FAR INFRARED EMISSION SPECTROSCOPY OF AMMONIA

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Far infrared emission spectroscopy appears to be a very difficult experimental technique due to the ν^3 dependence of the spontaneous emission Einstein A coefficient. We present the first Fourier transform emission spectrum of ammonia in the far infrared spectral range (between 35 and 475 cm^{-1}) together with the experimental details. Thermal emission provided by a continous flow of ammonia through a 13.5 MHz electrodless radio frequency discharge permits the observation of transitions between high rotational levels of the molecule. The spectrum contains pure rotational transitions in all vibrational modes up to the streching modes around 3500 cm^{-1}. We also observe rovibrational transitions between $2\nu_2$ and ν_4 which have very close energies. The assignments of our spectrum are performed using energy levels published in the litterature for low J and K rotational levels. Our experimental set-up allows us to confirm and to complete the determination of higher J, K rotational energy levels obtained by absorption studies from the ground state or from hot bands.