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Development of tropine-salt aqueous two-phase systems and removal of hydrophilic ionic liquids from aqueous solution

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Highlights

- Novel aqueous two-phase systems composed of tropine and salts have been developed.
- The phase behavior of tropine-salt ATPS was systemically investigated.
- Existence of micelle in the ATP was observed.
- A combination ATPS and adsorption-desorption for the removal of hydrophilic ILs.

ABSTRACT

A novel aqueous two-phase systems (ATPS) composed of a small molecule organic compound tropine and an organic or inorganic salt aqueous solution has been developed for the first time. The phase behavior of tropine-salt ATPS was systemically investigated and the phase equilibrium data were measured in different temperatures and concentrations and correlated by the Merchuk equation with satisfactory results. The detection of the conductivity and particle size proved the formation of micelle in the process of forming tropine-salt ATPS. The separation application of the ATPS was assessed with the removal of hydrophilic benzothiazolium-based ionic liquids (ILs) from aqueous solution. The result showed that ILs were effectively extracted into the top tropine-rich phase. Finally, ILs in the top tropine-rich phase were further separated by the means of adsorption-desorption with DM301 macroporous resin and ethanol. The method of novel tropine-salt ATPS combined with adsorption-desorption is demonstrated a promising alternative thought and approach for the removal or recovery of hydrophilic compounds from aqueous media

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