PHYSICOCHEMICAL CHANGES IN MUNICIPAL WASTEWATER TREATMENT PLANT

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Abstract- **The physicochemical parameters comprise pH, temperature (T), chemical oxygen demand (COD), alkalinity, and ammonia NH_3, . The results obtained in this study were as follows: temperature (21.6-23.7°C), pH (7.69 - 7.51), ammonia NH_3 is in range 0 to 1.8 mg/L and Chemical oxygen demand (COD) is in range (13 – 620mg/L), and alkalinity (370-200 mg/L). . We conclude that these municipal sewage plants are important point sources of pollution in surface water with possible public health and ecological risks. The present paper comprises of the various Physico-Chemical parameters and technologies used in waste-water treatment, with emphasis on municipal waste-water.**

Index Tems: **Waste Water, Physico-Chemical Parameters, final effluent and Operations of Treatment**

I. INTRODUCTION

The removal of impurities present in wastewater in the form of suspended solids, organic substances, and nutrients and removal of pathogens are some of the basic purposes of wastewater treatment [1-3]. Municipal waste-water is the mixing of liquid or water-carried wastes originating in the sanitary Conveniences of dwellings, commercial or industrial facilities and institutions [4]. Municipal wastewater treatment plants often discharge their treated effluents back to the environment, the majority especially surface water environments .Untreated or inadequately treated municipal sewage discharges might have public health compromising pathogens and hazardous elements (e.g., heavy metals) as well as chemical substances that could lead to hostile environmental effects such as alterations of aquatic organism behaviours and structure, reduction in diversity of life on earth, diminishing the quality of recreational waters and shellfish harvesting zones, and polluting of water meant for consumption[5-6].

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The major purpose of municipal treatment plants is to protection of the environment in a manner commensurate with public health and socio-economic concerns. Another goal is to study on a variety of waste-water treatment technologies, technical details on treatment methods, applications and sludge disposal.

II. MATERIALS AND METHOD

Two samples (A,B) were collected every day as shown in figure 1 , sample A was taken from inflow of wastewater to the station before treatment by activated sludge situate in Alhadhbah- Tripoli. Municipal wastewater treatment plant and station received wastewater from houses, shopping, the hostels, and faculties. Sample B was taken from outflow of wastewater after treatment. A total of 5 water quality parameters were studied are temperature (T), pH, COD, ALK,and Ammonia. For temperature, pH, COD, Alkalinity, and Ammonia samplings were carried out two times during January and February of 2017. All samples were collected in polyethylene bottles as shown in figure 2 and kept in a humid dark place and sent to the laboratory on the same day. Physicochemical analyses were carried out in the analysis laboratory, environmental laboratory which belongs to Alhadhbah- Tripoli municipal wastewater treatment plant.


(A) (B)

Figure 1. Shown Samples (A,B) Before and After Treatment.

Figure 2. Shown Polyethylene Bottles.

A. Sample Analysis

Samples were filtered (0.5 um membrane filter) as shown in figure 3 and the raw wastewater is characterized by the following physicochemical parameters presented in the Table 1. Physical parameters as Temperature (^{0}C), pH, and Alkalinity were measured by using (a pH meter 3151WTW 82362 Wellheim as shown in figure 4. Chemical Oxygen Demand (COD), Nitrate NO_3-N, Nitrite and ammonia NH_3 were measured by using COD reactor analyzing model HACH DR 2010 Spectrophotometer as shown in figure 5. Physicochemical parameters were measured in accordance with the Standard Method for Examination of Water and Wastewater (2005).

Figure 3. Shown Sample Filtration

Figure 4. Shown pH Meter

Figure 5. Model HACH DR 2010 Spectrophotometer

B. Hydraulic Flowchart

Figures 6. Shows plan of the hydraulic flowchart of Alhadhbah- Tripoli municipal wastewater treatment plant with five units to treatment waste water , first unit is screen to separate a big solid from water ,pumps room to send water to clean room by sand tanks after that the water send to sedimentation tank to removal total Suspended solids SS out after that the water send to aeration tank to removal ammonia (NH_3) and the water send to sedimentation tank .

