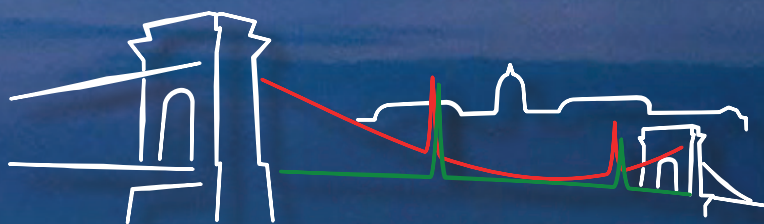


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Adsorption Treatments for Water Remediation by Zeolite Y: Removal of Per-poly Fluoroalkyl Substances (PFAS)

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Perfluoroalkyl chemicals (PFAS) compounds present high thermal stability and lipid/water repelling properties that legitimated the wide use of PFAS, in an array of different formulations, as surfactants intermediates, waterproofing treatment for textiles, and household products. The extensive use of PFAS has caused their ubiquitous presence in natural waters. Among the different technologies and methods applied for water remediation, adsorption is widely use for the low cost, the wide range of application, selectivity and regeneration of adsorbent materials, such as activated carbon, mesoporous silica, nanocarbon tubes and zeolites. In this work the adsorption efficiency of zeolites Y towards perfluorooctanoic acid, and perfluorooctane sulfonate was investigated. The hydrophobic/hydrophilic behaviour of zeolites was evaluated by varying the silica/alumina ratio. Furthermore, zeolites Y have been used to obtain Ag-exchanged zeolites. The adsorption efficiency of the several materials considered was evaluated by adsorption kinetic and isotherm studies. Adsorption isotherms show that the saturation capacity of Y390 as-synthesized and Ag-exchanged sample, was respectively 43 mg/g and 62 mg/g for PFOA, and 17mg/g and 32mg/g for PFOS. These findings indicated that these materials can be successfully used for the decontamination of water from perfluoroalkyl chemicals. Additionally, the introduction of Ag onto zeolites could confer combined antifouling and adsorption properties, thus exhibiting improved performances compared to zeolite as-synthesized, working synergistically in the removal of PFAS from water.

[1] Kotthoff et al., Environmental Science and Pollution Research volume 22, pages 14546–14559 (2015)

Keywords: PFAS, zeolites, adsorption, water remediation