

Abstract of Thesis presented to COPPE/UFRJ as a partial fulfillment of the requirements for the degree of Doctor of Science (D.Sc.)

SIMULTANEOUS REMOVAL OF NUTRIENTS AND ENDOCRINE DISRUPTING
CHEMICALS USING AEROBIC GRANULAR SLUDGE TECHNOLOGY AND
ADVANCED OXIDATION PROCESSES

Reynel Martínez Castellanos

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Advisors: Márcia Walquíria de Carvalho Dezotti

João Paulo Bassin

Vítor Vilar

Department: Chemical Engineering

Aerobic granular sludge (AGS) technology has shown to present a promising alternative for wastewater treatment, mainly organic matter and nutrients removal. The work was separated in three stages, where the first stage evaluated the effect of the solids retention time (SRT) on the stability and performance of the AGS system in a long-term study (392 days). Maintaining an SRT of 15 days, was observed, average COD, ammonium and total phosphorus removal efficiencies above 93%. The second stage followed the reactor performance during 151 days feeding synthetic effluent with, in terms of COD, NH_4^+ , PO_4^{3-} and endocrine disrupting compounds (EDCs) removal together with the evaluation of estrogenic activity in the treated effluent. The results showed that the system is able to achieve high removal of organic matter (93%), ammonium (87%) and phosphorus (87%) together with biodegradation of EDCs (> 90%), while moderate levels of estrogenic activity were detected in the samples ($0.122 \mu\text{g L}^{-1}$ EQ-E2). Finally, the third stage studied the removal of EDCs by heterogeneous photocatalyst in a membrane micro-reactor with continuous permeation of H_2O_2 . The UVC/ H_2O_2 / TiO_2 system showed the highest oxidation ability, with EDC removals around 50% for a synthetic matrix.