

عنوان مقاله:

Preparation and Comparison of Two Different Nanocomposite Kinds Based on MgZnAl-Layered Double Hydroxide for Simultaneous Removal of Cationic and Anionic Dyes

محل انتشار:

نشریه پیشرفته شیمی، دوره 4، شماره 1 (سال: 1400)

تعداد صفحات اصل مقاله: 10

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خلاصه مقاله:

In this work, the MgZnAl-LDH/Zeolite Y and (MgZnAl-LDH+MgFe₂O₄)@SiO₂ composites based on layered double hydroxide (LDH) were synthesized and characterized using X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM), and energy-dispersive X-ray spectroscopy (EDX) analysis. The efficiency of the samples was assessed for simultaneous removal of cationic and anionic dyes from the solution. In this work, methylene blue and methyl orange as cationic and anionic dyes were used. The performance of prepared composites was also compared with their components. The results demonstrated that the Zeolite Y sample could only remove the methylene blue dye from the solution. The MgFe₂O₄ sample is not able to remove any of the anionic and cationic dyes. The simultaneous removal of the methylene blue and methyl orange dyes is observed by the MgZnAl-LDH sample. The MgZnAl-LDH/Zeolite Y and (MgZnAl-LDH+MgFe₂O₄)@SiO₂ composites revealed similar performance to the MgZnAl-LDH. Moreover, the MgZnAl-LDH@SiO₂ composite showed lower efficiency compared with that of the MgZnAl-LDH. In addition, different kinetic models including, the pseudo-first-order, pseudo-second-order, and particle diffusion models were examined for the simultaneous removal of dyes. The kinetic data revealed the adsorption process could be well fitted by the pseudo-second-order kinetic model. The methylene blue dye removal by (MgZnAl-LDH+MgFe₂O₄)@SiO₂ sample occurred by the adsorption on the surface and intra-particle diffusion.

کلمات کلیدی:

Adsorption, Composite, Layered double hydroxide, Dye removal

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