# FORMATION OF AEROBIC GRANULES IN SEQUENCING BATCH REACTOR SBR TREATING DAIRY INDUSTRY WASTEWATER: STARTUP AND PERFORMANCES

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Many recent studies in the field of wastewater treatment and environmental protection have focused their attention on the possibility of obtaining aerobic granular sludge in order to develop new innovative wastewater treatment technologies. Compared to conventional activated sludge wastewater treatment plants, aerobic granular technology represent a novel alternative offering numerous advantages such as high biomass retention, good settling ability and simultaneous removal of organic load and nutrients. The main focus of research was to evaluate granules formation and evolution of treatment performances during startup and steady state conditions. Two lab scale sequencing batch bioreactors were used in the experiment: one of the bioreactors (D) was inoculated with conventional activated sludge while the other one (GM) was inoculated with crushed aerobic granular sludge. Both bioreactors were fed with dairy industry wastewater with high organic and nutrients load (CODCr = 1723 – 3550 mg $O_2$/L, $BOD_5$ = 492 – 1806 mg$O_2$/L; $NH_4^+$= 64.6 - 114 mg/L, P tot = 5.04 – 21.5 mg/L) and underwent the same operational cycle: anaerobic feeding (45min), aerobic reaction (11 h), settling (5min.) and effluent withdrawal (10 min). The first granular structures were observed after 5 days (10 treatment cycles) with a diameter of 67 to 556 μm in D bioreactor and with 392 to 1200 μm in GM bioreactor. After 25 days the granules in D bioreactor increased significantly reaching diameters between 513 μm and 1276 μm. By the end of the experiment the granules reached 2 mm in diameter. The granules in GM bioreactor increased to 764-1482 μm and reached up to 4 mm in diameter by the end of the experiment. Treatment performances increased along with the growth of granules size.

Keywords: aerobic granular sludge, dairy wastewater, SBR