

Synthesis and characterization of novel amine-based deep eutectic solvents for CO₂ capturing

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In this study, we report new experimental measurements of the density, viscosity, conductivity, pH, surface tension and thermal stability of three different deep eutectic solvents (DES), (Choline chloride + Monoethanolamine, ChCl-MEA), (Choline chloride + Diethanolamine, ChCl-DEA) and (Choline chloride + Methyl-diethanolamine, ChCl-MDEA), representing the primary, secondary and tertiary amines, respectively. The experimental data was obtained at temperature from 293.15-353.15 K and for three different choline chloride: amine molar ratios of 1:6, 1:8 and 1:10. Results revealed that amine-based DESs are more thermally stable as compared to stand-alone amine solvents. The density and viscosity showed a negative relationship with temperature in the linear regression model based on the least square approach. On the other hand, the conductivity increased linearly with increasing the temperature. The density, viscosity, stability and conductivity increased with decreasing molar ratio of the amine in the DESs. However, there was no clear trend in the pH with molar ratio. The prepared DESs showed very promising results in CO₂ capturing.

Biography:

Dr. Al Nashef joined King Saud University, Saudi Arabia, after obtaining his Ph. D. from the University of South Carolina in 2004. In 2011, Al Nashef was promoted to associate professor. Al Nashef was very active in research related to green engineering and sustainability. In 2014, Dr. Al Nashef joined Masdar Institute of Science and Technology at Abu Dhabi.

Al Nashef co-authored more than 80 peer-reviewed journal publications. In addition, he received 7 patents from US and EU Patent Offices. He is also a recipient of several prestigious awards including King Abdullah Award for best invention in 2013.