

Solid state anaerobic digestion of agro-industrial by-products

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Abstract

Solid state anaerobic digestion is an appropriate method for treating agro-industrial wastes and food waste with varying composition. For these types of solid wastes there is a need of farther experiments to overcome difficulties associated with high total solids and inoculum to substrate ratios. A batch reactor system with dehydrated inoculum studied for the solid anaerobic digestion of agro-industrial waste and food waste. The designed batch reactors have an appropriate stirring system to treat materials with a humidity of approximately 80%. Consequently, this paper presents the results of a research carried out in laboratory anaerobic bioreactors with a total volume of 5 L where agro-industrial waste and food waste were used for the production of biogas through solid state anaerobic digestion. The materials used in the reactors are different mixtures of food waste, pig manure, two-phase oil mill sludge and primary sludge from municipal sewage. The reactors were operated under mesophilic conditions (37 °C) with HRT of 60 days. The biogas production rate ranged from 0.9 L_{biogas}/L_{reactor}/d to 1.1 L_{biogas}/L_{reactor}/d. Regarding volatile solids the reduction ranged between 26% to 30%. These results showed the great potential of agro-industrial wastes and food waste for their conversion into renewable energy by using solid state anaerobic technology.

Keywords: solid anaerobic digestion, agro-industrial by-products