



Macrocyclic Adsorbed Hybrid Nanoparticles for Preconcentration and Atomic Absorption Spectrophotometric Estimation of Zinc from Acid Leached Rodenticide

Kundan C. Tayade, Sopan T. Ingle, Sanjay. B. Attarde*

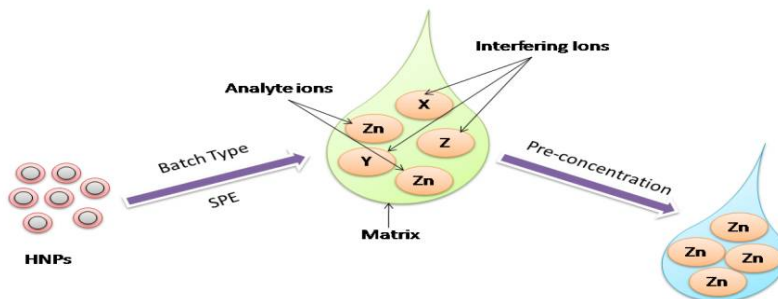
School of Environmental and Earth Sciences, North Maharashtra University, Jalgaon-425001, **INDIA**
Email: sb.attarde@yahoo.co.in

Accepted on 6th February, 2018

ABSTRACT

Hybrid nanoparticles (HNPs) were designed by adsorbing a newer serendipitous preorganized macrocyclic motif (L) on $Fe_3O_4@SiO_2$ distorted hexagonal and cubic nanoparticles. These magnetic HNPs are tested for efficiency of Zn(II) metal ion extraction. Simultaneously, Zn(II) ion is estimated using flame atomic absorption spectroscopy. This method is validated with acid leached commercial rodenticide sample. The recovery from HNPs was 98.70 % with relative standard deviation of ± 2.56 %. Also, the rodenticide samples were analyzed in triplicate with quantitative recovery of 100.00 ± 0.36 % without any matrix interference. The parameters affecting on the extraction efficiency viz. pH, initial concentration of Zn(II) ions and reusability of the reagent were studied. The effect of altering analyte concentrations was screened with basic adsorption models such as Langmuir, Freundlich and Temkin isotherms. The key HNPs were successfully applied for preconcentration of Zn(II) ions in real sample (rodenticide residue) analysis without bare matrix interference.

Graphical Abstract



Highlights:

- Development of new HNPs as quantitative Solid Phase Extractor for enrichment of Zn(II) ions.
- Detailed exploration on sorption study and interpretation of equilibrium isotherms.

Validation of developed method by analyzing real sample of rodenticide without matrix interference.

Keywords: Hybrid Nanoparticles, Zn(II) ion extraction, Rodenticide analysis, AAS.