THE $(1)^1\Pi_g$ STATE OF $^{39}K_2$ REVISITED

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Vibrational levels up to v=107 of the $(1)^1\Pi_g$ state of $^{39}K_2$, which dissociates to $K(4s)^2S + K(4p)^2P_{3/2}$, have been observed in high resolution Fourier transform records of $C^1\Pi_u \rightarrow (1)^1\Pi_g$ fluorescence of potassium molecules in a heatpipe source. From a revised analysis of this system, we have constructed a rotationless RKR potential curve which extends to R=40.3 $\AA$ covering 99.2% of the $(1)^1\Pi_g$ state. Vibrational and rotational constants (at J=0) have been calculated from this curve. The parameters describing the coulombic interactions between $K(4s) + K(4p)$ atoms are given in a Hund's case (c) basis. From this work, the dissociation energy D_e for the $(1)^1\Pi_g$ state is found to be 1290.30$\pm$0.09 cm^{-1} (leading to a new value of $T_e = 16203.25 \pm 0.09$ cm^{-1} for this state) and the long-range parameters are $M^2 = 25.30 \pm 0.02$ e$^2a_o^2$, $R_{01} = 7261 \pm 223$ e$^2a_o^5$. These values are in good agreement with values obtained from the pure long range 0_g^- state analyzed by H. Wang, P. L. Gould and W. C. Stwalley (J. Chem. Phys. 106, 7899 (1997)).

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