

Study Some of the Specific Characteristics of Sewage in the Industrial Zone of Kirkuk, Iraq

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Abstract - Industrial wastewater is one of the dirtied water coming about because of different human exercises, the improvement of modern cycles today has prompted the tainting of water, soil, and residue with risky substances and misuse of weighty metals, which is a consequence of modern exercises, for example, minig mining, refining, electroplating, and a few enterprises. the significance of the human wellbeing perspective is focused on exceptional consideration by the pertinent services and divisions, so the flow study was led on a few physical and compound properties of modern wastewater for the modern zone in Kirkuk Governorate for a time of five months from (25/2 to 24/6/2023). The results showed water temperatures ranging between (20.4 – 21.5°C). The electrical conductivity ratio was limited to ($\mu\text{S}/\text{cm}$ 692.2-1455.6). The percentage of dissolved solids ranged between (450-973.2 $\mu\text{S}/\text{cm}$), and for turbidity, the rates ranged between (30.6-200.2NTU). A turbidity unit. The values of the pH function ranged between (6.68-7.36). It was found that total hardness is high in most study stations at rates ranging from (mg/L 445.2--682.6). The calcium and magnesium hardness ranged at a rate of (217.4-457.4 mg/L) and (180.4--237.8 mg/L) respectively, while the total basicity ranged between (194.6-300 mg/L) during the current study period.

Keywords: Industrial wastewater, Water pollution, Heavy metals, Kirkuk Governorate, Water quality, Physical properties, Chemical properties, Environmental impact, Human health, Total hardness.

I. INTRODUCTION

Water pollution may occur directly or indirectly due to human activities, and may endanger aquatic ecosystems [1]. The development in industrial processes today to water pollution with hazardous substances is the result of industrial activities such as mining, refining, electroplating and some industries [2].

The physical and synthetic properties of modern water are of extraordinary significance and a significant figure deciding the quality and reasonability of water and they give a

thought of the water content of natural and inorganic components and mixtures [3].

The release of modern water into streams makes colossal harm the amphibian climate because of the great centralizations of destructive ecological determinants contained in water [4].

Human activities may also cause rapid pollution of aquatic sources through the direct discharge of industrial and wastewater into water bodies without treatment, resulting in increased river pollution and degradation of water quality [5].

II. MATERIALS AND METHODS

The examples were gathered from the modern zone west of Kirkuk city, five focuses were chosen from the modern water seepage organization, one example was taken each month from each point and for the period from 25/2/to 24/6/2023, sewage tests were gathered by sterile polyethylene compartments and an undeniable limit of 5 liters and three repeaters after it was washed two times with test water at each station and subsequent to filling it, its spout was shut well and kept in a stopper holder assigned for move to the research center, a few tests were led on it Direct physical and compound specifically:

- Water temperature, electrical conductivity, dissolved solids, total hardness according to the method [4].
- pH, calcium and magnesium hardness according to the method [5]
- Total basal by method [6].



Figure 1: Study Area

III. RESULTS AND DISCUSSION

1. Water Temperature

The nature and arrangement of modern water change as per the circumstances in the studios, works and materials utilized in upkeep [7]. The typical water temperature in the review region ran between 20.4 - 21.5 in the third and fourth stations separately, temperature is one of the principal factors that influence natural action, whether in sea-going or land conditions, and every organic entity has a particular warm reach where it exists and spreads [8].

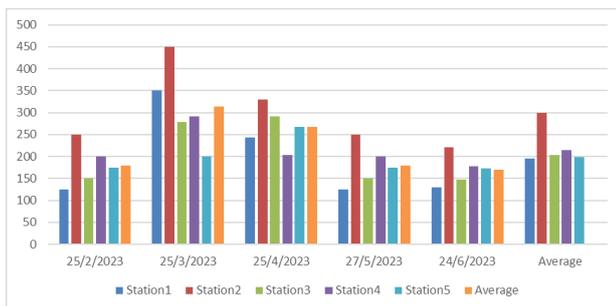


Figure 2: Monthly changes of water temperature during the study period (°C)

2. Electrical conductivity (E.C)

The aftereffects of the flow investigation of the kept upsides of electrical conductivity in the sewage of the review region showed that their rates went between 692.2-1455.6 in the third and second stations separately, and the consequences of electrical conductivity were contrasted and the standard qualities and were higher than them in the vast majority of the review stations as per the US Natural Security Organization [9]. This distinction in electrical conductivity values between concentrate on stations is because of the circumstances in the studios and the materials utilized in upkeep [10].

