analytical estimation and chemical treatment for some inorganic and organic pollutants in surface watear

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Egypt has been facing increasing problems due to the pollution of its surface and groundwater. Major water bodies in Egypt are receiving increasing loads of domestic, industrial, and agricultural pollution loads due to the inadequate and insufficient treatment facilities. This deterioration in Egypt’s water quality threats the beneficial uses of water for domestic, agriculture, and industrial purposes.The main objective of the present thesis is to study the sources of surface water pollution in Qalubia Governorate through the determination of chemical pollutants such as trace metals, major cations, major anions and organic matter. Also, the study includes the use of polyferric sulfate in wastewater treatment, and the removal of trace metals from wastewater by sulfide precipitation.Thesis Contents:The current thesis consists of five chapters. Chapter I includes the thesis introduction. Chapter II contains the thesis literature review. Chapter III includes the different materials and the scientific methods which are applied in the practical part. Chapter IV includes the results and discussion. Finally, chapter V summarizes -the finding and conclusions of the study.The results can be summarized as follows:I Physicochemical Parameters• The pH values for the Nile River water samples ranged from 7.27 to 8.30, while for the drains water samples ranged from 7.12 to 8.01. Decrease in the pH values of drains water compared to the River Nile water may be due to that these drains contain largequantities of organic matter that get oxidized by bacterial decomposition.•EC values for the Nile River water samples ranged from 320 to 440 j.iS/cm, while for drains water samples ranged from 1130 to 1520 µS/cm . The increase in EC values for drains water reflects the increase in soluble cations and anions, which were produced from the activities in the area under study.•TDS values for the Nile River water samples ranged from 187 to 263 mg/L. On the other hand, in drains water samples, TDS values, ranged from 687 to 941 mg/L.•The results of hardness in the Nile River water ranged from 115.45 to 164.67 mg/L as CaCO3. According to these results the Nile River water is considered to be moderately hard. On the other hand, the results of hardness in the drains water, are considered to be hard water. The hardness as CaCO3 ranged from 216.56 to 300.05 mg/L.11-Major Cations•In the Nile River water samples sodium concentrations ranged from 17.82 to 23.50 mg/L, while in the drains water samples ranged from 122 to 198 mg/L.•Potassium concentrations for the Nile River water samples ranged from 4.87 to 6.09 mg/L. In drains water samples, potassium

