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"Gheorghe Asachi" Technical University of Iasi, Romania

INFLUENCE OF VARIOUS COMBINATIONS OF HEAT PRETREATMENT ON HYDROGEN FERMENTATION FROM DEOILED JATROPHA WASTE USING MIXED MICROFLORA

Gopalakrishnan Kumar*, Periyasamy Sivagurunathan, Chiu-Yue Lin

Feng Chia University, Department of Environmental Engineering and Science, Taiwan

Abstract

This study emphasis the hydrogen fermentation from De-oiled Jatropha waste (DJW), a secondary and promising waste from biodiesel industry via influence of various combination of heat pretreatment using sewage sludge as inoculum. Batch experiments were carried out at a DJW concentration of 50 g /L, temperature of 55 ^{o}C and an initial cultivation pH of 7. The peak hydrogen production rate and hydrogen yield of 16.3 mmol H_2/L-d and 1.10 mmol H_2/g Volatile solids (VS), respectively, were obtained when untreated DJW was fermented with heat-treated seed sludge. The peak methane production rate and methane yield of 6.10 mmol CH_4/L-d and 1.80 mmol CH_4/g VS were observed from the control experiment. In addition, the untreated sludge with heat-treated substrate produced methane revealed that heat-treatment is necessary to inhibit methane producers. Mixed acid type metabolic pathway was observed in all the pretreatment conditions and the soluble metabolic products mainly composed of butyrate and acetate with smaller quantities of other acids and alcohols. The peak energy generation rate and energy yield were calculated as 94 kJ/L-d and 1.8 kJ/g VS added, respectively.

Key words: de-oiled jatropha waste (DJW), energy yield, heat pretreatment, hydrogen production rate, soluble metabolic products

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*Author to whom all correspondence should be addressed: e-mail: gopalakrishnanchml@gmail.com; Phone: +886-4-24517250 ext. 6200; Fax: +886-4-35072114