

Selective Partitioning of CO₂ in the Flue Gas Mixtures by TBAC Semiclathrates Formation

김소영, 이요한, 김은애, 서용원*

울산과학기술대학교

(ywseo@unist.ac.kr*)

Tetra-butyl ammonium chloride (TBAC) semiclathrate has vacant small cages which can be used for capturing small-sized gas molecules at atmospheric pressure conditions, while the large cages are occupied by TBAC cations. This research is focused on selective partitioning of CO₂ in the flue gas mixtures for an application to CO₂ capture process using TBAC semiclathrate formation. TBAC semiclathrate phase equilibria of 3.3 mol % which is a stoichiometric concentration of TBAC•29.7H₂O were measured with CO₂ (20, 40, 60, 80, and 100%) + N₂ gas mixtures. CO₂ composition was analyzed for measuring the gas consumption and the CO₂ concentration in gas phases during the TBAC semiclathrate formation using gas chromatography. Enclathration of CO₂ in the cages of TBAC semiclathrate was confirmed through Raman spectroscopy. Also, the CO₂ concentration in the gas and hydrate phases were measured after completing the TBAC semiclathrate formation. The CO₂ in flue gas mixtures was found to be enriched approximately 60 % in semiclathrate phase. The overall experimental results are helpful to understand the selective partitioning of CO₂ by TBAC semiclahtrates formation.