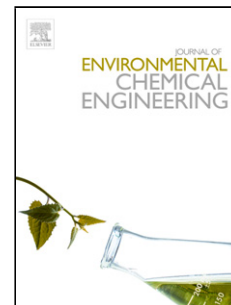


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## Obtaining drinking water using a magnetic coagulant composed of magnetite nanoparticles functionalized with *Moringa oleifera* seed extract

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### ABSTRACT

In this study, the association of functionalized magnetic nanoparticles with proteins from *Moringa oleifera* seeds to treat surface water with high turbidity was investigated. With the proposed methodology, it was possible to synthesize magnetite nanoparticles that were susceptible to functionalization with the protein extract, which was characterized by X-ray powder diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), transmission electron microscopy (TEM), scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDX), zeta potential and vibrating sample magnetometry (VSM). The functionalized nanoparticles were applied to the coagulation/flocculation and sedimentation (CFS) process of superficial raw water under the influence of an external magnetic field. This showed a removal efficiency of 96.8% for turbidity, 97.1% for the apparent colour and 58.3% for the UV<sub>254nm</sub> after 10 min of magnetic sedimentation, proving that the CFS process can be optimised and that the sedimentation time can be reduced from 30 min to 10 min. The reuse assays indicated that the functionalized magnetic nanoparticles can be reused for up to two times consecutively without significant loss in efficiency in removing the evaluated parameters. Furthermore, the residual values obtained for the turbidity and apparent colour parameters were sufficient to meet the values proposed by the Brazilian legislation after 10 min of magnetic sedimentation, without needing of a secondary processes of treatment, such as filtration. This highlights the ample potential of this coagulant and its applicability.

**Keywords:** *Moringa oleifera*, Magnetic nanoparticles, Water treatment, Magnetic sedimentation.

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