

EXPERIMENTAL CHARACTERIZATION OF THE $\text{He} + \text{I}^{35}\text{Cl}(E, v^\dagger=11,12)$ AND $\text{He} + \text{I}^{35}\text{Cl}(\beta, v^\dagger=0-2)$ INTERMOLECULAR POTENTIAL ENERGY SURFACES

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Two-photon excitation of the T-shaped and linear $\text{He} \cdots \text{I}^{35}\text{Cl}(X^1\Sigma^+, v''=0)$ complexes are used to access multiple intermolecular vibrational levels within the $\text{He} + \text{I}^{35}\text{Cl}(E0^+ \ ^3P_2, v^\dagger=11,12)$ and $\text{He} + \text{I}^{35}\text{Cl}(\beta1 \ ^3P_2, v^\dagger=0-2)$ ion-pair state intermolecular potentials. The excitation utilizes different metastable intermolecular levels within the $\text{He} + \text{I}^{35}\text{Cl}(B \ ^3\Pi_{0+}, v'=2,3)$ and $\text{He} + \text{I}^{35}\text{Cl}(A \ ^3\Pi_1, v'=15)$ potentials, and thus varying Franck-Condon windows, to access levels with varying amounts of vibrational excitation within the ion-pair state intermolecular potential. The $\text{He} + \text{ICl}(E, v^\dagger=11,12)$ and $\text{He} + \text{ICl}(\beta, v^\dagger=0-2)$ intermolecular potentials are found to be nearly identical with an overall minimum in the near T-shaped orientation and binding energies $D_0^\dagger = 40 \text{ cm}^{-1}$. Intermolecular stretching and bending frequencies are measured to be 25 and 13 cm^{-1} , respectively. Since common intermolecular levels are accessed by transitions from both the T-shaped and linear $\text{He} \cdots \text{ICl}(X, v''=0)$ ground state conformers, the relative binding energies of the conformers can be directly measured; the linear conformer is found to be 5.4(2) cm^{-1} more strongly bound than the T-shaped conformer.