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### Original Research Article

## Removal of toxic Tl(I) and Tl (III) ions from Water Sample a Magnetite Nanoparticle Composite Modified with Aminodibenzo-18-Crown-6 Functionalized MIL-101(Cr)

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### ABSTRACT

Herein, magnetic metal-organic framework nanocomposite consisting of aminodibenzo-18-crown-6 magnetite nanoparticles and MIL-101(Cr) was synthesized. The nano-adsorbent was characterized with FT-IR, VSM, SEM and XRD. The nano-adsorbent was suitable for extractive preconcentration of Tl(I) and Tl (III) ions. The total amount of thallium was then determined by reducing Tl (III) to Tl(I) by hydroxylamine hydrochloride and also extracting it. Experimental design was employed for optimizing the affective variables. Under the opted conditions, limit of detection and relative standard deviation (%) of the developed method was as low as 1.5 ng L<sup>-1</sup>, the quantification limit is 5.0 ng L<sup>-1</sup>, the linear range extends from 5 to 400 ng L<sup>-1</sup>, and is <12% (for n = 5 at levels of 5, 50 and 250 ng L<sup>-1</sup>), respectively. Maximum sorption capacity of the sorbent for Tl(I) and Tl(III) ions was 197 mg g<sup>-1</sup>. this method was utilized for analysis of a certified reference material (NIST SRM1643d water sample and to various real water samples.

**Keywords:** Magnetite Nanoparticles, Limit of Detection, Quantification Limit, Preconcentration, Experimental Design.