SPECTROSCOPIC INTERROGATION OF THE MULTI-DIMENSIONAL INTERMOLECULAR POTENTIALS OF RARE GAS ATOMS AND DIHALOGENS

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Laser-induced fluorescence and action spectroscopy experiments have been performed on numerous complexes comprised of rare gas atoms and dihalogen molecules. Discrete spectroscopic features associated with transitions of both T-shaped and linear conformers of the ground state complexes have been observed in all cases. The transitions of the T-shaped complexes access the lowest intermolecular level within each excited state potential, while those of the linear complexes access multiple levels with intermolecular bending excitation, which tend to be delocalized in the excited state. Action spectroscopy experiments also enable the binding energies of the linear conformers to be precisely measured. Detailed comparisons of the experimental data with theoretical calculations of the He + ICl and He + Br_2 systems have enabled assignments of the specific excited state levels to be made and properties of the ground and excited state intermolecular potentials to be accurately characterized. In addition, similar agreement has been achieved for interactions on the Ne + ICl ground state.