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Synthesis of β-Octabromo Meso-Tetracycloheptyl Porphyrinogen and its Application in Arsenic Removal

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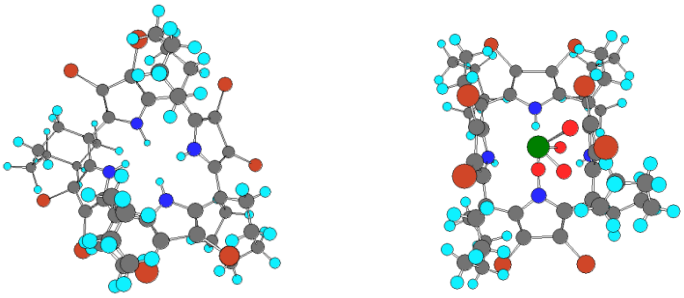
ABSTRACT

Synthesis of β-Octabromo meso-tetracycloheptyl porphyrinogen(Br-mtcp) has been achieved by a simple method and characterized. Considering their host-guest binding capacity, Br-mtcp was tested for removal of arsenic by batch mode. Arsenic bound compound was characterized by NMR, FT-IR, SEM and XRD that confirms the interaction of arsenic with the adsorbent. Important physico-chemical parameters like contact time, concentration and pH were investigated. Three kinetic models were studied among which pseudo 2nd order best describes the mechanism of arsenic uptake with R^2 value of 0.999. Maximum adsorption was found to be 16.52mg/g. Freundlich isotherm was found to follow best with R^2 value 0.999. Field samples were collected from nearby areas in Ranchi and detoxified to a good extent.

Graphical Abstract



Before Adsorption **After Adsorption**

Highlights

- Synthesis of β- octabromo meso-tetracycloheptyl porphyrinogen.
- Characterization using FTIR, XRD, SEM and NMR.
- Arsenic removal by synthesized porphyrin based ligand.
- Batch study of adsorption of arsenic onto the synthesized ligand.
- Real water sample analysis for arsenic removal in Ranchi city.

Keywords: β-octabromo meso-tetracycloheptyl porphyrinogen, XRD, arsenic removal, kinetic, isotherm.