

Comparison of an Upflow Anaerobic Sludge Blanket and an Anaerobic Filter for Treating Wheat Straw Washwater

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Abstract : The study compared the performance of upflow anaerobic sludge blanket (UASB) reactors and anaerobic filters (AF) for the treatment of wheat straw washwater (WSW) which has a high concentration of Potassium ions. The trial was conducted at mesophilic temperatures (37 °C). The digesters were started up over a 48-day period using a synthetic wastewater feed and reached an organic loading rate (OLR) of 6 g COD L⁻¹ day⁻¹ with a specific methane production (SMP) of 0.333 L CH₄ g⁻¹ COD. When the feed was switched to WSW it was not possible to maintain the same loading rate as the SMP in all reactors fell sharply to less than 0.1 L CH₄ g⁻¹ COD, with the AF affected more than the UASB. On reducing the OLR to 3 g COD L⁻¹ day⁻¹ the reactors recovered to produce 0.21 L CH₄ g⁻¹ COD added and gave 82% COD removal. A discrepancy between the COD consumed and the methane produced could be accounted for through increased maintenance energy requirement of the microbial community for osmo-regulation as K⁺ was found to accumulate in the sludge and in the UASB reached a concentration of 4.5 mg K g⁻¹ wet weight of granules.

Keywords : anaerobic digestion, osmotic stress, chemical oxygen demand, specific methane production

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