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# *A Study on Different Parameters of Effluents in Chittagong Industrial Area, Bangladesh*

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***Abstract***

*The study was carried out to assess the surface water quality parameters such as pH, DO, BOD, COD, TDS, TSS in different industries likeAramit Thai Aluminium Ltd, Smart Jeans Ltd, Base Textile Mill andPharmic Laboratories Ltd. of Bangladesh. The statistical methods of sampling were used for collecting samples. The Samples were preserved using suitable preservation methods. Water samples were collected during the hydrological years from 15$^{th}$ July 2018 to 25$^{th}$ June2019. The results showed thatalmost in every industry, their waste water contain high amount of pH, TSS, TDS, Bod and also COD which are not permissible limit prescribed by department of Environment (DoE), Bangladesh.It should be taken necessary steps for the mitigation of water pollution of these industries. The results also provided data to understand and quantify the threat of the impact of climate change on freshwater resources of this region. The results further provided data for water quality of surface-water resources of greater Chittagong region to match national and international standards for drinking, agricultural, industrial and livestock requirements.*

***Keywords:*** *-Industrial water, Parameters, Chittagong, pollution.*

## INTRODUCTION

The Research is to assess the quality and quantity of the earth resources of the nation and to provide information that will assist resource managers and policy makers at national, regional and local levels in making sound decisions. Chemical assessment of water quality

conditions and trends is an important part of this research. One of the greatest challenges faced by water resources scientists is acquiring reliable information that will guide the use and protection of the nation's water resources[1].That challenge is being addressed by national ,divisional ,inter-district and local water resource agencies and by many academic institutions[2].These organization are collecting water quality data for a host of purposes that include compliance with permits and water supply standards; development of remediation plans for specific contamination problem; operational decisions on industrial, wastewater, or water supply facilities; and research on factors that affect water quality. An additional need for water quality information is to provide a basis on which regional and national level policy decisions can be based. Wise decisions must be based on sound information[2].

Because Bangladesh is fortunate enough having an extensive and huge water resources scattered all over the country in the form of small pond, beels (natural depression), lakes, canals, small and large rivers and estuaries covering an area of about 4.34 million hectares. In Bengali, Bangladesh is called as 'nodimatrikdesh'.Many of these ponds are chemically and bio-chemically contaminated for fish culture. If one pond per mauza could be protected from contamination, it would provide a source of drinking water with minimal treatment and water for other domestic uses without treatment. The Government of Bangladesh has greatly emphasized the development of protected pond-based water supply systems. The protected ponds should not receive any surface discharge and should only be replenished by rain and groundwater infiltration[3].Rivers, streams and lakes are the important surface water resources through which public water supplies are managed.

Quality of surface water depends upon the season of the year, nature of soil and the habitation in the catchments area. But in general surface water is impure and become contaminated where the river flow through thickly populated and industrial area. Lakes, natural and artificial, also show similar quantities as rivers and streams but they, being quiescent, show less pollution both physically and bacteriologically[4].

According to the WHO water borne diseases are the world's leading cause of death, killing more people than war, terrorism and weapons of mass

destruction combined. Diarrhoea alone kills around 1.8 million people every year, mostly children in developing countries, as a result of unclean water and poor sanitation[5]. In an attempt to protect public health, the WHO publishes guidelines for safe drinking water that serve as a reference for both developed and developing countries when setting national standards[6].

Water quality standards have been established for all surface and drinking water[7]. The WHO international standards for drinking water were published in 1968. Bangladesh developed the first quality standards in the 1976 based on the WHO 1971. International Drinking StandardsBangladesh Standard and Testing Institute (BSTI) have aspecification for drinking water (BDS 1240:2001)[7].

The objective of the drinking water directiveis to protect the health of the consumers in the country and to make sure the water is wholesome and clean[8].Water is said to be polluted when it's quality is degraded as a result of man's activities to an extent that it becomes less suitable for its intended use. The foreign substances that impair or degrade the water quality are referred to as pollutants and may be of organic, inorganic, biological or physical origin[9]. The deleterious effect of pollutions include harm to human health, hindrance to aquatic activities and the inability of the water to support agriculture, industrial and other related economic activities. The poisonous substances that are found in water cause a harsh, lacks of oxygenfor aquaticorganisms that are eventually die out. This population would also severely infect water with different types of bacteria and diseases, this being the water that we drink and wash with.

Therefore thedisadvantages of water would gradually transfer to us, causing horrible illness as well as other miserable condition[10]. Water quality refers to the chemical, physical, biological and radiological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and any human need or purpose. It is most frequently used by reference to a set of standards against which compliance can be assessed. The most common standards used to assess water quality relate to health of ecosystems, safety of human contact and drinking water[11].

## MATERIALS AND METHODOLOGY

**Place of study:** The present study was carried out in the Aramit Thai Aluminium Ltd, Smart Jeans Ltd, Base Textile Mill andPharmic Laboratories Ltd.

**Study period:** From 15th July 2018 to 25th June2019.

***Sampling and Preservation***

The significance of a chemical analysis depends to a large extent on the sampling program. Samples are collected for various examinations under different conditions. An ideal sample should be one which is both valid and representative i.e., the sample must represent the conditions that exist at the sampling point[1]. A number of parameters are important when considering how to set up a sampling protocol, including the requirement of any legislation or guidelines.

Water is essential for life, so strict control over its purity is both necessary and desirable, but it is by no means uniform and the legislation and its implementation involving water and water supplies varies widely from country to country and place to place.

