Species Tag:	41011	Name:	K41-atom
Version:	1		$^2S_{1/2}$ ground state
Date:	Dec. 2014		^2P_J $J = \frac{1}{2},\frac{3}{2}$
Contributor:	B. J. Drouin		
Lines Listed:	11	Q(300.0)=	7.9998
Freq. (GHz) <	7500000	Q(225.0)=	7.9997
Max. J:	1	Q(150.0)=	7.9996
LOGSTR0=	-99.0	Q(75.00)=	7.9982
LOGSTR1=	-5.0	Q(37.50)=	7.9984
Isotope Corr.:	-1.167	Q(18.75)=	7.9968
Egy. (cm^{-1}) >	0.0000	Q(9.375)=	7.9935
μ_e =	6.3768	A=	
μ_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 equivilent 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 of ^{39}K 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× longer than reported, presumably due to the different degeneracies of the states.