

Synthesis of 15-, 17- and 19-membered thiacrown ether functionalized composite SBA-16 adsorbents for selective recovery of silver ( $\text{Ag}^+$ ) ions

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Dihydroxy functionalized 15-, 17- and 19-membered thiacrown-4 ethers (thia-CEs) were synthesized by intermolecular cyclization of bulky epoxides with 1,2-benzenedithiol. The bulky epoxides were synthesized from etherification of bromoalkenes with penderol then epoxidation of their alkenes. Preparations of thia-CEs were optimized by changing the metal templates, reactant concentrations, reaction solvents, time, and temperature. Each thia-CE will be immobilized into 3-(chloropropyl)triethoxysilane functionalized mesoporous silica to enhance the recyclability of the adsorbents. Batch adsorption and desorption (acid treatment) experiments will be performed. These composite adsorbents have the potential as successful  $\text{Ag}^+$  ion recovery. This work was supported by the National Research Foundation of Korea (NRF) funded by the Ministry of Science and ICT (No. 2016R1A2B1009221 and No. 2017R1A2B2002109), and the Ministry of Education (No. 2009-0093816).