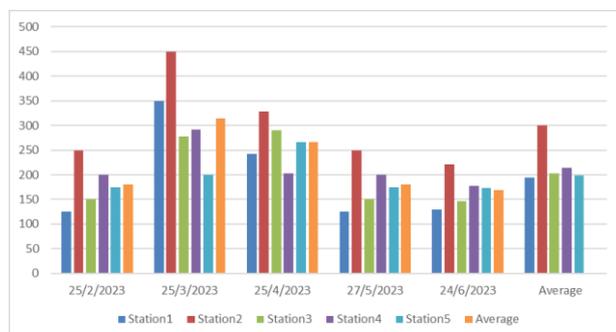


Figure 3: Electrical conductivity of plant water during the study period (microscopes/cm)

3. Total Dissolved Salts TDS

The consequences of the flow concentrate on in Figure (4) show that the fixation paces of disintegrated salts range

between 450- - 973.2 in every one of the third and second stations separately, and the explanation might be because of the great water levels of the stream because of the precipitation throughout the colder time of year, which cleared away with an amount of contaminations and diminished throughout the late spring because of low water levels [11]. The aftereffects of TDS were likewise contrasted and the standard qualities and were higher than in some review stations as per the Focal Association for Normalization Quality control of drinking water was 1000 mg [11].

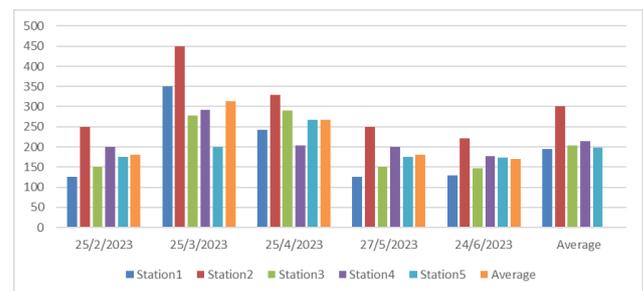


Figure 4: Monthly changes of dissolved solids for plant water during the study period (mg/L)

4. Turbidity

The paces of turbidity values as displayed in Figure (5) went between 30.6-200.2 NTU at the first and second stations separately, and the outcomes in the majority of the review stations were higher than the standard worth (5 NTU) as per the Focal Association for Normalization and Quality Control of Drinking Water [12].

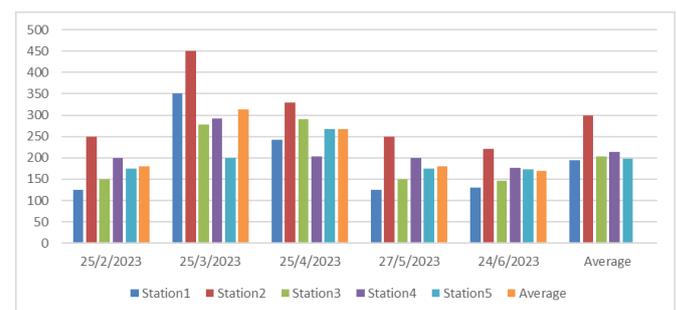


Figure 5: Monthly changes of plant water turbidity during the study period (NTU)

5. Chemical properties

pH: The aftereffects of the ongoing review showed that the pH keeps an eye on powerless basal in most review stations, as its rates run between 6.68-7.36, the high pH capability is because of the presence of essential particles. Where the pH values didn't diminish in the majority of the five review stations to the acidic side, for example they were of a frail base nature, the degree of variety in the pH values to the base side is because of the water containing carbons and

bicarbonates, notwithstanding what enters the water body of these mixtures from the dirt encompassing the water body, taking into account that the Iraqi soils are wealthy in these mixtures [13].

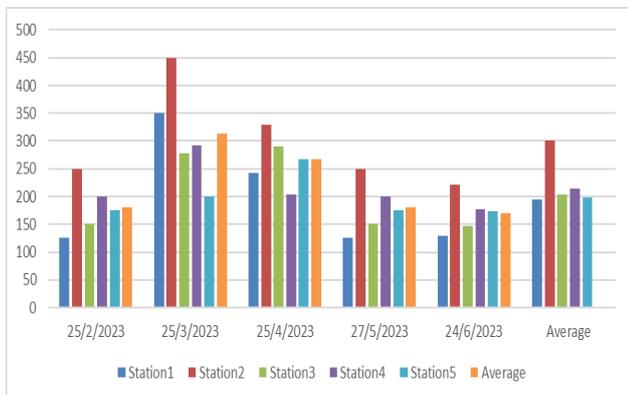


Figure 6: Monthly changes of pH of plant water during the study period

Total Hardness: The aftereffects of the ongoing review displayed in Figure (7) that the all-out hardness rates range between 445.2- - 682.6 in the fourth and second stations separately, demonstrating the scattering and heterogeneity of values between the stations. Changes in absolute hardness show what is added to the sewage of modern and human waste as well as the absence of release. The outcomes were contrasted concurring with the Focal Association for Normalization and Quality Control of drinking water, which was 500 mg, as it was higher than in many stations [14].

