

Magnetic Coagulation for Oily Waste Treatment

© Zhong Liu 2005
Master of Applied Science
Environmental Applied Science and Management
Ryerson University

ABSTRACT

The food-processing industry produces wastewater with high concentration of biological oxygen demand (BOD), total suspended solids (TSS), fats, oils and grease (FOG). Current treatment processes suffer from either insufficient contaminant removal efficiency or the sludge disposal problems. The project researches an on-site pre-treatment system, using the innovative concept of magnetic coagulation. The alpha tests demonstrate the performance of the magnetic coagulation system for the FOG removal, ranging from nearly 100% under good settling condition to 52.9% under unfavourable settling condition. In addition, 25.9% to 52.5% of the settled FOG-adsorbed magnetic powder could be recovered through thermal treatment. The vial tests investigate the adsorption capability of magnetic powder. Through an integration of the results from two phases, a synergy hypothesis for FOG removal mechanism is proposed and a mathematical model for the treatment of both oily sludge and oily wastewater is developed. Beta model unit of magnetic coagulator is also designed.