

LIBRARY USE ONLY

National University of Science and Technology Zimbabwe

Faculty of Applied Sciences

Department of Applied Chemistry

Project Title

*An integrated Process For The Recovering of Fine Coal
and Recycling Waste From Coal Tailings*

Bepete George
N002138D

LIBRARY		
NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY		
P.O. BOX 346 BULAWAYO ZIMBABWE		
DATE	ACCESSION NO.	RECEIVED BY
16/05/07	1822	RECEIVED BY

Supervisor: Mr D. Dube

*Submitted in partial fulfilment of the requirements for a
Bsc (Hons) Degree in Applied Chemistry*

May 2006



Abstract

This project presents a detailed study on an integrated process for the recovery of fine coal from coal tailings. The integrated process features three distinct mechanisms: hydrophobic extraction, coagulation and flocculation. In this process, fine coals in the tailings stream are extracted into a mineral oil by hydrophobic extraction, while a coagulant is used to aid effluent clarification by coagulation. With a single stage process, a coal-in-oil mixture (COM) is produced as a potential fuel, while clarifying the water for recycling. The hydrophobicity of coal is found to be a key parameter in coal extraction. The addition of mineral oil prior to coagulant addition, especially in the presence of fine clays, is beneficial for recovering weakly hydrophobic fine coals. In a further study it was found that re-grinding of original tailings is necessary to expose fresh hydrophobic surfaces and increase the degree of liberation. This helped in increasing the selectivity of the extraction, which is illustrated, by the increase in combustible recovery and in the decrease in the ash recovery in the mineral oil. Applying this single stage unit operation to a tailings containing 41% ash, a combustible recovery greater than 80% in the form of coal-in-oil mixture at product ash content less than 18 wt% was achieved.