



ENHANCED PRIMARY TREATMENT OF MUNICIPAL WASTEWATER BY ION EXCHANGE AND MEMBRANE PROCESSES

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Abstract

The main objective of this paper is to evaluate the removal efficiencies of physical-chemical wastewater treatment by combining ion exchange and membrane filtration. By using this type of preliminary treatment it is possible to reduce the organic load of the influent in the biological stage or even to reduce biological treatment to a simple polishing operation. The tests have been performed using the effluent from the grit chamber of the Garching municipal wastewater treatment plant. As a first step, batch test experiments were performed to investigate the exchange capacity of two types of natural zeolite: phylipsite-chabasite and clinoptilolite. Phylipsite-chabasite was chosen as a proper ion exchange for the ammonium removal. In the second step the efficiency of a submerged membrane reactor (SMR) using an influent after the sieving operation was compared with the filtration process alone and with the combination filtration/ion-exchange process. With an influent flux rate of 10 l/m²day, a removal efficiency of 70 % of COD_{total}, 100% removal of COD_{particulate}, 99 % of TSS, 99 % of turbidity and 0 % removal of NH₄-N was achieved. However, when dosage of 8.18 g zeolite /L was added in the reactor, a removal efficiency of 63 % NH₄-N was observed. The maximum exchange capacity was 4.627 mg NH₄-N/g zeolite.

Keywords: wastewater treatment, physical-chemical treatment, batch tests, jar tests, membrane filtration

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