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Effects of a Coulomb Barrier on the Dissociation of Sodium Chloride Dianions SHAUN ARD, NASRIN MIRSALE KOHAN, AL TUINMAN, ROBERT COMPTON, University of Tennessee, MANFRED KAPPES, PATRICK WEIS, Institut Für Physikalische Chemie, Universität Karlsruhe, Germany — Calculations show that doubly-charged sodium chloride anions of the stoichiometry $(\text{Na}_7\text{Cl}_9)^{2-}$ and $(\text{Na}_9\text{Cl}_{11})^{2-}$ are metastable toward dissociation as a result of a coulomb barrier, similar to that which also inhibits electron detachment. Measurements of the energy threshold for collisional dissociation of sodium chloride dianions are used to examine this barrier to dissociation. As one example, cross section for dissociation of $(\text{Na}_7\text{Cl}_9)^{2-}$ into ion-pairs of the type $\text{NaCl}_2^-(\text{NaCl})_n + \text{NaCl}_2(\text{NaCl})_{5-n}^-$ for $n = 0,1,2$ are observed to appear at very low ($\sim 1\text{eV}$ for $n=0$) collision energies and maximize a few eV above threshold. The observed threshold for $n=0$ ions agree reasonably well with the calculated coulomb barrier to dissociation. Interestingly, collisional electron detachment or loss of the Cl^- ion from the these dianions is not observed over the energy range studied [0 to 50 eV, Lab].

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