

EFFECT OF TEMPERATURE AND HYDRAULIC RETENTION TIME ON HYDROGEN PRODUCING GRANULES: HOMOACETOGENESIS AND MORPHOLOGICAL CHARACTERISTICS

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The effect of temperature and hydraulic retention time (HRT) on the homoacetogenesis and on the morphological characteristics of hydrogen producing granules was investigated. Hydrogen was produced using an expanded granular sludge blanket (EGSB) reactor, fed with glucose and L-arabinose, under mesophilic (37°C), thermophilic (55°C), and hyperthermophilic (70°C) conditions. Apparent homoacetogenesis was observed only at mesophilic conditions. Glucose was utilized preferentially over L-arabinose at thermophilic and hyper-thermophilic conditions. Higher yields of hydrogen production were linked to the decrease of lactic acid and the increase of n-butyrate, in all temperatures tested. Under mesophilic conditions with an organic loading rate (OLR) of 5KgCOD/m³/d the total filaments length per VSS (TL/VSS) increased and the apparent granules density (VSS/TA) dropped off. With the application of OLR 10 and 16KgCOD/m³/d, TL/VSS decreased and the VSS/TA augmented suggesting an increase of granules density. Under thermophilic conditions the enhance of TL/VSS and the diminish of VSS/TA only occurred with the application of OLR16KgCOD/m³/d, while under hyperthermophilic conditions it happened since the beginning of operation with the application of OLR10KgCOD/m³/d. Granules size was not affected by temperature but the application of higher OLR promote a decline on the percentage of projected area of aggregates with equivalent diameter (Deq) larger than 1 mm.

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