concentrations ranged from 13.70 to 23.8 mg/L.•Calcium concentrations for the Nile River water samples ranged from 33.37 to 53.10 mg/L. In drains water samples, calcium concentrations ranged from 48.76 to 71.35 mg/L.•Magnesium concentrations for the Nile River water samples ranged from 5.81 to 7.80 mg/L. In drains water samples, magnesium concentrations ranged from 21.30 to 31.80 mg/L.•Boron concentrations for the Nile River and drains water samples were less than 1.0 mg/L.III-Major Anions•Fluoride concentrations for the Nile River water samples ranged from 0.26 to 0.41 mg/L, while for drains water samples ranged from 0.26 to 0.45 mg/L. The fluoride concentrations of the River Nile and drains water samples were within the permissible limits of law 48 (not exceed 0.5 mg/L).•Chloride ion concentrations for the Nile River water samples ranged from 12.21 to 29.21 mg/L, while for drains water samples ranged from 117.00 to 221.00 mg/L.•Nitrate concentrations for the Nile River water samples ranged from 1.8 to 14.80 mg/L. In drains water samples, nitrate concentrations ranged from 6.40 to 19.30 mg/L. The nitrate concentrations for the Nile River and drains water samples were within the permissible limits of law 48 (not exceed 45 mg/L).•Sulfate concentrations for the Nile River water samples ranged from 18.40 to 47.40 mg/L, In drains water samples, sulfate concentrations ranged from 66.20 to 121.2 mg/L. Sulfate concentrations in the Nile River and drains water samples were within the permissible limits of law 48 (not exceed 200 mg/L).•Phosphate concentrations for the Nile River water samples were less than 1.0 mg/L (the permissible limits of law 48),In drains water samples, phosphate concentrations ranged from 0.92 to 11.87 mg/L.IV-Trace Metals•Aluminum concentrations for the Nile River water samples ranged from 0.06 to 6.41 mg/L. In drains water samples, aluminum concentrations, ranged from 0.09 to 0.63 mg/L.•Barium concentrations for the Nile River water samples ranged from 0.02 to 0.06 mg/L. In drains water samples, barium concentrations ranged from 0.05 to 0.12 mg/L.•Cadmium concentrations for the Nile River water samples were less than 0.01 mg/L (the permissible limits of law 48), except samples No. All and A15. In drains water samples, cadmium concentrations exceeded the permissible limits of law 48 (not exceed 0.01 mg/L) except samples No. B1 and B12. The presence of cadmium in water samples is mainly due to industrial discharge wastes in the area under study.•Chromium concentrations for the Nile River water samples were less than 0.05 mg/L (the permissible limits of law 48),In drains water samples, chromium concentrations were more than 0.01 mg/L (the permissible limits of law 48) except samples No. B 12 and B13.•Copper concentrations for the Nile River and drains water samples were less than 1.0 mg/L (the permissible limits of law 48).•Iron concentrations, for the Nile River water samples were less than 1.0 mg/L (the permissible limits of law 48),In drains water samples, iron concentrations ranged from 0.37 to 2.01 mg/L. Most of the drains water samples were higher than the permissible limits of law 48 (not exceed 1.0 mg/L).•Manganese concentrations for the Nile River water samples were less than 0.5 mg/L (the permissible limits of law 48),In drainswater samples, manganese concentrations were higher than 0.5 mg/L (the permissible limits of law 48). The presence of manganese in the drains water is mainly due to excess irrigation water.•Nickel concentrations for the Nile River and drains water samples were less than 0.1 mg/L (the permissible limits of law 48) except samples No. B I,

B2 and B4.•Lead concentrations for the Nile River water samples ranged from 0.01 to 0.11 mg/L. Lead concentrations in most of the Nile River water samples were higher than the permissible limits of law 48 (not to exceed 0.05 mg/L). Presence of lead in the River Nile water in the area under study is mainly related to precipitation of lead dust fallout as a result of heavy traffic and condensed human population.•Zinc concentrations for the Nile River and drains water samples were less than 1.0 mg/L (the permissible limits of law 48).V-Organic Matter•TOC concentrations for the Nile River water samples ranged from 2.73 to 8.75 mg/L, while for drains water samples ranged from 16.84 to 62.47 mg/L.•In drains water samples, COD concentrations ranged from 130 to 540 mg/L.•In drains water samples, BOD concentrations ranged from 40 to 240 mg/L.•Oil and grease concentrations for the Nile River water samples ranged from 0.11 to 5.30 mg/L. All oil & grease values werehigher than the permissible limits of law 48, (not to exceed 0.1 mg/L).VI-Removal of Trace Metals•The results showed that, trace metals can be removed by precipitation as sulfides through the addition of sodium sulfide to very low concentrations under alkaline condition. Optimum pH, which gives higher metal removal, was 7.5 for Chromium and Aluminum, 8.5 for Copper, Cadmium and lead, 9.5 for Nickel and Zinc.•The results data showed that, high concentrations of sulfide were shown to be more efficient in removal of trace metals than lower concentrations.•Sulfide precipitation has shown to be able to remove trace metals from actual industrial wastewater to values below the standards limit of Law 48/1982.-Removal of TOC•Different doses of polyferric sulfate and ferrous sulfate were used to reduce the concentrations of TOC. The results showed that the reduction of TOC was found to be greater with polyferric sulfate than ferrous sulfate for the same coagulant dose used. The use of polyferric sulfate in water treatment is expected to reduce treatment costs through a lower coagulant dose.