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Liang Guo, Zengshuai Zhang, Mengchun Gao, Zonglian She, Yangguo Zhao, Yiding Guo, Jian Sun

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**Comparison of thermophilic bacteria and alkyl polyglucose pretreatment on  
two-stage anaerobic digestion with waste sludge:**

**Biogas production potential and substrate metabolism process**

Liang Guo<sup>1,2\*</sup>, Zengshuai Zhang<sup>1</sup>, Mengchun Gao<sup>1</sup>, Zonglian She<sup>1</sup>, Yangguo Zhao<sup>1</sup>,  
Yiding Guo<sup>1</sup>, Jian Sun<sup>1</sup>

(1.College of Environmental Science and Engineering, Ocean University of  
China, Qingdao, 266100, China; 2. Key Laboratory of Marine Environmental  
and Ecology, Ministry of Education, Ocean University of China, Qingdao,  
266100, China)

**Abstract:** To gain a better understanding of the influence on two-stage anaerobic digestion of waste sludge with thermophilic bacteria (TB) and alkyl polyglucose (APG) pretreatment, changing of soluble chemical oxygen demand (SCOD), carbohydrate and protein in extracellular polymeric substances (EPS) and dissolved organic matters (DOM) were analyzed. The excitation-emission matrix (EEM) with fluorescence regional integration (FRI) was also used to investigate compositional and structural characteristics of DOM. The highest hydrogen and methane yield of TB pretreated sludge was 12.2 ml/g VS (volatile suspended solid) and 124.7 ml/g VS, and that of APG pretreated sludge was 28.3 ml/g VS and 19.9 ml/g VS. The VS removal of TB pretreated sludge (36.7%) was higher than APG pretreated sludge (27.1%) in the two-stage anaerobic digestion. The APG pretreatment could inhibit the activity of methanogens and the substrate (such as volatile fatty acids (VFAs), protein and soluble microbial materials) was accumulated compared with TB pretreatment.

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\* Corresponding author: Tel: +86 532-66781020 Fax: +86 532-66782810  
E-mail address: [geletu@ouc.edu.cn](mailto:geletu@ouc.edu.cn)

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