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# Field Survey and Experimental Analysis of

# Water Quality in Industrial Areas of Sangareddy District

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### INTRODUCTION:

Water is an indispensable component of the living entities including plants and animals constitutes up to 50-95% of their body mass, and especially human body contains 70% of water. (Allan,1995). The major anthropogenic activities such as cultivation, industrial production, transportation and construction incorporated heavy use of water, although the water is one of the most inadequately and inexpertly managed resource on the planet (Chutter, 1998).

The virtue and standards of human life certainly depends on access and utility of pure and safe water. Water quality is always related to human handling and economic developmental stage of the region (Chennakrishnan *et al.,* 2008). Industrial effluents are prime source of contamination of Ground and surface waters bodies. Colorless industrial waste waters creates severe environmental issues as they significantly reduces quality of water. (Mathuthu *et al.,* 1997). Most often, the water bodies serves as sinks for industrial effluents in the regions of industrial urbanization.

## SIGNIFICANCE OF THE STUDY:

The study assessed the current status of water quality and impact of industrial effluents on physico-chemical parameters of water in neighboring areas of various industries in Sangareddy district of Telangana State, India and it is assumed that the result analysis of this study will provide suitable advancements in designing the strategies for preventive measures and develop remedial technologies for adequate effluent treatment and to ensure the safe consumption of water.

## SAMPLE COLLECTION:

Water samples were collected from neighboring industrial areas from SIX sampling stations in Sangareddy district. The samples were collected from vicinity of various industries not exceeded with 1000 meters radius. Standard methods were adopted for the analysis of various water qualities, Poly ethylene bottles of one liter capacity were used for water quality parameter analysis and all bottles were washed with dil. Acid followed by distilled water and dried in regulated temp. At each sampling location, water samples were collected in three Poly

ethylene bottles. Before taking final water sample, bottles were washed with the same sample water thoroughly for two times. Three liters of each sample was collected and homogenous samples were prepared for analysis.

**Table 1. Sample collection regions and Sources.**

| S.No. | Sample | Region | Neighboring Industry | Drinking water Source |
|---|---|---|---|---|
| 1 | Sample-A | Isnapur | **PVC** | Borewell |
| 2 | Sample-B | Pashamylaram | **Pharmaceutical** | Borewell |
| 3 | Sample-C | Zaheerabad | **Sugar Mill** | Borewell |
| 4 | Sample-D | Sadasivpet | **Pharmaceutical** | Borewell |
| 5 | Sample-E | Sangareddy | **Pharmaceutical** | Borewell |
| 6 | Sample-F | Sangareddy | **Pharmaceutical** | Borewell |

## METHODS:

The following physic-chemical parameters were analyzed.

### pH:

Is a logarithmic scale generally used to express the acidic, alkaline or neutral nature of the solution. In fact, it representing the hydrogen ion concentration or more precisely, the H+ ion

activity, and alkalinity. The pH of any aqueous system is suggestive of the acid base equilibrium achieved by various dissolved compounds. pH of the water was determined at the site itself by using portable probe pH and pH indicator solution, latterly in laboratory by using pH meter. pH is an important parameter which is important in evaluating the acid-base balance of water.

**TOTAL SOLIDS (TS) AND TOTAL DISSOLVED SOLIDS (TDS):**

Total solid content is estimated through evaporating the unfiltered samples by heating at 100± 30C till completely evaporated. The residue left after evaporation is the TS content in the water sample which is expressed in mg/L. Total dissolved solids was also determined in the same manner after filtering the sample. Total solids analysis has great implications in biological and physical waste water treatment processes and the available reports are also *at par* with the present results (Bahadur and Chandra, 1996). A high amount of dissolved solids increases the density of water, effects osmoregulation of aquatic life, reduces the quality of water for human consumption and agricultural needs.(Swarnalatha and Rao 1998).

**DISSOLVED OXYGEN (DO), BIOCHEMICAL OXYGEN DEMAND**

**(BOD) AND CHEMICAL OXYGEN DEMAND (COD):**

Oxygen dissolved in water is referred as Dissolved Oxygen (DO). The DO content in water is estimated titrimetrically following Winkler's Method. Biochemical Oxygen Demand (BOD) is used as an approximate measure of the amount of biochemically degradable organic matter present in water. The 5-day incubation method suggested by APHA (2005) was adopted to measure the BOD content in water samples. Chemical Oxygen Demand (COD) is the measure of oxygen required in oxidizing the organic compounds involving oxidizing agents under acidic

conditions. The COD estimation was done using closed reflux method as suggested by APHA (2005).

