

Paper Industry Wastewater

Paper board mill effluent was successfully treated at loading rate of 20 kg COD/m³.d and hydraulic retention time of 2.5 h in UASB reactor, with 70% COD removal efficiency [Habets and Knelissen, 1985]. Habets *et.al.*, [1991] have reported the anaerobic treatment of bleached TMP and CTMP effluent in the Biopaq UASB system.

The treatment of soda-anthraquinone chemical wheat-straw pulp black liquor in a UASB reactor has been reported by He Yan-Ling *et.al.*, [1995]. In this work the feasibility of wheat-straw and soda-anthraquinone (soda-AQ) pulp black-liquor treatment using UASB reactors was investigated. Furthermore, the process of sludge granulation was monitored. Two lab-scale UASB reactors were used to treat black liquor. In both the reactors, granulation was achieved. Granular sludge could be formed with or without supplementation of biodegradable carbohydrates in the treatment of black liquor, although the supplementation could accelerate the rate of granulation and lead to a quick enhancement of COD removal. The UASB reactor without a gas-solid separator (GSS) was more suitable for sludge granulation, due to accelerated washout of dispersed sludge. Low influent concentration was also essential for granulation. In this experiment 40-46% of influent COD and 56-65% of BOD removal could be achieved by application of loading of 10 kg COD/m³.d. The specific yield of biomass was 510 L/kg COD removed.

Anaerobic treatment of sulphate-rich (COD/SO₄ ratio 1.4 - 2.1) clarified whitewater from a thermo mechanical pulping (TMP) process was studied in three laboratory-scale UASB reactors at 55°C and in batch digesters at 55°C and 65°C by Rintala *et.al.*, [1991]. The COD/SO₄ ratio in wastewater ranged between 1.4 to 2.1. The highest COD removal efficiency (effluent sulfide stripped) achieved was approximately 65% in the UASB reactors. About 55% COD removal efficiency was obtained at a loading rate of about 41 kg COD m⁻³.d⁻¹ in the UASB reactor seeded with thermophilic sludge cultivated with volatile fatty acids (VFAs). The total sulphide present in the liquid phase after anaerobic treatment accounted for approximately 65-78% and 15-61% of the removed COD in batch digesters, whereas about 24-64% of sulphate was reduced in the UASB reactors. Acetate utilization for sulfate reduction was apparent in the UASB reactors. Sulfate reduction in the UASB reactors was substrate limited.