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MACROSPHERICAL POROUS METALLOSILICATE MATERIALS: CHARACTERIZATION AND APPLICATIONS

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Abstract

The main goal of this work was to develop a cheap and easy method for the synthesis of the porous metallosilicate macrospheres. Zirconium silicate macrospheres with diameters in the range 1.5 – 1.6 mm were obtained by the spray gelling technique, using the multi templating method. Tetraethyl orthosilicate was used as silica source. The chitosan played a dual role (pore and shape generating agent), while other inexpensive and easily accessible biomaterials including yeast, sugar and gelatin were used as pore generators. The multi templating technique allowed to obtain spherical form particles with large pores which facilitate the access of the reactants to the active centres located inside the pores. The zirconium silicate beads were characterized by nitrogen sorption technique, XRD, FTIR and SEM/EDAX analyses. The synthesized beads were used as adsorbents for the removal of the Astrazon Blue BG dye from aqueous solutions. The adsorption data were analysed through different adsorption isotherm and kinetic models. The dye removal percentage varied from 92.5% to 88.71% when the initial dye concentration varied from 60 mg/L to 150 mg/L (for an adsorbent concentration of 5 g/L and a temperature of 295 K). Due to their size, hardness and shape these materials can be easily handled, recovered and reused.

Key words: adsorption isotherm, adsorption kinetic model, dye, metallosilicate macrosphere, synthesis

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