THE PURE ROTATIONAL SPECTRUM OF THE CoS RADICAL ($X^4\Delta_i$): CONTINUED STUDIES IN MONO-LIGATED COBALT SPECIES

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The sub-millimeter wave spectrum of the CoS radical has been observed in the frequency range 350-540 GHz using direct absorption techniques. This work is the first spectroscopic study of this molecule. Cobalt vapor was reacted with CS_2 to produce CoS. Rotational transitions from three spin-components in the radical's $X\,^4\Delta_i$ ground state have been recorded thus far, and magnetic hyperfine splittings due to the ^{59}Co nucleus (I = 7/2) have been resolved. We are continuing our search to identify the fourth spin-component. Transitions from the $Co^{34}S$ isotopomer were also measured, as well as several arising from excited vibrational levels. There is no evidence of λ -doubling in the lower three spin-components (Ω = 7/2, 5/2, 3/2). The hyperfine pattern in the various spin-orbit components is somewhat irregular, particularly the Ω = 3/2, suggesting some mixing from nearby excited electronic states. The preliminary data have been fit with a case (a) Hamiltonian, and spectroscopic constants have been determined. The most current results of this study will be presented.