Hydroxypyridine-Based Ionic Liquid for The Process of CO_2 Capture

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ABSTRACT

Ionic liquids (ILs) are salts consisting of an organic cation and an inorganic polyatomic anion, with melting point lower than the boiling point of water (<100 ºC)[1]. ILs with melting point below room temperature are called Room Temperature Ionic Liquids (RTILs). These organic salts are potential candidates to replace current aqueous amine technology used in post-combustion CO_2 capture from flue gas due to their unique properties, including non-volatility, good thermal and chemical stability, nonflammability, wide liquid ranges, and tunable properties[2]. On the other hand, most ILs for CO_2 capture suffer from low adsorption capacity and high viscosity. Hence, immobilizing ILs with high adsorption capacity on solid materials could be an alternative method to deal with the high viscosity of ILs.

Trihexyltetradecylphosphonium 2-pyridinolate, $[P_{66614}][2\text{-Op}]$, was synthesized[3] and its structure was characterized by FTIR and NMR spectroscopy. The thermal stability of the IL and its CO_2 sorption performance was determined by thermogravimetric analysis (TGA), using a 15% CO_2/Ar gas mixture. With varying IL loading, IL/alumina composites were also prepared. Their CO_2 sorption performance was evaluated, under dynamic conditions, by sorption at room temperature, followed by temperature programmed desorption (TPD) under He flow with heating rate of 10 ºC/min from RT to 200 ºC. TPD profiles of the $[P_{66614}][2\text{-Op}]/Al_2O_3$ samples present one peak, corresponding to weakly adsorbed CO_2. The best performance of composite material is obtained at low IL loadings making it a good candidate as alternative CO_2 capture material.

REFERENCES

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