



Anaerobic digestion of waste from leather industry: biogas production potential by bench and pilot scale experiments

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Keywords:

Anaerobic digestion,
biological waste,
bioreactor,
biogas, methane,
leather, fleshing,
waste to energy.

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Abstract: Meat waste is the most common source of biological waste in the world, including Bosnia and Herzegovina. Leather industry contributes to the production of biological waste mainly through the processing of raw hides and the treatment of wastewater.

These residuals are difficult to be properly disposed and solutions such as thermal treatment, because of high water content, are less appealing. Anaerobic digestion could represent an attractive solution from the environmental and economic perspective.

Anaerobic digestion of leather industry wastes (raw hides fleshing and wastewater treatment surplus sludge) have been investigated using bench scale Biochemical Methane Potential tests (BMP) and a 1 m³ inclined plug flow pilot reactor under mesophilic conditions (35 ±1 °C). The experiments revealed the possibility of stable biogas production. In detail, at maximum stable loading rate, the anaerobic treatment of 35-70 kgd⁻¹ of waste generated up to 400 – 450 ld⁻¹ of biogas, with a yield compared to maximum theoretically achievable of 70% (0,17-0,20 l_{CH₄} g_{COD}⁻¹). Recorded concentrations of ammonia and sulfide did not reach values to produce evident inhibitory effects and to compromise the overall process.

Sažetak

Mesni otpad predstavlja najzastupljeniji izvor biološkog otpada kako u svijetu, tako i u Bosni i Hercegovini (BiH). Industrija prerade kože doprinosi produkciji biološkog otpada kroz proces obrade sirove kože i tretman otpadnih voda. Ovu vrstu otpada je izuzetno teško propisno zbrinuti, a rješenja poput termalne obrade su manje privlačna zbog velikog sadržaja vlage. Stoga se proces anaerobne digestije nudi kao atraktivno rješenje u okolišnom i ekonomski opravdanom smislu

Istraživanje anaerobne digestije otpada kožarske industrije (mesina i otpadni mulj postrojenja za tretman otpadnih voda) je vršeno uz primjenu laboratorijske postavke BMP testa (eng. Biochemical Methane Potential tests) i anaerobnog reaktora zapremine 1m³, tipa horizontalno nagnutog reaktora (eng. plug flow reactor) u mezofilnim temperaturnim uslovima (35 ±1 °C). Eksperiment je dokazao mogućnost stabilne proizvodnje biogasa. Precizno govoreći, pri maksimalnom doziranju otpada, anaerobnom obradom 35 – 70 kgd⁻¹ otpada nastaje oko 400-450 ld⁻¹ biogasa, sa procenutalnim udjelom metana u odnosu na teoretski mogući u iznosu od 70% (0,17-0,20 l_{CH₄} g_{COD}⁻¹). Zabilježene koncentracije amonijaka i sulfida nisu dostigle vrijednosti koje bi mogle ugroziti cjelokupan proces.