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Membrane treatment applied to aqueous solutions containing atrazine photocatalytic oxidation products

A. Sotto*, M.J. López-Muñoz, J.M. Arsuaga, J. Aguado, A. Revilla

Department of Chemical and Environmental Technology, ESCET, Universidad Rey Juan Carlos, C/ Tulipán s/n, 28933-Móstoles, Madrid, Spain
Tel. +34 91 4888135; Fax +34 91 4887068; email: arcadio.sotto@urjc.es

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ABSTRACT

The present work aims to study the viability of combining heterogeneous photocatalysis and nanofiltration as an innovative strategy to improve atrazine elimination from aqueous solution by advanced oxidation processes. In order to promote the photocatalytic oxidation of atrazine, the selective separation of the intermediate products was explored by means of membrane filtration. Two nanofiltration membranes (NF-90 and NF-270) were tested to study their performance for aqueous solutions of atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-triazine), cyanuric acid (2,4,6-trihydroxy-1,3,5-triazine), desethyl-desisopropyl-atrazine (2-chloro-4,6-diamino-1,3,5-triazine) and ammeline (2-hidroxy-4,6-amino-1,3,5-triazine). The influence of membranes and solutes properties on the organic rejection and flux decline was evaluated. Experimental flux declines were systematically small, although the values obtained for NF-90 were slightly larger than those found for NF-270. The highest difference was observed in the case of atrazine which is the most hydrophobic solute. NF-90 membrane exhibited high solute rejection for all compounds, reaching 98% for atrazine; however, rejection selectivity was poor. Conversely, NF-270 membrane showed significant differences in solute rejection between atrazine and the other studied compounds, systematically higher than 30%. In addition, rejection selectivitywas enhanced al lowtransmembrane pressure. ExperimentalNF-270 rejection values suggest the use of this nanofiltrationmembrane to achieve the effective separation of aqueous atrazine from the other selected compounds originated in its photocatalytic oxidation.

Keywords: Nanofiltration; Rejection; Selectivity; Atrazine; Pollutant removal

* Corresponding author.