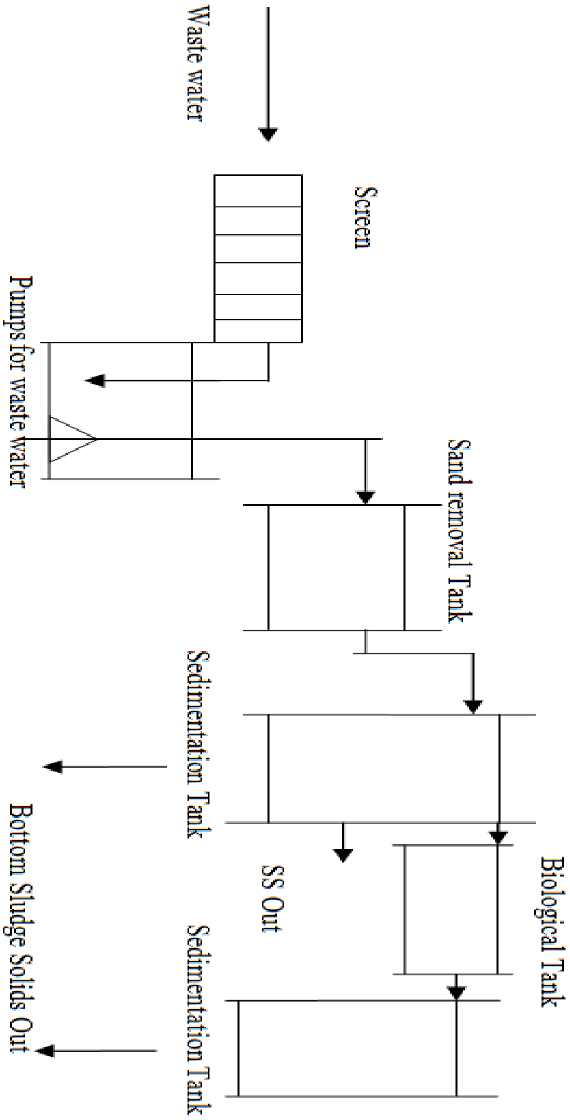

Figure 6. The Hydraulic Flowchart of Alhadhbah- Tripoli Municipal Wastewater Treatment Plant

III. RESULTS AND DISCUSSIONS

The initial results of the physicochemical of the wastewater samples are presented in Table 1.

Table 1. The initial values of some physicochemical parameters in raw water

Parameters	Raw water
pH	7.69
Temperature	23.7 ^{0}C
COD	340 mg/l
Ammonia(NH_3)	48 mg/l
ALK	370 mg/l

