P-17

Optical constants of NH_3 and NH_3:N_2 amorphous ices in the MIR and NIR regions

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Ammonia ice has been detected on different astrophysical media, ranging from interstellar medium (ISM) particles [1,2] to the surface of various icy bodies of our solar system [3], where nitrogen is also present. We have carried out a detailed study of amorphous NH_3 ice, and of NH_3:N_2 ice mixtures, based on IR spectra in the mid- and near-IR regions, supported by theoretical quantum chemical calculations. The ice samples were generated through vapor deposition on a cold Si substrate under vacuum (details of the experimental set up can be found in refs [4,5]). Spectra of varying thickness were obtained and the optical constants calculated for amorphous NH_3 at 15 K and 30 K and for a NH_3:N_2 mixture at 15 K, in the 500 to 7000 cm^{-1} spectral range, with improved accuracy over previous data where available. Using the imaginary part of the refractive index and a good estimate of the density of our samples, we have also obtained absolute values for the band strengths of the more prominent infrared features in both spectral regions. Our results indicate that the estimated NH_3 concentration in ISM ices [1,2] should be scaled upward by ~30 %.

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