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CO₂ solubility of deep eutectic solvent consisting of choline chloride and ethylene glycol
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Abstract (less than 300 words)
<p>Deep eutectic solvents (DESs) are now widely acknowledged as a new class of solvents like ionic liquids (ILs) because they share many characteristics and properties with ILs [1]. DESs generally have low vapor pressure and non-flammability, and their physicochemical properties are optimized. Then, DESs can be conveniently prepared by simply mixing a hydrogen bond donor (HBD) and acceptor (HBA) with a suitable composition. In the previous work [2], we have investigated CO₂ solubilities of DES, consisting of choline chloride (ChCl) and ethylene glycol (EG) at a 1 : 2 molar ratio (ChCl2EG) at 313.15 K. CO₂ solubilities of ChCl2EG were lower than Leron <i>et al</i> [3], however, the reason is not still known.</p> <p>In the present study, CO₂ solubilities and their saturated densities of EG or ChCl2EG were measured at 298.15, 313.15, and 333.15 K and the pressure up to 10 MPa by a static-circulation type apparatus [4]. The saturated densities of liquid phase (ρ_L) slightly increases with increasing pressure. The saturated density of vapor phase (ρ_V) remains almost the same as that of pure CO₂ density calculated by Span-Wagner equation [5] at each pressure. CO₂ solubilities of EG or ChCl2EG decreased with increasing temperature. CO₂ solubilities of ChCl2EG were slightly higher than that of EG, on the other hand, that of ones were lower than Leron <i>et al</i> [3]. Furthermore, the molarity scaled solubilities were calculated from the experimental solubility data. The volumetric concentration for CO₂ in ChCl2EG were slightly lower than that in EG, however, the volumetric concentration of ChCl2EG were greatly lower than EG; therefore, ChCl2EG can absorb CO₂ with fewer molecules than EG.</p>
References
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