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Anaerobic Digestion of Sewage Wastewaters with Sludge and Rumen Fluid

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Abstract

Anaerobic digestion was conducted at mesophilic (37°C) and thermophilic (55°C) conditions using sewage wastewaters as the substrate and sludge and/or rumen fluid as the inoculum, with a view to optimize biogas production. The substrate and inoculum were mixed in the ratios 1:1, 1:3, and 3:1 (volume by weight (where sludge was used) or volume by volume (where rumen fluid was used). At mesophilic conditions for both inocula, the 3:1 substrate/inoculum mixture produced the most biogas in a 24 hour period, with the rumen mixture producing the highest yield (20 ml). At thermophilic conditions the 3:1 wastewater/sludge mixture had the highest biogas yield (58 ml), whereas when rumen fluid was used as inoculum, the 1:3 mixture produced the most biogas (66 ml). The thermophilic experiments using rumen as the inoculum were repeated for a 10 day period and the 3:1 mixture achieved the maximum yield (140 ml) faster than the other two (1:1 and 1:3 mixtures) indicating that the 3:1 substrate/inoculum ratio is the best.

Key words: biogas, wastewater, anaerobic digestion, rumen, sludge.