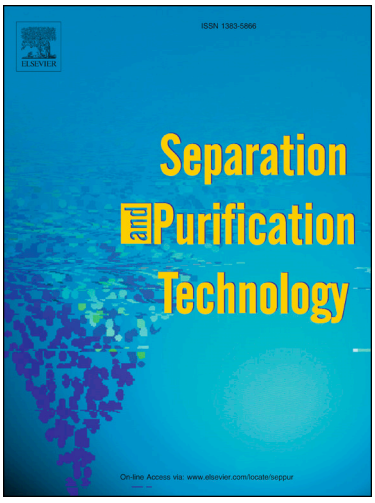

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Highly efficient removal of fluoride from aqueous media through polymer composite membranes

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Abstract

Different aluminum and calcium based particles, montmorillonite (MMT), zeolites (NaY), bayerite (BAY) and hydroxyapatite (CaHAp), were compared and evaluated for water defluorination. The effect of parameters such as temperature of the medium, concentration (mass of adsorbent), reaction time and pH on the defluorination capacity were studied for the particles with best performance. MMT and CaHAp adsorbents showed increased fluoride rejections in batch experiments (≈45 and 100 %). The defluorination capacity of MMT is influenced by the concentration and pH, while for CaHAp is independent of the evaluated parameters within the measured range. Further, polymer composite membranes based on poly(vinylidene fluoride-hexafluoropropylene) (PVDF-HFP) and the adsorbents with higher defluorination capacity were prepared by thermally induced phase separation in order to produce active filters for fluoride removal from water. The composite membranes presented a homogeneous porous structure with degrees of porosity ranging between ≈20 and 76 % and average pore size in the micron range. The permeability of the composite membranes ranged between