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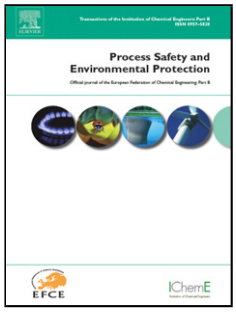

Title: Treatment of nickel ions from contaminated water by magnetite based nanocomposite adsorbents: effects of thermodynamic and kinetic parameters and modeling with Langmuir and Freundlich isotherms

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Treatment of nickel ions from contaminated water by magnetite based nanocomposite adsorbents: effects of thermodynamic and kinetic parameters and modeling with Langmuir and Freundlich isotherms

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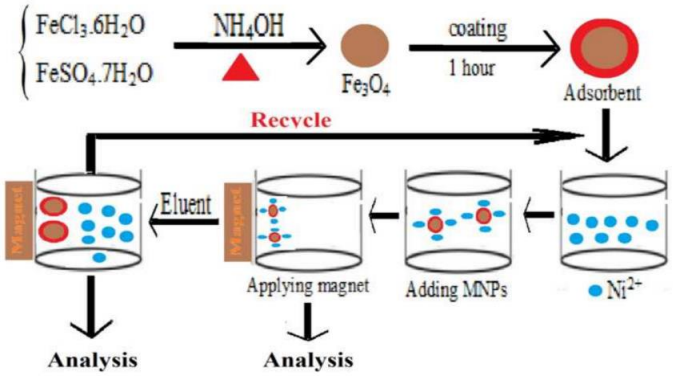
Graphical abstract



Highlights

- Magnetic nanoadsorbents were synthesized by using a cost effective co-precipitation method.
- Maximum removal efficiency and adsorption capacity of nickel was obtained 96% and 46.513 mg g^{-1}.
- Adsorption process was exothermic, feasible and spontaneous.
- Nanoadsorbents were easily separated from wastewater after adsorption of Ni(II).

ABSTRACT

Co-precipitation procedure was applied in order to obtain different kinds of magnetic nanocomposite adsorbents for the removal of Ni(II) ions from aqueous solution. Prepared nanoadsorbents were characterized by using Fourier transform infrared spectroscopy, X-ray diffractometer, Field emission scanning electron microscopy, transmission electron microscopy and the thermogravimetric analysis. The average sizes of nanoparticles were found to be 60±10 nm. Adsorption studies of heavy metal ions were carried out by batch experiments. Several factors effecting the adsorption of Ni(II) ions on the surface of