discharge at starting point

a) The obtained acidity is 1200 mg/L as CaCo3 which is exceeding the limit. elevated levels of metal contaminants found in acidic water can cause plenty of health issues.
b) In pH test we have obtained the values such as, 5.2 which are not within the limit hence we conclude that the water is acidic in nature .If the water is acidic in nature it can leach metals from pipes such as copper, led and zinc and it can also cause many diseases in human beings.
c) The result obtained from the hardness test exceeds the permissible limit. Hard water can interfere with the action of soaps and detergents and can result in deposits of calcium carbonate, calcium sulphate and magnesium hydroxide inside pipes and boilers.
d) In the DO test the color change was not observed due to the intense black color of water. Therefore, from the earlier conducted experiment we conclude that there is a decrease in DO limit compare to the standard limit. If dissolved oxygen level in water drops below 5 mg/L, aquatic life is put under stress. The fish and other aquatic organisms cannot survive in that water.
e) The obtained turbidity level is 29.9 NTU which is exceeding the permissible limit. High turbidity levels can reduce the amount of light reaching lower depths which can inhibit growth of submerged aquatic plants and species.
f) The color of water is blackish grey which is far different from actual watercolor.
g) Generally the water has no odor in it but the sample of water obtained has a rotting odour.

B.2 Sample2: 6km radius

a) The obtained DO value is 11.5 mg/L hence, it is not within the limit. If dissolved oxygen level in water drops below 5 mg/L, aquatic life is put under stress. The fish and other aquatic organisms cannot survive in that water.
b) The colour of water is blackish grey which is far different from actual water colour.

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c) Generally, the water has no odour in it but the sample of water obtained has a rotting odour.

B.3 Sample 3: 12km radius

a) The obtained DO value is 4 mg/L hence, it is not within the limit. Total dissolved gas concentrations in water should not exceed 110 %. concentration above this level can be harmful to aquatic life. In this type of water fishes may suffer from gas bubble diseases.
b) The color of water is grey which is far different from actual water colour.

c) Generally, the water has no odour in it but the sample of water obtained has a foul odor.

B.4 Sample 4: Groundwater

a) The obtained DO value is 2.2 mg/L hence, it is not within the limit. If dissolved oxygen level in water drops below 5 mg/L, aquatic life is put under stress. The fish and other aquatic organisms cannot survive in that water.

VII. CONCLUSION AND FUTURE WORK

- Identify existing problems
- Ensure water is suitable for the intended use
- Ensure safe drinking water.
- Determine the effectiveness of a treatment system.
- Helps to obtain reliable and useful data.
- To assess the impact of human activities on water quality and its suitability.
- To determine the quality of water in its natural state.
- To keep under observation the sources and pathways of pollutants/contamination.
- This will help ensure that the water source is being properly protected from potential contamination.
- Water quality testing makes sure that water is safe and meets local and international water standards.
- All water for human and animal use should be tested for safety.

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