

Accepted Manuscript

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PII: S0167-7322(17)31686-0
DOI: doi: [10.1016/j.molliq.2017.08.018](https://doi.org/10.1016/j.molliq.2017.08.018)
Reference: MOLLIQ 7726

To appear in: *Journal of Molecular Liquids*

Received date: 20 April 2017
Revised date: 15 June 2017
Accepted date: 6 August 2017

Please cite this article as: Zohreh Dahaghin, Hassan Zavvar Mousavi, Leila Boutorabi , Application of magnetic ion-imprinted polymer as a new environmentally-friendly nonocomposite for a selective adsorption of the trace level of Cu(II) from aqueous solution and different samples, *Journal of Molecular Liquids* (2017), doi: [10.1016/j.molliq.2017.08.018](https://doi.org/10.1016/j.molliq.2017.08.018)

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Application of magnetic ion-imprinted polymer as a new environmentally-friendly nonocomposite for a selective adsorption of the trace level of Cu(II) from aqueous solution and different samples

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Abstract

Copper is a necessary elements and an important micronutrient for metabolism of many living organisms at low levels but it is toxic at high levels. The present study reports the preparation of a novel and selective magnetic ion-imprinted polymer ($\text{Fe}_3\text{O}_4@\text{SiO}_2@\text{IIP}$) through the application of isatin (Isa) as a ligand and 4-vinylpyridine (4-VP) as a functional monomer for a selective and efficient extraction of Cu(II) ions from various samples. Further studied were the effect of several factors such as pH value, sorption and elution time, eluent type and concentration, sample volume, sorption capacity, and potentially interfering ions. Under the selected conditions, the limit of detection, preconcentration factor, and sorption capacity of this new polymer were 0.13 ng mL^{-1} , 200, and 83 mg g^{-1} , respectively. Ultimately, the feasibility of the $\text{Fe}_3\text{O}_4@\text{SiO}_2@\text{IIP}$ nanoparticles was evaluated via the extraction and determination of Cu(II) ions in different water samples, and agricultural products including (apple, kiwi, carrot, and tomato).

Keywords: Magnetic-ion imprinted polymer. Copper determination. Selective extraction. Flame atomic absorption spectrometry.

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