CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME I

Editors:

Suleyman Aremu Muyibi
Mohammed Saedi Jami
Zaki Zainudin

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CHAPTER 36

STUDY OF THE DEWATERABILITY OF KAOLINE AS A MODEL SUBSTANCE FOR SLUDGE

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ABSTRACT

This paper reports the results on enhancement of dewaterability of sludge using kaolin synthetic sludge as model material by addition of cationic polyacylamide (PAM-C) in the presence of surfactants which is anionic sodium dodecyl sulphate (SDS). In this study, kaolin synthetic sludge was used as model material as it has similar property of being very difficult to dewater like sludge. The results of different concentration of PAM-C-SDS combinations used was compared and optimized. Accordingly, the optimum concentration of PAM-C and SDS are found to be 0.96 mg/g and 0.25 mg/g where the optimum value for settling rate, SRF and cake moisture is predicted at 0.68cm/s, 4.915 x 10^9 m/kg and 51.22% respectively. At the end of the experiment, the optimal dosage of flocculants-surfactants combination was tested on actual sludge collected from wastewater treatment plant (WWTP). The settling rate of sludge is 0.159 cm/s, while value for SRF and cake moisture is 1.89 x 10^{11} m/kg and 90.342 %, respectively.

Keywords: wastewater, sludge, activated sludge model, dewaterability, flocculation, surfactant.

INTRODUCTION

Sludge is an active organic compound which comprises the solids and colloids produced from waste water treatment as well as substances from biological and chemical operation units. It represents only 1% or 2% of treated wastewater but contains from 50% to 80% of pollution (Boran et al., 2010). Operating cost for sludge treatment can amount to approximately 50% of the total operating cost of the whole wastewater treatment plant (Appels et al., 2008). It is important to optimize sludge management so that the sludge processing cost can be reduced as much as possible. The dewatering process applied in a wastewater treatment plant basically consist of mechanical dewatering like filter press and belt filter which ensure the particles drainage of the water mobilized by mechanical action (Vesilind and Hsu, 1997). The performances of these operations are generally insufficient to obtain adequate dryness for elimination and additional treatment process is necessary.

In the sludge treatment process, the main concern is separating the large amounts of water from solid residue and this process is referring to sludge conditioning. Coagulation or