The most significant factor in aerobic waste water treatment is pH, normally in aerobic treatment system , aerobic bacteria acclimatize circumstance with in wide range of pH value. the majority of aerobic bacteria can grow well in pH value range of pH 5 -8.5. bacteria are very sensitive to the change of the pH value. The vary of the pH value will cause the growth of bacteria even the pH value changes in the growth range. The pH value will fall down quickly and contrarily when the influence waste water with a great amount of soluble carbohydrates, such as fecula and saccharide is adapted. If the influence waste water is acidized then the pH value will augment quickly. though, if the entering waste water contains a great amount of protein and aminophenol, the pH value will increase but not much because ammonia will be produced by those compounds. Therefore, the pH value of the influence waste water should depend on the characteristic of the waste water. The measured of pH was 7.69 in influence and it was 7.51 in outflow of wastewater after treatment as exposed in figure 7. Alkalinity can be defined as the ability of a water to neutralize acid or to absorb hydrogen ions. It is the sum of all acid neutralizing bases in the water. In municipal and industrial wastewater there are many factors which contribute alkalinity. Factors which contribute to alkalinity include the kind of dissolved inorganic and organic compounds present in the water, the amount of suspended organic matter in the water, whether the water is strongly or weakly buffered, the presence or absence of free hydroxyl alkalinity, the amount of bicarbonate in the water, the bicarbonate to dissolved CO_2 ratio and is indirectly correlated to the amount of dissolved solids in the water [13]. The alkalinity profile ranged 370-200 mg/L in influence and in effluent as shown in figure 8. Low alkalinity levels were observed in influence compared to effluent , while alkalinity was generally high in influence which may be linked to the industrial effluents discharged at the plant. Temperature over range will cause the death of the bacteria. In addition, if keep working in over range temperature condition for a time long enough, bacteria will not recover after the temperature recovers. Death of bacteria is not caused by temperature lower than the low limitation but bacteria will stop or decrease the metabolize activities gradually. Bacteria can keep alive for a long time when they dormancy . Once the temperature recover to the growth temperature bacteria will recover soon. The temperature profile generally varies significantly and ranged between 23.7 and 21.6ºC at all sampling and the lowest and the highest temperatures were both recorded at municipal wastewater treatment plant. High temperature may produce softening of bituminous joints and increase odour as a result of anaerobic reaction, and can be deteropans to the pipe material itself [10], and the temperature of the effluents might pose a threat to the aqua-based organisms. The measured of temperature was 23.7^{o}C influence and it was 21.6^{o}C in outflow of wastewater after treatment as shown in figure 9. Wastewater treatment is a significant issue in environment protection, that includes a lot of topics such as ammonia removal. Ammonia (NH_3) is one of the main contaminants presented in the municipal wastewater. It is formed by bacteria decomposition processes of organic matter. Ammonia contribute to several environmental impacts including eutrophication of surface water, soil acidification, fertilization of vegetation and changes in ecosystem. . The influent concentration of ammonia NH_3 varied from 12.6 to 76 mg/L as shown in Figure 10 and corresponding to the effluent concentration of ammonia NH_3 is in range 0 to\ 1.8 mg/L. Approximately 86% of NH_4-N converted to nitrate and nitrite nitrogen as shown in the Figure 11. Biochemical oxygen demand is described as the amount of oxygen required to break down organic substances in water while COD is the amount of strong oxidant required to break down both organic and inorganic matters [11]. The influent concentration of COD varied from 240 to 620 mg/L as shown in Figure 12 and corresponding to the effluent concentration of COD is in range 17 to 61 mg/L. COD in the aquatic system is caused by high levels of organic matters such as leaves **and** industrial effluents, wastewater treatment plants,and food processing plants. High levels of COD in water may point to poor water standards caused by municipal or farmed effluent discharges, which may in turn result in higher oxygen depletion that affects aquatic organisms [12-13]

