

ANAEROBIC DIGESTION OF LIME PRETREATED CATTLE MANURE IN A HYBRID UP-FLOW ANAEROBIC BIOREACTOR

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Abstract

Modernization of livestock farming due to increasing food demands in modern ages resulted in new environmental problems. Animal manure is one of the major solid wastes of livestock farming. High chemical oxygen demand (COD), biological oxygen demand (BOD), total solids (TS) etc. are the main characteristics of cattle manure. High load anaerobic digestion can be one of the most efficient solutions. Up-flow anaerobic bioreactors are the most desired candidates for conducting digestion in short hydraulic retention times (HRT). High total solid content of cattle manure causes major problems for transmission lines and pumps in modern systems. In this study, effect of lime pretreatment as an effective method for solid precipitation were investigated. In addition, the effect of lime on characterizations of pretreated cattle manure such as pH, COD, total suspended solids (TSS) were discussed. The impact of lime pretreated manure on an active pilot size hybrid bioreactor was studied. Optimum lime concentration (6 g/L) was considered while pH increased due to lime addition. A hybrid bioreactor consisted of an Up-flow anaerobic sludge blanket and a packed bed reactor was used for anaerobic digestion. A settling tank for active biosolid recycled and a gas collector system was used for completing the pilot scale anaerobic digester. The COD concentration was reduced by 30% after introducing lime pretreated wastewater to the system. The COD removal was retained up to 60% after 7 days of feeding. The HRT for hybrid system was set at 30 h and pH of the feed stream was adjusted to 7.8 after lime pretreatment. The bioreactor was successfully recovered and behaved very stable condition.

Keywords

Anaerobic digestion, Lime, UASB, UAPB, Cattle manure