Study on Physico - Chemical Parameters of Waste Water Effluents from Industrial areas of Jaipur, Rajasthan, India.

Priyanka Dhingra*, Yashwant Singh*, Manish Kumar, Hitesh Nagar, Karan Singh, Laxmi Narayan Meena
Asstt. Professor, JECRC UDML COLLEGE OF ENGINEERING, JAIPUR, RAJASTHAN

Abstract
The present research work deals with the study of some of the important physic-chemical parameters of industrial waste water collected from industrial region. The study reveals that engineering, paper mill, fine chemicals, dyes, paint, pharmaceutical, petrochemical & textile industries are some of the major industries responsible for polluting surrounding aquatic environment. It was observed that pH values of effluents samples collected from dyes and textile industries shows extremely high total dissolved solid content. Beside this various other parameters are also calculated for waste water samples like pH, Dissolved Co₂, dissolved oxygen, BOD and COD. The result of the present investigation point out the need to implement advances and improvement in waste water treatment methods and implementation of various compatible policies and objectives.

Keywords: Physico - Chemical parameters, Water Pollution, Industrial Effluent, BOD, COD, Total solids.

1. Introduction:-
Waste management strategies adopted in India have failed to keep pace with industrial growth and urbanization. The population impacts on marine communities can be directly traced to the industrial centers, which release an array of chemical contaminants to effluent systems. Of even greater concern have been the adverse environmental effects associated with water disposal activities, particularly sewage sludge and dredged spoil dumping, oil spills, leakage as well as municipal and industrial waste water discharges. Most of the industries in India are situated along the river banks for easy availability of water and also disposal of waste. These wastes often contain a wide range of contaminants as petroleum hydrocarbon, chlorinated hydrocarbons and heavy metals, various acids, alkalies, dyes and other chemicals which greatly change the physicochemical properties of water. The waste also includes detergents that create a mass of white foam in river water, which is quite harmful and toxic to fishes. Out of this, a large portion can be traced to the processing of the industrial chemicals, and to the food product industry. The surface water is the main source of industries for waste disposal. Untreated or allegedly treated effluents have increased the level of the surface water pollution up to 20 times. Some times in the lack of proper collection system waste water is directly spreaded on open land. It may lead to the loss of agriculture & local vegetation.

Although all Indian industries function under the strict guidelines of central pollution control board (CPCB) but still the situation of environmental pollution is far from satisfactory. Different norms and guidelines are given for industries depending upon the pollution potential. Most of the major industries have treatment facility for industrial effluents, but this is not the case with small scale industries, which cannot afford enormous investment in pollution control equipments as their profit margin is slender. As a result in India there are sufficient evidences available regarding mismanagement of Industrial waste.

Our present area of research is the Jaipur district, of Rajasthan, India. It has geographical area of 11061.44 sq km forms east central part of Rajasthan state. It is undergoing rapid urbanization and industrialization since last two decades. It has many engineering and electrical industries, and mainly it is well known for gem, jewellery and dye industries. Effluents emerging from their industries are going to pollute water resources; the present paper is aimed to study effect of waste water effluents and physicochemical parameters of waste water. Further it also
aware system for modification, setting and proper functioning of waste water treatment plants.

2. Materials and Methods:

2.1 Area of Study:

Samples of waste water effluents were collected from 4 industrial sites, where engineering electrical, paper and dye industries are situated respectively. Water from their industries is continuously disposed off into soil. These industries are situated in Vishvakarma industrial area sikar road, 22 godam and sanganer area of Jaipur district. Population around these areas is under threat of environmental pollution.

2.2 Sampling and Preservation:

All the glass wares, conical flask were first cleaned with de-ionized distillwater. The pipettes and burettes were rinsed with solution before final use. The chemicals and reagents were used for analysis were of analytical grade reagent. The industrial waste water effluent samples were collected randomly. Polythene bottles of 2.5 litres and 2 litres were used to collect grab water samples. The bottles were thoroughly cleaned and washed with distilled water twice; the sample bottles were stoppered and sealed with paraffin wax.

2.3 Physico - chemical Study:

The samples collected were analyzed for temperature, PH, total solids, total dissolved solids, total suspended solids, dissolved oxygen, BOD, COD, dissolved CO₂, Alkanality, solids and hardness. The techniques and methods followed for collection preservation, analysis and interpretation are those given by Rain water and Thatcher 1960 and E Brown 1970.

