Contribution to biological treatment of dairy effluent by sequencing batch reactor (SBR)

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ABSTRACT

The treatment of dairy effluent, strongly loaded with biodegradable matter, can help protect the environment, when the purified water will be used for irrigation and the sludge produced valorized through agricultural use. The purpose of this study was to investigate the removal of organic matter (as COD) from synthetic dairy wastewater in a sequencing batch reactor which depends on three main factors: aeration time; volume load (VL), and organic loading (OL). Results show that whether the COD of the effluent to be treated varies from 220 to 7000 mg O₂/l, the COD of the treated effluent is reduced when aeration time increases. For low COD levels, below 2640 mg O₂/l, 20 h of aeration time appears to be an optimum value ensuring an effluent composition very much in line with the discharge standards (≈120 mg O₂/l). For higher applied organic loads, up to 7000 mg O₂/l, the aeration time required is longer. Thus, it takes 48 h to reduce 7000 mg O₂/l to a value hardly consistent with the discharge standards. The nature of the sludge produced (filaments) and the settling time limit the process performance. It is also noted that the COD removal efficiency depends more on the VL values than on the applied OL. For VL values ranging from 0.130 to 4.36 kg COD/m³/d and OL values between 0.08 and 3.46 kg COD/kg MLVSS/d, performance is inversely proportional to the applied loads and varies roughly from 65 to 96% for VL and from 90 to 99% for OL.

Keywords: Food processing effluents; Dairy wastewater; Biological treatment; Sequencing batch reactor

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