QUATERNARY AMMONIUM SALTS WITH IONIC LIQUID PROPERTIES: DESIGN, SYNTHESIS AND USE

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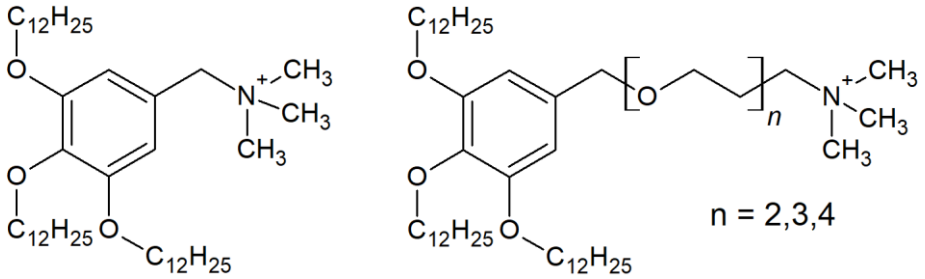
Quaternary ammonium salts (QAS) are widely used in ion exchange extraction, in particular for extracting non-ferrous metals, including rare and scattered ones. There are also known examples of their use for isolation of neutral organic compounds such as polycyclic aromatic hydrocarbons. For example, recently it has been shown that solutions of 1-methylquinolinium and 1-methylphenantrolinium benzenesulfonate in methanol have high affinity toward aromatic hydrocarbons, allowing their selective extraction from hydrocarbon mixture [1]. In addition, they are for many years used as ion exchangers in ion selective electrode membranes. For both purposes it is essential that QAS used have relatively low lattice energy, to ensure their good solubility in the extractant or in the membrane material and to avoid crystallization. Therefore, most suitable hydrophobic QAS must have low melting points, preferably below 100°C, that classifies them as ionic liquids.

Traditionally, QAS have been considered “non-selective” ion exchangers, their selectivity being governed by the Hofmeister extraction series. Hovewer, it has been shown in our works that improving the steric accessibility of QAS nitrogen atom by means of shortening the substituents’ chain length and/or introduction of spacers between the hydrophobic moiety and the exchange center considerably improves the selectivity toward hydrophilic anions, including double-charged, such as SO_4^{2-}. A series of ionic-liquid QAS with improved accessibility of exchange center have been designed, synthesized and used for making ion-selective electrodes reversible to double-charged ions [2].



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