

TITLE: Effect of magnesium on co-digestion of food waste and domestic wastewater towards the chemical oxygen demand (COD) removal efficiency and biogas production

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Presentation Category: Oral

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Research Interest of the Presenter/Attendee: Bio-based energy, Wastewater treatment, Biogas/Biodiesel production, Resources recovery from waste, Natural products, Biochemical engineering, and Strain engineering for over productions.

Effect of magnesium on co-digestion of food waste and domestic wastewater towards the chemical oxygen demand (COD) removal efficiency and biogas production

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Abstract: This study investigates the performance of anaerobic co-digestion of a mixture of food waste (FW) and domestic wastewater (DWW) (at 0.185 ratio, v/v) without and with addition of magnesium (in forms of MgSO_4 and MgCl_2) at different concentrations of Mg^{2+} (50, 150, and 250 mg/L). The upflow anaerobic sludge blanket (UASB) reactors were operated under the mesophilic condition (35°C) at 20 days of hydraulic retention time (HRT) with the intermittent feeding (48 hours feed and 48 hours no feed). The best performance of co-digestion in terms of organic matter removal and methane production was observed at 150 mg Mg^{2+} /L supplementation. The chemical oxygen demand (COD) removal efficiency and methane content reached $81 \pm 2.2\%$ and $60.8 \pm 1.2\%$, respectively, which were 10.2% and 9.6% higher than the control without Mg^{2+} addition, as well as lower concentration of ammonia-nitrogen (672.1 ± 51.3 mg/L) accumulated compared to the control (811 ± 44.4 mg/L). Supplementation of Mg^{2+} was observed to have effect on removing ammonia-nitrogen which would inhibit anaerobic digestion (AD) to some extent.

Keywords: Co-digestion, domestic waste, Mg^{2+} , UASB, COD, ammonia-nitrogen.

Acknowledgements: The research was supported by the grants from Macau Science and Technology Development Fund (FDCT044/2017/AFJ) and University of Macau Multi-Year Research Grant (MYRG2018-00108-FST).