***Preservation of water sample***

Once a sample is taken, the constituents of the sample should be maintained in the same condition as when collected. When it is not possible to analyze collected samples immediately, samples should be preserved properly. Biological activity such as microbial respiration, chemical activity such as precipitation or pH change and physical activity such as aeration or high temperature must be kept to a minimum. Methods of preservation include cooling, pH control and chemical addition. Freezing is usually not recommended.

The length of time that a constituent in water and wastewater will remain stable is related to the character of the constituent and the preservation method used. Sample collection and preservation were done in accordance with standard procedures as listed. Standard analytical techniques as listed in were followed for the analysis of samples.

**RESULTS & DISCUSSION:**

Comparative analysis of different parameter of ETP outlet water of different industries is given below:

**$P^H$:**

***Table 1: Comparison of ETP outlet pH values with standard***

| Sl. No. | Name of plant | Before treatment | After Treatment | Standard value of Dept. of Environment, Bd. |
|---|---|---|---|---|
| 1. | Aramit Thai Aluminium Ltd | 10.08 | 9.08 | 8.00 |
| 2. | Smart Jeans Ltd | 9.76 | 8.65 | |
| 3. | Base Textile Mill | 10.59 | 8.43 | |
| 4. | Pharmic Laboratories Ltd | 8.95 | 8.15 | |

***Table 2: Comparison of ETP outlet water TDS values with standard***

Total Dissolved Solid (TDS):

| Sl. No. | Name of plant | Before treatment (Mg/l) | After Treatment (Mg/l) | Standard value of Dept. of Environment, Bd. (Mg/l) |
|---|---|---|---|---|
| 1. | Aramit Thai Aluminium Ltd ltd | 2460 | 2236 | <2100 |
| 2. | Smart Jeans Ltd | 2667 | 2389 | |
| 3. | Base Textile Mill | 2809 | 2365 | |
| 4. | Pharmic Laboratories Ltd | 2379 | 2160 | |

***Table 3: Comparison of ETP outlet water TSS values with standard***

Total Suspended Solid (TSS):

| Sl. No. | Name of plant | Before treatment (Mg/l) | After Treatment (Mg/l) | Standard value of Dept. of Environment, Bd. (Mg/l) |
|---|---|---|---|---|
| 1. | Aramit Thai Aluminium Ltd | 297 | 198 | |
| 2. | Smart Jeans Ltd | 308 | 187 | <150 |
| 3. | Base Textile Mill | 326 | 201 | |
| 4. | Pharmic Laboratories Ltd | 179 | 166 | |

***Table 4: Comparison of ETP outlet water DO values with standard***

***Dissolved Oxygen:***

| Sl. No. | Name of plant | Before treatment (Mg/l) | After Treatment (Mg/l) | Standard value of Dept. of Environment, Bd. (Mg/l) |
|---|---|---|---|---|
| 1. | Aramit Thai Aluminium Ltd | 4.50 | 5.76 | 5.00 |
| 2. | Smart Jeans Ltd | 3.68 | 5.91 | |
| 3. | Base Textile Mill | 2.96 | 5.63 | |
| 4. | Pharmic Laboratories Ltd | 4.37 | 6.04 | |

***Table 5: Comparison of ETP outlet water BOD5 values with standard***

***Biochemical Oxygen Demand (BOD)***

| Sl. No. | Name of plant | Before treatment (Mg/l) | After Treatment (Mg/l) | Standard value of Dept. of Environment, Bd. (Mg/l) |
|---|---|---|---|---|
| 1. | Aramit Thai Aluminium Ltd | 108 | 76 | <50 |
| 2 | Smart Jeans Ltd | 164 | 103 | |
| 3. | Base Textile Mill | 192 | 87 | |
| 4. | Pharmic Laboratories Ltd | 87 | 65 | |

***Table 6: Comparison of ETP outlet water COD value***

***Chemical Oxygen Demand (COD):***

| Sl. No. | Name of plant | Before treatment (Mg/l) | After Treatment (Mg/l) | Standard value of Dept. of Environment, Bd. (Mg/l) |
|---|---|---|---|---|
| 1. | Aramit Thai Aluminium Ltd | 320 | 289 | <200 |
| 2. | Smart Jeans Ltd | 405 | 276 | |
| 3. | Base Textile Mill | 376 | 260 | |
| 4. | Pharmic Laboratories Ltd | 386 | 254 | |

## CONCLUSION

The present results showed thatalmost in every industry, their waste water contain high amount of pH, TSS, TDS, Bod and also COD which are not permissible limit prescribed by department of Environment (DoE), Bangladesh. It is strongly recommended that careless disposal of the effluents should be strongly prohibited, discouraged and there is need for each industry to establish an effluent treatment plant and its proper execution with a view to treat wastes before being discharged. Now, there is very much mandatory for DOE (Department of Environment) and other concern regulatory bodies to closely monitor the effluents from industries. So, experienced by this study in these situations only practicable alternatives that must be maintained are dumping site should be strongly managed to minimize its effects on the environment, proper laws should be strongly preserved and maintained, suitable distance from the surrounding water body should be maintained, appropriate laws on dumping of industrial effluents should be set up as well as some lessening measures should be taken for example, alertness should be also built up among the people about the environment degradation due to the discharging of industrial effluents. Government should take zero tolerance against environmental pollution for our safety.

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