

Adsorption of mono and polyaromatic hydrocarbons on polymer resins based on DVB and MMA-DVB

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Worries over environmental protection are increasing, particularly regarding treatment of wastewaters from the oil industry. The traditional treatment of these effluents involves physical-chemical processes of precipitation and ion exchange as well as electro-chemical methods. However, these treatments are not fully adequate and have high operational cost when applied to large wastewater volumes with small concentrations of highly toxic chemical products. Processes involving adsorption have been emerging as an alternative for treatment of oily wastewater, but it is still necessary to develop materials to remove specific contaminants. This paper evaluates the performance of polymer resins (DVB and MMA-DVB) in processes for adsorption of toluene and naphthalene in water, representing the class of mono- and poly-aromatics, respectively. The concentrations of toluene and naphthalene were monitored using a Shimadzu QP2010 gas chromatograph coupled to an FID detector. Batch studies were performed to evaluate the following factors: contact time, adsorbent mass and temperature. The data on the adsorption equilibrium were analyzed in two isotherm models: Freundlich and Langmuir. Studies under continuous flow were also carried out using resins to pack the columns. Average adsorption efficiencies of 80% were achieved for both contaminants. The incorporation of methyl methacrylate slightly reduced the adsorption efficiency, but can generate a considerable saving in the final cost of the resin, increasing the competitiveness of this resin in the water treatment market. The results confirmed the exothermal nature of the adsorption process, with the Freundlich model best representing the system under analysis.

Biography

Elizabete Fernandes Lucas is Chemical Engineer and obtained her D.Sc. degree in Polymer Science and Technology from Federal University of Rio de Janeiro (UFRJ) in 1994. She is Associate Professor at UFRJ since 1994 and has been accumulating a great experience in Polymer Science Applied to Petroleum Production for about 25 years. She is the Director of the Laboratory of Macromolecules Applied to Petroleum Production (LMCP), has published 107 scientific papers, presented more than 250 talk/poster at conferences and written 3 books, 1 polymer dictionary, 1 vocabulary of oil chemistry and refining (in 4 languages), 1 book translation and 3 chapters of books. Since she has a strong interaction with petroleum industry, about 90 research reports and 36 technical reports have been prepared. The main studies involve polymer synthesis/characterization/properties, physical-chemistry of polymer solution, rheology of polymers and methods to evaluate the performance of polymers applied to different operations in oil production, from drilling to oil and water treatment. In such field, she has directed 30 master dissertations and 14 doctor thesis, and has 7 master dissertations and 11 doctor thesis under direction.

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