Table-1 Physico - chemical Parameters of Effluent Samples collected from industrial region of Jaipur, Rajasthan

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameters</th>
<th>Site 1 Industrial Area 22 GODAM Electrical Industry</th>
<th>Site 2 Engineering Industry VKI area</th>
<th>Site 3 Paper Industry Sanganer</th>
<th>Site 4 Dye Industry Sanganer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>PH</td>
<td>7.20±0.002</td>
<td>7.04±0.02</td>
<td>8.44±0.02</td>
<td>8.50±0.02</td>
</tr>
<tr>
<td>2.</td>
<td>Temp °c</td>
<td>29.4</td>
<td>34.8</td>
<td>32.3</td>
<td>30.4</td>
</tr>
<tr>
<td>3.</td>
<td>EC s/m</td>
<td>78.6</td>
<td>51.2</td>
<td>33.6</td>
<td>98.7</td>
</tr>
<tr>
<td>4.</td>
<td>DO mg/l</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>5.</td>
<td>BOD mg/l</td>
<td>225</td>
<td>590</td>
<td>84</td>
<td>186</td>
</tr>
<tr>
<td>6.</td>
<td>COD mg/l</td>
<td>703</td>
<td>1811.7</td>
<td>262</td>
<td>649.8</td>
</tr>
<tr>
<td>7.</td>
<td>Alkalinity mg/l</td>
<td>715.5</td>
<td>397.5</td>
<td>450</td>
<td>371</td>
</tr>
<tr>
<td>8.</td>
<td>Hardness ppm</td>
<td>880</td>
<td>620</td>
<td>930</td>
<td>880</td>
</tr>
<tr>
<td>9.</td>
<td>TS mg/l</td>
<td>273</td>
<td>190</td>
<td>202</td>
<td>315</td>
</tr>
<tr>
<td>10.</td>
<td>TDS mg/l</td>
<td>150</td>
<td>155</td>
<td>120</td>
<td>250</td>
</tr>
<tr>
<td>11.</td>
<td>TSS mg/l</td>
<td>123</td>
<td>96</td>
<td>75</td>
<td>65</td>
</tr>
</tbody>
</table>

3. Result and Discussion:

The experimental data on physicochemical properties of water samples collected from different industrial region of Jaipur is represented in table 1.

Temperature of waste water emerging from industrial area may affect soil texture, if directly thrown on to the land. It may increase the microbial activity and may decrease fertility of soil. Moreover if waste water effluents are directly emitted to water it may harm to water living organisms. The temperature of samples varies from 29.4 °c to 34.8 °c.

PH is the measure of Acidity or Alkalinity of water determinations of PH of water is helpful in treatment of waste water, by chemically adjusting PH, removal of toxic metal can be carried out. All studies samples posses slightly Basic to the highly Basic.

Electrical conductivity gives idea about the number of dissolved salts present in it.EC varies from 33.6 mS/cm to 98.7 mS/cm to USPH standard.

TDS content in water is measured of salinity. A high content of dissolved salts content affects density of water, influences osmoregulation of fresh water in organism, reduces solubility of gases and utility. Water can be classified based on the concentration of TDS (reference) 10. Drinking(up to 500 mg/l) useful for irrigation (up to 2000 mg/l) is not useful for irrigation and drinking (up to 3000 mg/l). In all the collected samples of industry total dissolved solids content is very less. Similarly TSS and TS values are reported.
4. Conclusion:

Around the world as countries are struggling to arrive at an effective regulatory regime to control discharge of industrial effluents into their ecosystem. Indian economy holds a double edged sword of economic growth and echo system collapse. The experimental data suggests a need to implement common objective and mox polices for the treatment of waste water. It also suggests modification in waste water treatment plant to control TDS, TS, and TSS. The dissolved oxygen amount in waste water sample is very less, due to high amount of BOD and COD.

BOD may be defined as rate of removal of oxygen by microorganisms in aerobic degradation of the dissolved organic matter in water over a 5-day period.

Increases in BOD can be due to heavy discharge of industrial waste water effluent, which contains enormous amount of organic matter according to UN Department of Technical Corporation for Development. Maximum permitted BOD content is $<100$ to $300 \text{ mg/lit}$ the experimental data reveals Industrial effluents from Electrical Industry has BOD $255 \text{ mg/lit}$. Whereas paper, engineering, the dye industry has BOD $84,589,186 \text{ mg/lit}$ respectively. The grater is the BOD lesser will be the dissolved oxygen in water.

Further chemical oxygen demand is the measure of oxygen equivalent of that portion of the organic matter in a sample that is susceptible to oxidation by strong chemical oxidant.

It is important rapidly measured parameters for industrial waste water and control of waste treatments.

COD test is used to measure the load of organic pollutants in industrial waste water. It was observed that in all the effluents are very much higher than $4.0 \text{ mg/lit}$ which has maximum permissible limit according references.

5. References:


