FOURIER TRANSFORM EMISSION SPECTROSCOPY OF THE $g^4\Delta - a^4\Delta$ SYSTEM OF FeCl

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The emission spectrum of FeCl has been investigated at high resolution in the near infrared. The molecule was excited in a microwave discharge lamp using a mixture of $FeCl_3$ vapor and 2.5 Torr of He, and the spectra were recorded in the 3000-12500 cm^{-1} region using a Fourier transform spectrometer. New bands with R heads near 7725, 8149, 8577, 8949, 9319, 9686 and 10050 cm^{-1} have been assigned as the 0-2, 0-1, 0-0, 1-0, 2-0, 3-0 and 4-0 bands of a new $g^4\Delta - a^4\Delta$ system of FeCl. The strong bands of this system consist of four subbands assigned as $^4\Delta_{1/2}$-$^4\Delta_{1/2}$, $^4\Delta_{3/2}$-$^4\Delta_{3/2}$, $^4\Delta_{5/2}$-$^4\Delta_{5/2}$ and $^4\Delta_{7/2}$-$^4\Delta_{7/2}$. This transition is analogous to the 1 μm transition of FeH and FeF. A rotational analysis of a number of bands in each subband has been obtained and spectroscopic constants extracted. The lower $a^4\Delta$ state is affected by perturbations from a nearby electronic state while the excited $g^4\Delta$ state is free from perturbation. This work represents the first observation of a transition involving the quartet states of FeCl.