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Calcium hydroxyapatite microfibrillated cellulose composite as a potential adsorbent for the removal of Cr(VI) from aqueous solution

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Abstract

In the present study, the potential of synthesized hydroxyapatite microfibrillated cellulose (CHA/MFC) composite to remove chromium (VI) from aqueous solutions was investigated by batch tests under different experimental conditions. The chemical and morphological structures of adsorbent were investigated by scanning electron microscopy (SEM), energy dispersive analysis of X-rays (EDAX), element analyzer and Fourier-transform infrared spectroscopy (FTIR). The study also investigated the effects of process parameters such as initial Cr(VI) concentration, solution pH and temperature. Results of the present study revealed that the adsorption rate was very high in the beginning and over 94% of Cr(VI) removal was achieved within the first 5 min. At pH < 7 and > 5, the overall Cr(VI) adsorption mechanism can be described to follow four different steps namely, (i) strong electrostatic interaction between positively charged adsorbent surface and negatively charged adsorbate in the aqueous solution, (ii) electrostatic attraction between positively charged adsorbent