Methacrylic acid-ethylene glycol dimethacrylate polymeric sorbent for the removal of estrogens from water

Juan Carlos Bravo*, Alejandrina Gallego, Gema Paniagua, Pilar Fernández, Rosa María Garcinuño

Departamento de Ciencias Analíticas, Facultad de Ciencias, Universidad Nacional de Educación a Distancia, C/Senda del Rey 9, 28040, Madrid, Spain, emails: jbravo@invi.uned.es (J.C. Bravo), agallego@ccia.uned.es (A. Gallego), gpaniagua@ccia.uned.es (G. Paniagua), pffernando@ccia.uned.es (P. Fernández), rmgarcinuno@ccia.uned.es (R.M. Garcinuño)

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ABSTRACT

The presence of estrogens in environmental waters can cause adverse effects to aquatic organisms. In the last years, diverse researches have been focussed on the development of cost-effective methods for the removal of these compounds in water. In this paper, a series of methacrylic acid-ethylene glycol dimethacrylate polymers with different monomers ratio were synthesised by photochemical (UV irradiation at 365 nm) or thermal (oven at 60°C) initiation. Batch and continuous flow experiments were carried out to evaluate the capacity of these polymers to adsorb estradiol (E2), ethinylestradiol (EE2) and dienestrol (DEN). Adsorption isotherm studies revealed that Langmuir isotherm model was fitted with a better correlation than Freundlich isotherm. Finally, continuous flow experiments were carried out by microcolumn studies to check the suitability of the polymeric sorbent for the removal of estrogens from real water samples. When continuous removal experiments at 8 mL min⁻¹ flow rate were carried out, breakthrough adsorption capacities of 28.5, 38 and 69.7 mg g⁻¹ for E2, EE2 and DEN, respectively, were achieved.

Keywords: Estrogens; Removal; Polymer; Sorbent; Waters

* Corresponding author.