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$NiFe_2O_4$ MAGNETIC NANOPARTICLES AS AN ADSORBENT FOR CADMIUM REMOVAL FROM AQUEOUS SOLUTION

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The magnetic $NiFe_2O_4$ nanoparticles have been synthesized and used as adsorbents for cadmium removal from aqueous solution. The $NiFe_2O_4$ nanoparticles were characterized by scanning electron microscope (SEM), Transmission electron microscope (TEM), X-ray diffraction (XRD) and Fourier transform infrared spectra (FTIR). Various parameters, which can affect the adsorption such as pH, adsorption time and adsorbent dose have been fully investigated. The results reveal that the magnetic adsorbent can be easily removed by a simple external magnet with high separation efficiency. In addition, the process is clean and safe for purifying water pollution. The prepared $NiFe_2O_4$ magnetic nanoparticles could thus be used as favorable adsorbents for the remove cadmium from polluted water.

Keywords: magnetic separation, adsorption, cadmium, $NiFe_2O_4$.

Introduction

Water contaminated by heavy metals remains a serious environmental and public problem [1]. The heavy metals are of special concern because they are non-degradable and therefore persistent [2]. Cadmium is a heavy metal with a greatest potential hazard to humans and environment [3]. It makes its way to water bodies through wastewater from metal plating industries, industries of Cd–Ni batteries, phosphate fertilizer, mining, pigments, stabilizers and alloys [4]. Poisoning of cadmium in humans causes high blood pressure, kidney damage and destruction of testicular tissue and red blood cells [5]. In small amounts cadmium is associated with hypertensive diseases and considered as carcinogenic to men [6].

From an environmental point of view, the removal of cadmium is of great concern. Among several chemical and physical methods, adsorption process

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