Removal of Cesium Ions in Water Using Macrocyclic Ligands on Mesoporous Silica Support

Erwin Escobar, Gebremichael Gebremedhn Tekeste, Grace Nisola, 정욱진, Limjuco Lawrence†
명지대학교
(renzlimjuco@gmail.com†)

The development of advanced materials for the removal and recovery of Cs^+ from aqueous media has been a growing area of study since the inadvertent and widespread contamination of the natural environment in recent years linked to nuclear energy production. Advanced materials such as mesoporous silica possess ideal physical and chemical properties that permit custom-made applications. In this paper, we report the functionalization of mesoporous silica with crown ether for the development of a Cs^+-selective adsorbent. The composite material was characterized using FTIR, TGA, BET, and SEM-EDX. Batch adsorption experiments reveal that the sequestration of Cs^+ by the composite material is best embodied by the Langmuir isotherm and follows pseudo-second order kinetics. Adsorption capacity is optimal at pH 6 and equilibrium is achieved in less than 2 hours. This research was supported by the National Research Foundation of Korea (NRF) funded by the Ministry of Science and ICT (No. 2018R1D1A1B07047503 and No. 2017R1A2B2002109, No. 22A20130012051 (BK21Plus).