

Measurement of binary choline chloride system melting points by DSC

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The halide anion of quaternary ammonium salt and the hydrogen bond donor (HBD) component make a special solvent that has very low melting point. Choline chloride which is cheap, bio-degradable, and non-toxic is one of the most frequently used quaternary ammonium salts as a component of such solutions. HBDs capable of hydrogen bonding with choline chloride are urea, glycerol, and carbohydrate-derived polyols. We chose urea among them to exhibit low melting point on a solution. As 2 moles of HBD associate with 1 mole of halide anion in choline chloride by making hydrogen bonds, the eutectic melting point occurs when the mole ratio of choline chloride to urea becomes 1:2. Melting points of urea and choline chloride are 133 and 302 °C, respectively, which shows considerable difference. But when mixing the two components a homogeneous solution exhibits a melting point of 12 °C, which is considerably decreased. This study focused on measuring melting point of the urea and choline chloride mixture at different mole ratios by differential scanning calorimetry (DSC) and analyzed the phase equilibrium diagram based on the melting point.