

## DETERMINATION OF HEAVY METAL CONCENTRATIONS IN EFFLUENTS EMANATING FROM VEGETABLE OILS AND CHEMICAL INDUSTRIES IN NAIROBI COUNTY

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### Abstract

*The rate at which Kenya is urbanizing is alarming. Millions of Kenyans are relocating to urban centers every year to search for employment opportunities in industries. As a result of this rapid population growth and urbanization, there is a high demand for goods such as vegetable oils and detergents. These oils and detergents are contaminated with heavy metals through endogenous and exogenous sources. Most of these industries discharge their effluents in sewers, rivers and other water bodies without following the NEMA, KEBS and WHO guidelines. This project was therefore aimed at determining the concentration of Pb, Cd, Cr, Mn, Cu and Zn from effluents emanating from chemical and vegetable oil industries and determines their level of compliance. Samples from the two industries were collected on the same day at two sampling points; (I) Entry to the treatment plant for untreated effluents. (ii) Discharge from the treatment plant for treated effluents. Digestion of the samples was carried out using aqua-regia. Analysis of heavy metals was carried out using atomic absorption spectrophotometer. Physicochemical parameters were also determined using the standard method for the examination of waste and waste water.*

*The concentration of Cd, Zn, Mn and Cu were within the set standards of discharge with mean value  $\pm$  standard deviation (sd) in the treated effluent of chemical industry as  $0.02 \pm 0.01$ ,  $0.44 \pm 0.07$ ,  $0.64 \pm 0.37$  and  $0.04 \pm 0.01$  respectively. Similar results were obtained from a vegetable oil industry where the mean concentration  $\pm$  sd for Cd, Zn, Mn and Cu in the treated effluents were  $0.02 \pm 0.01$ ,  $0.39 \pm 0.13$ ,  $0.56 \pm 0.04$  and  $0.05 \pm 0.01$  respectively. Chromium was not detected in both untreated and treated effluents from the two industries. Lead concentration in chemical industry exceeded the KEBS limits. For the physicochemical parameters, Total dissolved substances (TDS) values in the chemical industry were within the limits however in the vegetable oil industry, the values exceeded the limits set by NEMA and KEBS. Electrical conductivity values in the treated effluents from the chemical industry were within the NEMA and KEBS limits while the conductivity values in treated effluents exceeded both limits. All the pH and temperature values were within the NEMA and KEBS limits.*

*Due to the presence of heavy metals and total dissolved substances in the effluents, regular monitoring of the effluent from these companies is important. NEMA should enforce the existing regulations for compliance.*

**Key Words:** Heavy Metals, Effluents, Vegetable oils, Chemical Industries, Sampling