

Biohydrogen generation from jackfruit peel using anaerobic contact filter

Abstract

A novel method of anaerobic digestion using contact filter was adopted for treating solid waste generated from the fruit processing industry, namely jackfruit, with the intention of generating energy free from greenhouse gases. A new source of microflora was isolated from cow dung by subjecting it to pH adjustment at 5 ± 0.2 coupled with heat treatment at for 1 h, and not less than three consecutive periods of heat treatment. The isolated microflora exhibited their capability to generate hydrogen while treating solid waste consisting of jackfruit peel. The biogas generation was found to be 0.72 l/g VS (jackfruit peel) destroyed. The hydrogen content in the biogas was found to be consistent resulting in $55\pm 2\%$, while the biogas was free from methane content. The effect of hydraulic retention time (HRT) on volatile solids destruction efficiency was investigated for an influent volatile solids content of 33 g/l at an HRT of 7 and 12 d. The results showed a volatile solids destruction efficiency of 22% and 50%, respectively, for the above said conditions. The efficiency of anaerobic digestion was also investigated for varying influent volatile solids content viz: 22.5, 17.1 and 11.3 g/d at 12 d HRT. The anaerobically digested jackfruit peel waste having an initial volatile solid content of 22.5 g/d was subjected to filtration test at 15 psi for a period of 1.3 h. The sludge resulting from the filtration test had a solids content of 12%, whereas the filtrate had the following characteristics viz: pH 5.3 ± 0.2 , COD 1700 mg/l, BOD 1175 mg/l and TKN 120 mg/l.

Keyword: Biohydrogen, Anaerobic contact filter, Hydrogen, Jackfruit peel, Cow dung, Anaerobic digestion