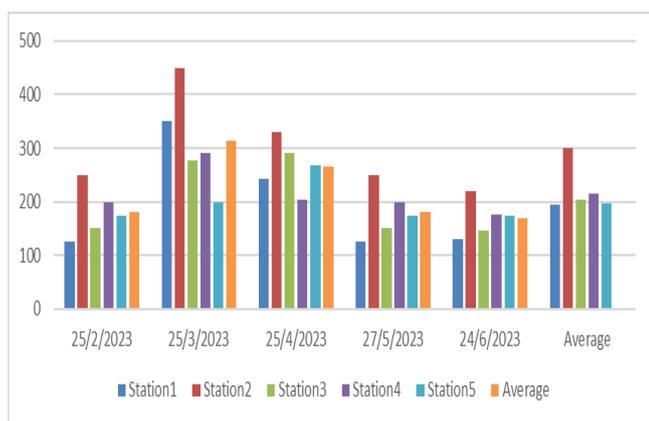


Figure 7: Monthly Changes of Total Plant Water Hardness during Study Period (mg/L)

Calcium hardness: The aftereffects of the ebb and flow study displayed in Figure (8) that the paces of calcium hardness values range between 217.4-457.4 in the fifth and second stations separately, where they are viewed as high in many stations, when contrasted with contrasted agreeing and what was expressed in the Focal Association for Normalization and Quality Control of Drinking Water [15].

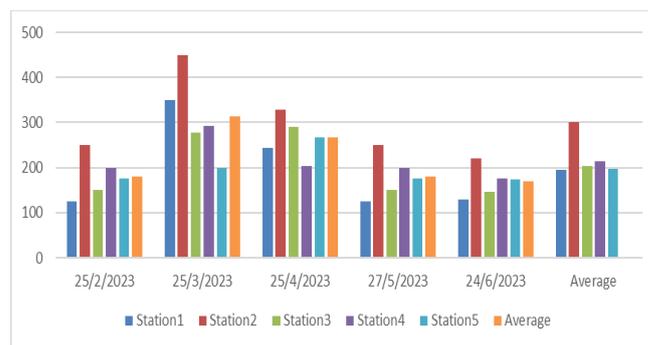


Figure 8: Monthly Changes of Calcium Hardness of Station Water during Study Period (mg/L)

Magnesium hardness: The aftereffects of the ebb and flow study displayed in Figure (9) that the paces of calcium hardness values range between 217.4-457.4 in the fifth and second stations separately, where they are viewed as high in many stations, when contrasted with contrasted agreeing and what was expressed in the Focal Association for Normalization and Quality Control of Drinking Water [15].

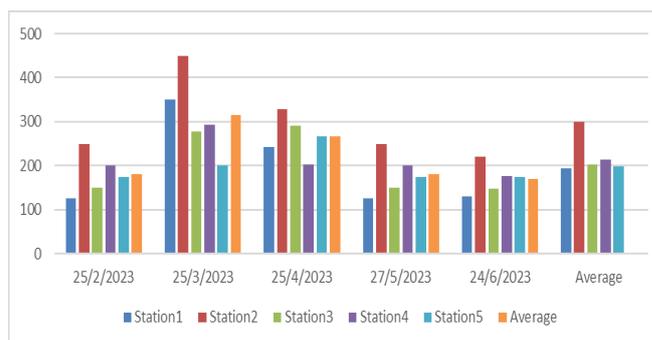


Figure 9: Monthly changes of magnesium hardness of plant water during the study period (mg/L)

Total Alkalinity: The average values of the total basicity during the current study period ranged between 194.6-300 in the first station and the second station respectively, the total base values may be due to the nature of the pollutants of the study area, and this variation varies according to the source of CO₃ and HCO₃ bicarbonate in water [16].

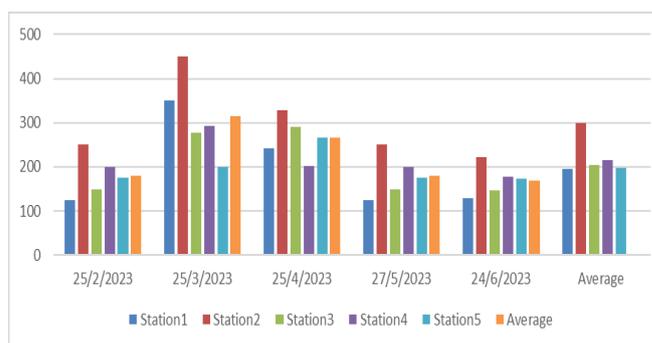


Figure 10: Monthly changes of total base of station water during the study period (mg/L)

