Viscosities and CO_2 Capacities of Chemically Complexing Ionic Liquids

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An increasing number of research groups have acknowledged the potential for using ionic liquids (ILs) as media for separation and capture of carbon dioxide from flue gas, possibly as an alternative to the current monoethanolamine (MEA) technology. Many ionic liquids preferentially dissolve CO_2 (physical absorption) and react with CO_2 when an amine functional group is present (chemical absorption). It is therefore possible for the capacity to be greater than 1:1 mole ratio (mol CO_2/mol IL). The benefits of using an ionic liquid on a large scale include its superb recyclability, due to the reversibility of reaction, practical non-volatility, resistance to degradation, and a large temperature operating range. However, the viscosity of the ionic liquid is a crucial property that needs to be measured in order to design processes. We present CO_2 capacities for ionic liquids that chemically complex with carbon dioxide, such as 1-(3-aminopropyl)-3-methylimidazolium bis(trifluoromethylsulfonyl)imide, $[H_2NC_3H_6mim][Tf_2N]$. Also, we will discuss the viscosity of each ionic liquid (from 22 °C to 65 °C), both before and after reaction with CO_2.