HIGH RESOLUTION LIF SPECTROSCOPY OF KCs MOLECULE.

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Among intensively studied heteronuclear alkali dimers the KCs molecule remains the one which is almost unstudied by experimentalists. Most information on the KCs electronic structure comes from recent *ab initio* calculations[a].

We present here the first high resolution analysis of laser induced fluorescence (LIF) of this molecule with the goal to obtain the potential of the $X^1\Sigma^+_g$ ground state in a possibly wide range of internuclear distances accessible by conventional spectroscopy. KCs molecules were produced by heating a mixture of K (10 g) and Cs (7 g) in a heat-pipe oven at a temperature of about 270 ^{o}C under ca. 3 mbar of Ar buffer gas pressure. KCs molecular fluorescence was induced by different laser sources: the 454.5, 457.9, 465.8, and 472.7 nm lines of an Ar^+ laser; a dye laser with Rh6G dye (excitation frequency around 16870 cm^{-1}); or 850 nm and 980 nm diode lasers (11500 - 11900 cm^{-1} and 10200 - 10450 cm^{-1} tuning range respectively). The fluorescence to the ground state was recorded using a Bruker IFS-125HR Fourier transform spectrometer with 0.03 cm^{-1} spectral resolution. Particularly, applying the 850 nm diode laser allowed us to observe LIF progressions to very high vibrational levels of the ground state close to dissociation limit. The present data field contains term values v, J for the $X^1\Sigma^+_g$ ground state which cover a range from $v'' = 0$ to 96 with J'' varying from $J = 14$ to 185.

More than 4000 fluorescence lines were used to fit the ground state potential energy curve via the Inverted Perturbation Approach procedure. The present empirical potential extends up to ca. 11 Å and covers more than 95% of the well depth describing most of the spectral lines with the precision of 0.005 cm^{-1}. Future plans on KCs excited states studies will be discussed.

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[a] M. Korek et al., *Can. J. Phys.* **78**, 977 (2000); M. Korek et al., *J. Chem. Phys.* **124**, 094309 (2006).