Industrial scale anaerobic digestion of brewery waste: Marmite-Unilever three-year case study

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Here we discuss operational experiences of the AD facilities used by Marmite Unilever at Burton on Trent to treat brewery waste over the period of three years.

In order to average various concentrations and composition and prevent toxic shocks effluent was balanced in a buffer tank. AD uses a 900 m$^3$ expanded granular sludge blanket (EGSB) tank, at controlled temperature of 35°C and pH 7. There is a throughput of 250 m$^3$/day of waste with loads of 18 kg COD/m$^3$/day in the first year and 26 in the second with 4.4 days HRT. The data reported include COD, suspended solids, Ripley’s ratio, volatile fatty acids, and biogas production, which shown to be good indicators of digestion performance. The initial COD concentration in effluent of 18000 mg/l is reduced to 120 mg/l in waste sent to sewer, resulting in about 99.2% COD reduction. Suspended solids concentrations are reduced from 2400 mg/l in the effluent to 55 mg/l being released to sewer. The wastewater effluent has a very good treatability with 86% COD present as soluble COD. Operational data from an EGSB reactor was analysed before and after problems with the internal separator. Simple VFA analysis using test kits was shown to be the most effective indicator of reactor stability providing an earlier warning of problems than Ripley’s. An average of 80 m$^3$ of biogas is produced every hour, but the variance in gas flow was a difficulty for a direct use in the existing boilers. This has led to the recommendation for additional balancing.