

Disintegration of Waste Activated Sludge by Thermo-Chemical Pre-treatment

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Aim of the study: The activated sludge process is one of the most commonly used biological processes for treatment of both domestic and municipal wastewaters. Inevitably, the formation of large amounts of excess biomass (waste activated sludge, WAS) is the most important disadvantage of the activated sludge process. Anaerobic sludge digesters are commonly used to treat the waste sludge. However, the slow hydrolysis stage limits the efficiency of digesters. In order to improve the sludge digestion process, combination of thermal pre-treatment with potassium permanganate oxidation (called as “*thermo-chemical pre-treatment*”) was investigated in this study.

Material and Methods: Thermo-chemical disintegration of WAS was performed by using potassium permanganate in order to improve the solubilization of sludge, prior to the sludge digestion. For this aim, the influences of potassium permanganate dosage was investigated in the range of 250 – 1500 mg/L within one hour disintegration period. Pre-treatment experiments were conducted without any pH adjustment at 100 C. According to the results of the thermo-chemical pre-treatment experiments, optimal potassium permanganate dosage was found to be 250 mg/L. In order to determine the effects of chemical sludge disintegration on anaerobic sludge digestion, the biochemical methane production (BMP) tests were performed in mesophilic batch reactors.

Results: It was determined that the chemical sludge disintegration was enhanced the biogas (38%) and methane gas (34%) productions. Thus, the sludge disintegration via potassium permanganate was improved the anaerobic biodegradability by increasing the sludge solubilization.

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