

# Optimization of Different Parameter in Synthesis Ion Imprinted Polymers via Precipitation Polymerization for Nitrate Adsorption

## Abstract

An important issue in synthesis of ion imprinted polymers (IIP) is optimization of the main parameters that involved during polymerization process as those parameters can influence the performance of IIP. In this study, IIP was synthesized by precipitation polymerization using allylthiourea (ATU) as monomer, nitrate as template ion, ethylene glycol dimethacrylate (EGDMA) as crosslinker, 2,2'-azobisisobutyronitrile (AIBN) as initiator with 365 nm ultraviolet (UV) light and mixture of acetonitrile and dimethylsulfoxide (DMSO) as porogenic solvent. The influences of various polymerization parameters in the synthesis of IIPs were investigated. The parameters studied included: ratio of monomer-template, amount of crosslinker and amount of porogenic solvent. These parameters were optimized using response surface methodology (RSM) coupled with central composite design CCD). Results showed that IIP with an optimum adsorption capacity of 156.233 mg/g of nitrate ion ( $\text{NO}_3^-$ ) can be obtained under the following polymerization conditions: 3.90 mmol of ATU, 18.67 mmol of EGDMA and 38.30 mL of porogenic solvent. The nitrate imprinted polymer and non-imprinted polymer were characterized by Fourier transform infrared (FTIR) spectroscopy and scanning electron microscopy (SEM). The SEM micrograph showed microparticles ranging from 14.05 - 16.17  $\mu\text{m}$  in diameter and the surface was rough and porous. The sorption of IIP followed Langmuir adsorption isotherm model. In this study, the binding capacity indicated that nitrate imprinted polymer recognized  $\text{NO}_3^-$  in aqueous solution more effectively compared to non-imprinted polymer and this polymer particles portrayed better adsorption as compared other adsorbent