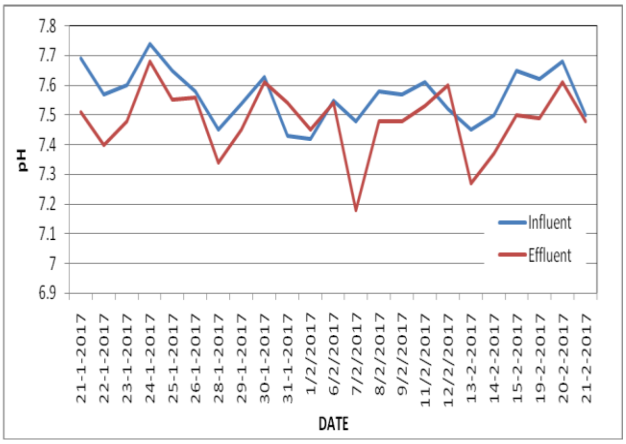

Figure 7. Influent and Effluent of pH Profile with Elapsed Time

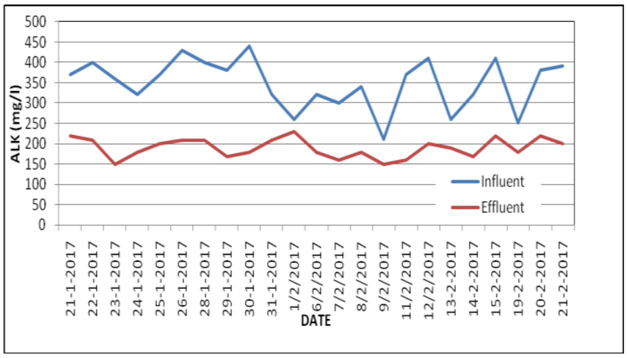

Figure 8. Influent and Effluent of Alkalinity Profile with Elapsed Time

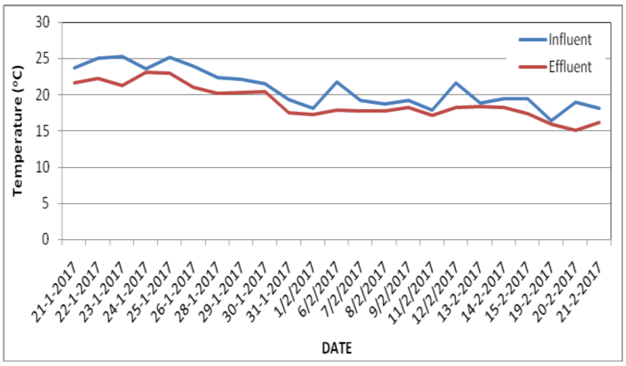

Figure 9. Influent (A) and Effluent (B) of Temperature Profile with Elapsed Time

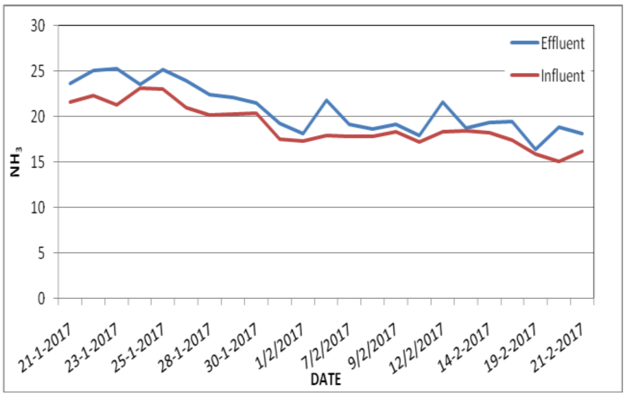

Figure10. Influent and Effluent of NO3-N Profile with Elapsed Time

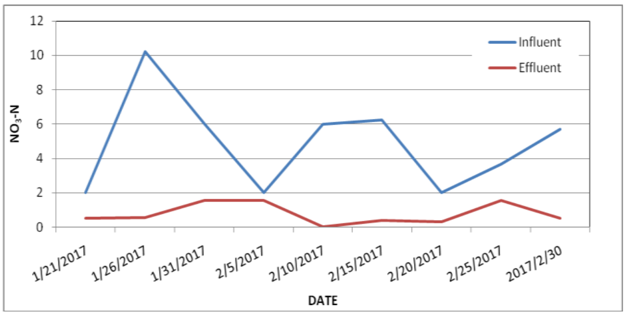

Figure 11. Influent and Effluent of NO3-N profile with Elapsed Time

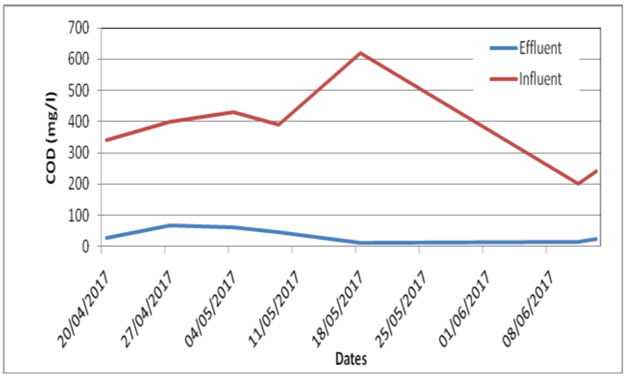

Figure 12. Influent and Effluent of COD Profile with Elapsed Time

IV. CONCLUSIONS

Waste-water treatment is becoming even more significant in the light of diminishing water resources, rising industrial, domestic and agriculture water usage and consequently waste-water disposal and its costs along with stricter discharge regulations that have lowered permissible contaminant levels in waste streams. Physical treatments are very significant with in the waste water treatment systems and prior to any biological and advanced treatment technologies. In the present paper an attempt has been made to explain and illustrate the unit processes and operations of physical , treatment and physicochemical parameters in detail with a view to impart conceptual knowledge for the success of any waste water treatment technology.

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