# The Residual Volume Approach II: Simple Prediction of Ionic Conductivity of Ionic Liquids

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The Residual Volume Approach (RVA), a recently developed method for the prediction of fundamental physical properties of ionic liquids (ILs) is extended and now allows the estimation of ionic conductivity of unknown ILs, using a simple linear correlation between the ionic conductivity and previously defined substituent parameters – $\beta^X$. The proposed method is applied to the conductivity correlations of 61 *n*-alkyl substituted imidazolium, tetraalkylammonium, pyrrolidinium, piperidinium, sulfonium and phosphonium homologous ILs, containing $[BF_4]^-$, $[Tf_2N]^-$, $[C_2F_5PF]^-$, $[CF_3BF_3]^-$, $[C_2H_5BF_3]^-$, $[F(HF)_{2.3}]^-$, $[Br]^-$, $[I]^-$, and [formate]$^-$ as anions. The influence of the ion type – both anion and cation – on the property changes is discussed. Moreover, it is shown that relatively rigid cations with $C_2$ symmetry decrease the expected conductivity in the same manner as they increase the viscosity of the ILs.

*Key words:* Ionic Liquids, Predictive Methods, Ionic Conductivity, Viscosity, Structure-Property Relationships