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"Gheorghe Asachi" Technical University of lasi, Romania



## EVALUATION OF BIOMETHANE YIELDS FROM HIGH-ENERGY ORGANIC WASTE AND SEWAGE SLUDGE: A PILOT STUDY FOR A WASTEWATER TREATMENT PLANT

Agnieszka A. Pilarska<sup>1\*</sup>, Krzysztof Pilarski<sup>2</sup>, Bogusława Waliszewska<sup>3</sup>, Magdalena Zborowska<sup>3</sup>, Kamil Witaszek<sup>2</sup>, Hanna Waliszewska<sup>3</sup>, Marek Kolasiński<sup>4</sup>, Karolina Szwarc-Rzepka<sup>5</sup>

<sup>1</sup>Institute of Food Technology of Plant Origin, Poznań University of Life Sciences, ul. Wojska Polskiego 28, 60-637, Poznań, Poland

<sup>2</sup>Institute of Biosystems Engineering, Poznań University of Life Sciences, ul. Wojska Polskiego 28, 60-637, Poznań, Poland <sup>3</sup>Institute of Chemical Wood Technology, Poznań University of Life Sciences, ul. Wojska Polskiego 28, 60-637, Poznań, Poland <sup>4</sup>Poznan City Hall, 61-847, Poznań, Poland

<sup>5</sup>Centre of Advanced Technologies, Adam Mickiewicz University, ul. Umultowska 89C, 61-614, Poznań, Poland

## Abstract

The article describes a pilot study on a wastewater treatment plant operating a biogas plant (2.793 MW). The authors of the experiment used organic waste material, including: chicken fat with feathers (FF), molasses (M), glycerol (GL), raw sewage sludge (SS) and digested sewage sludge as an inoculum. The parameters of raw and digested sludge were compared, e.g. changes in the concentrations of ammonium nitrogen (N-NH4+), alkalinities, chemical oxygen demand (COD) and light metal ions. Potential biodegradation pathways for the organic waste used in the experiments were also proposed. The proposed sequences of chemical reactions are a useful tool for further biochemical analyses and for the mathematical modeling of anaerobic digestion. The results showed that fat with feathers was the most valuable high-energy substrate as it gave a cumulative methane yield of 822 m<sup>3</sup>/mg VS (VS – volatile solids). There were comparable values of cumulative methane yield from molasses (350 m<sup>3</sup>/mg VS) and

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glycerol (342 m<sup>3</sup>/mg VS), whereas sewage sludge gave the lowest yield (246 m<sup>3</sup>/mg VS).

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<sup>\*</sup> Author to whom all correspondence should be addressed: e-mail: pilarska@up.poznan.pl; Phone: +48 61 848 73 08; Fax: +48 61 848 73 14