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## Highly efficient micellar extraction of toxic picric acid into novel ionic liquid: effect of parameters, solubilization isotherm, evaluation of thermodynamics and design parameters

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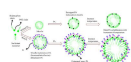
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### Graphical abstract



### Highlights

- Picric acid is a toxic compound
- DIL significantly improves CPE efficiency of PA
- Higher extraction efficiency obtained in both nearly neutral and acidic condition
- The extraction process - spontaneous and endothermic in nature

### Abstract

A simple and new approach in cloud point extraction (CPE) method was developed for removal of picric acid (PA) by the addition of N,N,N,N',N',N'-hexaethyl-ethane-1,2-diammonium dibromide ionic liquid (IL) in non-ionic surfactant Triton X-114 (TX-114). A significant increase in extraction efficiency was found upon the addition of dicationic ionic liquid (DIL) at both nearly neutral and high acidic pH. The effects of different operating parameters such as pH, temperature, time, concentration of surfactant, PA and DIL on extraction of PA were investigated and optimum conditions were established. The extraction mechanism was also proposed. A developed Langmuir isotherm was used to compute the feed surfactant concentration required for the removal of PA up to an extraction efficiency of 90%. The effects of temperature and concentration of surfactant on various thermodynamic parameters were examined. It was found that the values of  $\Delta G^0$  increased with temperature and decreased with surfactant concentration. The values of  $\Delta H^0$  and  $\Delta S^0$  increased with

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