IV. CONCLUSION

In conclusion, the study directed on the attributes of sewage in the modern zone of Kirkuk, Iraq, gave significant bits of knowledge into the quality and organization of modern wastewater in the area. The discoveries uncovered a few key perceptions, including different physical and synthetic properties like water temperature, electrical conductivity, broke up solids, turbidity, pH, all out hardness, calcium hardness, magnesium hardness, and complete alkalinity. These boundaries assume significant parts in deciding the appropriateness of water for different purposes and surveying its natural effect. The outcomes showed variances in these properties during the review time frame, affected by factors like occasional changes, modern cycles, and contamination releases. Raised degrees of contaminations, including weighty metals and risky substances, present dangers to human wellbeing and the climate, highlighting the requirement for powerful administrative measures and wastewater treatment conventions. The review features the significance of observing and relieving the effects of modern wastewater on general wellbeing and ecological trustworthiness and calls for extensive administration techniques to address water contamination challenges in the locale. Generally, the review contributes significant experiences into modern wastewater attributes in Kirkuk, underlining the significance of cooperative endeavors to guarantee natural manageability and defend human wellbeing in modern regions.

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REFERENCES

- [1] Central Organization for Standardization and Quality Control. "Standard No. (417) for the year 2001." Republic of Iraq.
- [2] Khalouf, Nisreen. "Evaluation of the efficiency of the desalination unit and the treatment plant in the removal of some heavy metals in the effluents of Banias Refinery Company." Master's thesis, Tishreen University, 2013.
- [3] Saadallah, Hassan Ali Akbar, Sabah Faraj Buses, and Imad Al-Din Abdulhadi Al-Mukhtar. "Study of the Effect of the Hamrin Reservoir on Some Water Properties in the Diyala River." *Diyala Journal* 2, no. 7 (2000): 272-296.
- [4] Tali', Abdul Aziz Younis, and Najwa Ibrahim Al-Barhawi. "Pollution of the Tigris River with residential waste north of Mosul." *Journal of Education and Science* 6, no. 41 (2000): 121-129.
- [5] Obaidi, Hilal Hamoud Hayes Hassan. "Environmental study on groundwater quality in the north of Salah al-Din Governorate." Master's thesis, University of Tikrit, 2009.
- [6] Mustafa, Moaz Hamed, and Mona Hussein Jankees. "Qualitative variation of two sites on the Tigris River within the city of Mosul." *Journal of Mesopotamian Sciences* 18, no. 1 (2007): 113-125.
- [7] American Public Health Association. "Standard Methods for the Examination of water and wastewater," 20th ed., American Public Health Association, Washington DC, USA, 2003.
- [8] Al-Hamdani, Nour Ahmed Saadoun. "Application of water quality indicators to assess the water quality of a number of wells on the left coast of the city of Mosul / Iraq." Master's thesis, University of Mosul, Iraq, 2020.
- [9] AL-Mousawi, A. H., AL-Saadi, H. A., and Hassan, F. M. "Spatial and seasonal variation of phytoplankton population and related environment in AL-Hammar Marsh, Iraq." *Basrah Journal of Science* 12, no. 7 (1999): 10-20.
- [10] Al-Safawi, Abdulaziz Younis Talee, and Younis Reda Flowers Al-Assaf. "Qualitative Evaluation of Tigris River Water Using Water Quality Factor WQI for Drinking Purposes of Nineveh Governorate, Northern Iraq." In *Proceedings of the Seventh International Conference of the Water Resources Research Center, Mosul University*, pp. 189-200, 2018.
- [11] American Public Health Association. "Standard Method for Examination of water and wastewater," 23rd ed., American Public Health Association, Washington DC, USA, 2017.
- [12] American Society for Testing and Materials. "Annual Book of ASTM standards," Philadelphia, USA, 1989.
- [13] Azuml, S. D., and Bichl, M. H. "Industrial pollution and heavy metals profile of Challawa river in Kano, Nigeria." *Journal of Applied science in Environmental sanitation* 5, no. 1 (2010): 23-29.
- [14] Dogan, A. U., Dogan, M., Onal, M., Sarikaya, Y., Aburub, A., & Wurster, D. E. "Baseline studies of the clay minerals society source clays: specific surface area by the Brunauer Emmett Teller (BET) method." *Clays and Clay Minerals* 54, no. 1 (2006): 62-66.
- [15] Mahmoud, B. A. M. "Laboratory Scale Peat Filter For Grey Water Treatment." Master's thesis, University of Babylon, Iraq, 2019.
- [16] Metcalf and Eddy. "Wastewater Engineering: Treatment and Reuse," 4th ed., McGraw-Hill, New York, 1991.

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