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Rotationally inelastic collisions of He and Ar with NaK: Theory and Experiment[1] K. RICHTER, T. PRICE, J. JONES, C. FAUST, A.P. HICKMAN, J. HUENNEKENS, Lehigh University, R.F. MALENDA, Moravian College, A.J. ROSS, P. CROZET, ILM Université Lyon 1 — Rotationally inelastic collisions of NaK ($A\,^1\Sigma^+$) molecules with He and Ar have been studied. At Lehigh, we use a pump-probe scheme (the probe is scanned over transitions to the $3\,^1\Pi$ state) with either polarization labeling (PL) or laser-induced fluorescence (LIF) spectroscopy. At Lyon, one-laser excitation is used with Fourier Transform (FT) fluorescence spectroscopy. In both cases, the pump laser excites a particular ro-vibrational level $A\,^1\Sigma^+(v, J)$. We observe strong direct lines corresponding to transitions from the (v, J) level pumped, and weak satellite lines corresponding to transitions from collisionally-populated levels $(v, J' = J + \Delta J)$. The ratios of satellite to direct line intensities in LIF and PL yield information about population and orientation transfer. A strong propensity for $\Delta J =$ even transitions is observed for both He and Ar perturbers. In the FT fluorescence experiment we also observe v changing collisions. Theoretical calculations are also underway for collisions in both the $A\,^1\Sigma^+$ and $X\,^1\Sigma^+$ states. For He-NaK we have calculated potential surfaces using GAMESS and carried out coupled channel scattering calculations of transfer of population, orientation, and alignment.

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