Facile preparation of apatite nanostructures and their potential application in water treatment

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**Abstract**

A novel precipitation route has been developed for synthesis of hydroxyapatite (HAp) and chlorapatite (ClAp) powders. The powders were characterized by X-ray diffraction, Fourier-transform infrared spectroscopy, scanning electron microscopy, transmission electron microscopy, and nitrogen adsorption–desorption techniques. The results showed that the as-prepared products were the nanostructures consisting of HAp and ClAp nanoparticles with a large surface area of 104.4 and 90.9 m\(^2\)\(\cdot\)g\(^{-1}\), respectively. The as-prepared products were respectively used as an absorbent for the removal of Congo red (CR) from simulated wastewater. The maximum adsorption capacity for CR onto HAp and ClAp nanoparticles was determined using the Langmuir equation and found to reach up to 512.78 and 542.27 mg\(\cdot\)g\(^{-1}\), respectively. The apatite such as HAp and ClAp is potential absorbents for use in dye pollution removal if synthesized on a large scale, a low price and a fast solid–liquid separation in the near future.

**Keywords:** Hydroxyapatite (HAp); Chlorapatite (ClAp); Nanostructures; Dye removal; Congo red

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