PURE ROTATIONAL SPECTROSCOPY OF TRANSITION METAL NITRIDES: MILLIMETER-WAVE STUDIES OF FeN ($X^2\Delta_i$) AND CrN ($X^4\Sigma^-$)

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The pure rotational spectrum of FeN in its $X^2\Delta_i$ electronic ground state has been observed in the region of 190 - 530 GHz using direct absorption techniques. The spectrum of CrN has been recorded in its $X^4\Sigma^-$ state as well. These nitrides were formed by reacting metal vapor, produced by a Broida-type oven, with either N_2 or NH_3 under d.c. discharge conditions. For FeN, eight rotational transitions were measured in the Ω = 5/2 spin orbit component, where no evidence of Λ-type doubling was observed. For CrN, five rotational transitions were recorded in which all fine structure components were resolved. These data have been analyzed and rotational and certain fine-structure parameters have been determined. Bonding in metal nitride species is also discussed.