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INFLUENCE OF COPPER ON THE PERFORMANCE OF A NOVEL UPFLOW–DOWNFLOW ANAEROBIC REACTOR SERIES IN CONTINUOUS OPERATION WITH VARYING HYDRAULIC RETENTION TIME

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Abstract

Copper is a heavy metal that affects biomass in biological wastewater treatment when fed without pre-treatment. A combined modified upflow anaerobic sludge blanket (UASB) reactor and static granular bed reactor (SGBR) series were used for the treatment of copper-containing wastewater with varying hydraulic retention time (HRT) and its performance in terms of chemical oxygen demand (COD) removal and biogas production was analyzed and compared with a control operation without copper. The reactor series was able to remove copper besides substrate removal. The optimum HRT of the reactor series was 24h and the maximum COD removal and the corresponding copper removal and biogas production of the reactor series obtained were 97.75%, 75.75%, and 0.24 m^3/kg $COD_{digested}$ respectively. The COD and copper concentration of the effluent were well within the discharge standards. Copper addition inhibited the biogas production of the reactors. The MUASB-SGBR series eliminated the necessity for pre-treatment of the influent with copper up to 8 mg/L and post-treatment for the polishing of the effluent.

Key words: biogas, COD removal, inhibitory substance, Modified Upflow Anaerobic Sludge Blanket, static granular bed reactor

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