

ASSESSMENT OF AN OILY WASTEWATER TREATMENT PLANT IN NYANKROM INDUSTRIAL AREA, GHANA: PHYSICO-CHEMICAL QUALITY OF EFFLUENT WATER AND TREATMENT EFFICIENCY

Godfred Safo-Adu

Department of Integrated Science Education
Faculty of Science Education
University of Education, Winneba
GHANA
gsafoadu@gmail.com

ABSTRACT

The study assessed the physico-chemical quality of effluent water and the efficiency of an oily wastewater treatment plant in an oily waste treatment facility in Nyankrom industrial area in the Western Region of Ghana. The oily wastewater treatment plant had a flow rate of 4 m³/hour and a treatment capacity of 50 m³. Influent and effluent water samples were collected monthly, starting from November 2018 to October 2019. Twenty physico-chemical parameters of the influent and effluent samples were analysed. The average removal efficiency of each parameter was calculated and the quality of effluent water was assessed by comparing the levels of effluent water parameters to the Ghana EPA effluent water guideline values. Pearson correlation and independent t -tests were used to analyse the data. The study revealed that the oily wastewater received at the oily waste treatment facility for treatment had high level of dissolved salt. The oily wastewater treatment plant had high efficiency in removing turbidity (87.0 %), TSS (95.5 %), TDS (94.6 %), EC (94.8 %), BOD (91.7 %), oil/grease (96.2 %) and moderate efficiency in dealing with Cr (67.7 %), Zn (66.4 %), Cu (68.6 %) and Fe (66.7 %). Moreover, the oily wastewater treatment plant removal efficiency of Hg (30.0 %), As (50.0), and Pb (50.0 %) was low. There was no significant difference between influent and effluent mean concentrations of Hg, Pb, and As ($p > 0.05$). The mean effluent physico-chemical parameters met the Ghana EPA effluent water guideline values. However, the maximum levels of TDS, EC and total phosphorus exceeded the Ghana EPA guideline values. Statistically, the effluent TDS contributed moderately to the level of EC ($r = 0.70$, $p < 0.05$). Conclusively, the physico-chemical quality of oily wastewater treatment plant effluent was satisfactory but can be improved. It is recommended that chemical precipitation and coagulation unit should be integrated into the oily wastewater treatment plant to help boost the treatment plant ability to deal with TDS, EC and total phosphorus and improve efficiency in removing As, Hg and Pb.

Keywords: Effluent, Physico-chemical, Oily wastewater, Quality, Treatment efficiency.