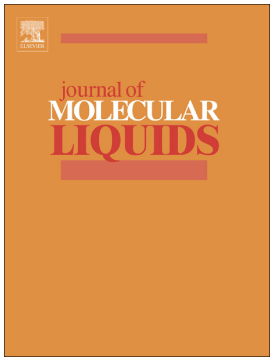

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Radiation-induced grafting copolymerization of resin onto the surface of silica extracted from rice husk ash for adsorption of gadolinium

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ABSTRACT

In this study, novel adsorbents were prepared, characterized and investigated for adsorption of gadolinium as one of rare earth elements. The first adsorbent is rice husk ash (RHA), the second is poly(acrylamide/acrylic acid/sodium styrene sulfonate) resin (P), the third and fourth adsorbents were the prepared resin grafted on the surface of the silica powder (poly(acrylamide/acrylic acid/sodium styrene sulfonate/silica powder) (P-SP) and gel form (poly(acrylamide/acrylic acid/ sodium styrene sulfonate/ silica in gel form) (P-SG) extracted from the first adsorbent (RHA) using alkaline treatment. These grafted resins as novel adsorbents were prepared by ^{60}Co gamma-rays irradiation of 25 kGy. Characterization of the new prepared adsorbents were investigated; swelling kinetics, ash content, FTIR, TGA & DTA, BET surface area and their ability for adsorption of some organic compound (Methylene Blue and *P*-Nitro-phenol from aqueous solution. It was found that: the swelling ratios take the following order: 28.55, 24.08 and 20.46 % for P-SG, P and P-SP, respectively. The P-SP has the highest value of ash content 9.5 %, and the BET surface areas were 8.5, 4.3 and 2.815 for P-SG, P-SP and P, respectively. For the adsorption of MB, the maximum capacity (q_m) was 277, 171.5 and 174.2 (mg/g), but for adsorption of P-NP it was 51.1, 38.6 and 52.99 (mg/g) for P, P-SP and P-SG. Finally, the new prepared four adsorbents were investigated for adsorption of Gd(III). The results showed high adsorption capacity; 229.36, 206.61, 184.84 and 133.33 for P-SG, P-SP, P and RHA, respectively. From this study we can conclude that the prepared four adsorbents can be used for sorption of Gd(III) as well as some organic compounds from aqueous solution.

Key words: Radiation copolymerization, Silica, Rice husk ash, Adsorption, Gd (III).