

Assessing the Effects of Spent Coffee Grounds on Dry Anaerobic Digestion of Kitchen Waste

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Abstract

The consumption of coffee around the world is increasing and it poses a problem about the proper management of the spent coffee grounds. At the moment, this solid residue is disposed of at landfills or incinerators. Because of its large amounts of organic matter it can be processed by biological procedures. Anaerobic digestion can convert organic matter into biogas, rich in methane, which can be used to produce renewable energy. However, mono-digestion of spent coffee grounds has been proved to be unstable in long term conditions. At the current study, mesophilic (35 °C) dry anaerobic co-digestion of kitchen waste and spent coffee grounds was performed in flasks. The inoculum to substrate (I:S) ratios which were used were 1:1 and 3:1 in respect to VS. Feedstocks were mixed at different percentages such as 100:0 (T10), 90:10 (T9), 80:20 (T8) and 70:30 (T7) kitchen waste to spent coffee grounds according VS. Tests were made in batch mode in order to determine specific methane potential, mass and VS reduction and acclimatization of the inoculum to these specific substrates. The I:S ratio 1:1 inhibited the procedure by decreasing pH at 6 to all flasks. The new run with I:S ratio 3:1 was evolved normally. The pH at the end was between 8.1 - 8.2. Specific methane production rate for T10, T9, T8 and T7 was 47.2; 42.8; 47.6 and 41.8 ml CH₄/g VS/d respectively. Mass and VS reduction was 28.2; 29.4; 31.3; 32.7% and 38.2; 35.8; 37.3; 40.9% for T10, T9, T8 and T7 respectively.

Keywords: dry anaerobic digestion, spent coffee grounds, kitchen waste