Electrolytic Conductivity Measurements and Models for Ten Ionic Liquids

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Electrolytic conductivity measurements for a total of ten ionic liquids (ILs) (four N-alkyl-N-methylpyrrolidinium cations [$C_n$mpyr] and six 1-(methyl)benzyl-3-alkylimidazolium cations ([Bnmim] or [MeBn$C_n$mim]), all paired with bistriflimide [Tf_2N] anions) are reported at p = 0.1 MPa over T = (293.15 – 323.15) K. This work adds electrolytic conductivity to viscosity and density measurements we reported earlier.[1] All samples were thoroughly dried under vacuum and their water content before and after measurements was determined by Karl Fischer titration. For the conductivity measurements, an impedance bridge technique was used in conjunction with a sealed cell equipped with platinum black electrodes. The cell constant (K_{cell} = 101 m^{-1}) was determined with standard aqueous KCl solutions before and after measurements. The results show that electrolytic conductivity increases with increasing temperature in both families of ILs, while conductivity decreases as the length of the IL side chain increases, which is associated with increase in IL viscosity. Conductivities of the pyrrolidinium ILs were consistent with other data for these compounds already reported in the literature.[2] The conductivities of the 1-(methyl)benzyl-3-alkylimidazolium ILs are reduced by ~70-90% compared to the analogous 1-alkyl-3-methylimidazolium ILs.

References

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