**BIOCHEMICAL OXYGEN DEMAND (BOD):**

The biochemical oxygen demand was estimated as per the official method inAPHA (2005).

1. The collected samples were diluted before incubation to bring the oxygen demand and supply into an appropriate balance. One litre of distilled water was mixed with nutrients. 1ml each of buffer, calcium chloride magnesium sulfate and ferric chloride. It was aerated overnight and was used as the dilution water.

2. Samples were neutralized to pH 6.5-7.5 with 0.1 M H2SO4 or 0.1 M NaOH.

3. The DO of the sample was determined initially and after 5 days of incubation in a BOD incubator at 200C.

4. A blank was also carried out simultaneously.

5. The BOD5 was then calculated by the following formula. BOD5 at 200C in mg/l= (D0-D5)-(C0-C5) ´ dilution factor Dilution factor = vol.ofsample 1000 Where

D0 = DO content of the sample on the 1st day

D5 = DO content of the sample on the 5th day

C0 = DO content of the blank on the 1st day

C5 = DO content of the blank on the 5th day.

**CHEMICAL OXYGEN DEMAND (COD):**

Chemical Oxygen Demand was determined following the official method mentioned in APHA (2005).

1. 10 ml of the sample was diluted to 500 ml using distilled water.

2. 50 ml of the diluted sample was taken in a round bottom flask (R. B. Flask) for COD determination.

3. 1g HgSO4 was added to the above sample to overcome the difficulties caused by chloride ions.

4. 5 ml of con. $H_2SO_4$ was added to dissolve the $HgSO_4$.

5. 1 g $AgSO_4$ was then added to the above mixture as a catalyst.

6. To the above solution 25 ml of 0.25 N potassium dichromate was added.

7. The RB flask was attached to the condenser and the water was allowed to flow.

8.70 ml of con.$H_2SO_4$ was added through the open end of the condenser and swirling was continued while the acid was being added.

9. The contents in the flask were refluxed for 2h, cooled, washed into a 500 ml beaker and was suitably diluted and made upto 140 ml.

10. 3-4 drops of ferroin indicator was added and the contents were titrated against ferrous ammonium sulfate (0.25 N).

11. The end point of the titration was the first sharp colour change from the bluegreen to reddish brown.

12. A blank was also run simultaneously in the same manner using distilled water.

13. The COD then calculated using the formula.

COD mg/l= ( ) 4 2 4 A-B ×normality of Fe(NH ) SO ×8×1000 volume of sample

Where A = volume of Fe (NH4)2 SO4 consumed for blank (ml)

B = volume of Fe (NH4)2 SO4 consumed for sample (ml)

## RESULTS AND DISCUSSIONS:

Water resources in Sangareddy district were considerably affected by industrial effluents in past few decades as rapid growth was found in industrialization in rural as well as in urban area. The past few decades have witnessed many socio-economic changes which lead to provocative establishment of industries with in the region. Developing countries like India, industrialization are unavoidable part of the Socio-economic sustainability as it provides employment to rural youth. The steady hike in the industrialization resulted in the emergence of several ecological problems neighboring areas of the industries.

The detailed analysis of the water samples from neighboring areas of industries was done to evaluate impact of different industrial effluents on physic-chemical quality of water resources. The detailed analysis of various factors such as pH, TDS, COD,DO and BOD was done in the above three phases.

**Table 2: Average Value of Physico-Chemical Analysis of water samples collected from Industrial areas of Sangareddy District.**

| Parameters | A | B | C | D | E | F | Permissible Range (WHO) |
|---|---|---|---|---|---|---|---|
| **pH** | 6.95 | 6.98 | 7.10 | 7.25 | 6.95 | 6.99 | 6.5-8.5 |
| **TDS** | 657 | 890 | 1180 | 1280 | 799 | 825 | 500-2000 |
| **DO** | **3.95** | **2.78** | **2.45** | **2.90** | **2.87** | **3.07** | 4-6 |
| **COD** | **87.1** | **78.1** | **75.9** | **81.9** | **78.9** | **80.9** | 250* |
| **BOD** | 3.71 | **2.95** | **2.34** | **2.98** | **2.89** | **2.95** | 3-5 |

All parameters in **mg/L.**

**CONCLUSION:**

It is evident from the study that all the water samples are slightly acidic but within the permissible levels, recommended by WHO. TDS of all the samples were found within the permissible range. Whereas quality of all the Samples were not up to the mark in terms of DO, COD and BOD. The possible reason might be the chances of contamination of Ground water due to industrial as well as Domestic wastes. It is recommended from the study that proper water treatment of water in these areas is required before consuming for Drinking purposes.