LINE PARAMETERS OF THE PH_3 PENTAD IN THE $4-5\mu$m REGION

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Line positions, intensities and line shape parameters are reported for four bands of phosphine between 2150 and 2400 cm^{-1} in order to improve the spectroscopic database for remote sensing of the giant planets. Knowledge of PH_3 in this spectral region is important for Cassini/VIMS exploration of dynamics and chemistry on Saturn, as well as for interpreting the near-IR data from Juno and ESA's proposed Jupiter mission. For this study, five high-resolution (0.0023 cm^{-1}), high signal-to-noise (¿2000) spectra of pure PH_3 were recorded at room temperature (298.2 K) with the Bruker IFS 125HR Fourier transform spectrometer at Pacific Northwest National Laboratory. Individual line parameters were retrieved by multispectrum fitting[a] of all five spectra simultaneously. Positions and intensities were measured for over 3100 transitions. The rotational quantum numbers of measured lines go as high as $J'' = 16$ and $K'' = 15$ in the ν_3 and ν_1 bands; some lines of the weaker bands $2\nu_4$ and $\nu_2 + \nu_4$ are also reported. The measured positions and intensities are compared to new theoretical calculations of the pentad. Lorentz self-broadened width and pressure-induced shift coefficients of many transitions were also obtained, along with speed dependence parameters. Line mixing coefficients were determined for several A^+A^- pairs of transitions for $K'' = 3, 6$, and 9. [b]

[a] D. C. Benner, C. P. Rinsland, V. Malathy Devi, M. A. H. Smith and D. A. Atkins, *JQSRT* **53** (1995) 705-721.

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