FACULTY OF APPLIED SCIENCES

DEPARTMENT OF APPLIED CHEMISTRY

Characterization and removal of toxic heavy metals from activated sewage sludge:

A case study of Eisleby sewage plant in Richmond Bulawayo.

BY

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"A project report submitted to the Faculty of Applied Sciences, National University of

Science and Technology, in partial fulfilment of the requirements for the Degree of Bachelor

of Science Honours in the field of Applied Chemistry."

MAY 2014

ABSTRACT

Heavy metals have always been a problem due to their increasing toxic threat to humans and the environment. Their removal has become an important issue due to strict measures introduced by various countries to enforce regulations concerning wastes originating from manufacturing industries. Hence, wastewater containing such compounds must be treated. Analysis of sewage sludge showed that lead and cadmium concentrations of 0.30 ppm and 0.505 ppm respectively were above the maximum permissible limits, hence the need to remove them. In this research, batch adsorption studies were performed to determine the effects of pH, contact time, adsorbent dosage, and shaking speed on heavy metal sorption. The optimum pH was 7.2 (sample pH), equilibrium time was 15 minutes and optimum adsorbent dose was 0.2 g for both metals. The equilibrium data for the removal of cadmium and lead ions for first 20 minutes fitted into the pseudo first order model with R^2 values of 0.9643 and 0.9667 respectively and the one from 20 to 80 minutes fitted the pseudo second order model with R^2 values of 0.9977 and 0.9919 for cadmium and lead respectively. The composite adsorbent was a cost effective and good choice of adsorbent.