

THE PURE ROTATIONAL SPECTRUM OF FeCO^+ ($X^4\Sigma^-$)

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The pure rotational spectrum of the molecular ion FeCO^+ ($X^4\Sigma^-$) has been measured using millimeter-wave direct absorption methods incorporating velocity modulation techniques. This work is the first gas-phase study of FeCO^+ by any spectroscopic method. FeCO^+ was created in an AC glow discharge of gas-phase $\text{Fe}(\text{CO})_5$ and argon. Eleven rotational transitions were measured in the frequency range of 323 to 408 GHz. The four fine structure components exhibited very large spin splittings, indicating a high degree of Hund's case (a) character and large second-order spin-orbit interactions. The data has been fit with a case (b) Hamiltonian and rotational and fine structure constants were obtained. FeCO^+ may be prevalent in interstellar/circumstellar gas given the large abundance of CO.