

Species Tag:	39006	Name:	K-atom
Version:	1		$^2S_{1/2}$ ground state
Date:	Dec. 2014		2P_J $J = \frac{1}{2}, \frac{3}{2}$
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Lines Listed:	11	Q(300.0)=	7.9996
Freq. (GHz) <	7500000	Q(225.0)=	7.9995
Max. J:	1	Q(150.0)=	7.9993
LOGSTR0=	-99.0	Q(75.00)=	7.9985
LOGSTR1=	-5.0	Q(37.50)=	7.9970
Isotope Corr.:	-0.03	Q(18.75)=	7.9941
Egy. (cm^{-1}) >	0.0000	Q(9.375)=	7.9882
$\mu_e =$	6.3768	A=	
$\mu_m =$	2.0	B=	

The atomic potassium line at has been measured to a precision of 0.001 Hz 1. Chan et al. 1970. See archived line file for precise frequency.

The transitions (a.k.a. D_1 and D_2 lines) to the 2P_J levels are measured with Lamb-dip spectroscopy,

2. S. Falke, E. Tiemann, C. Lisdat, H. Schnatz, G. Grosche, 2006, Phys. Rev. A 74, 032503.

All positions of the $^2S_{1/2}$ - $^2P_{1/2}$ multiplet were reported in 2, however only the hyperfine free center and a single component of the $^2S_{1/2}$ - $^2P_{3/2}$ multiplet were reported. For determination of the equivalent SPFIT operators, the $A_{3/2}$ and $B_{3/2}$ constants reported in [2] were used with the Casimir expression to determine calculated line centers for the remaining 5 transitions, these are used in the fit and artificially reduce the reduced rms. The fit includes a fixed value of a fictitious (and extremely large) value of the ‘rotational’ constant which serves to remove non-zero N quanta from the prediction.

The dipole moment for the $^2S_{1/2}$ - 2P_J transitions was assumed to be that of the $^2S_{1/2}$ - $^2P_{3/2}$ transition given by U.I. Safranova and M.S. Safranova, Phys. Rev. A 78, 052504 2008. the value given therein, 5.7939, was converted to Debye from atomic units (14.726 D) and then an empirically determined spherical harmonic scaling factor of $\sqrt{16/3}$ was factored out of the input value for entry into the .int file (6.3768 D). This value reproduces the lifetime ($\tau = 26.5$ ns) of the $^2S_{1/2}$ - $^2P_{3/2}$ state well, Wang et al. J. Chem. Phys. 106(19):7899-7912, 1997 report a value of 26.37(5) ns. The other transition gives a lifetime $2\times$ longer than reported, presumably due to the different degeneracies of the states.