NEW SUPERSONIC JET NEAR IR SPECTRA OF AMMONIA AND CHLOROMETHANE

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We report new high resolution near IR spectra of chloromethane (CH_3Cl) and ammonia (NH_3): Specifically for chloromethane $2\nu_4^0$ (6007 cm^{-1} - 6033 cm^{-1}) and $2\nu_1$ (5850 cm^{-1} - 5910 cm^{-1}) vibratioal bands have been recorded and two combination bands of ammonia were recorded in ranges 5990 cm^{-1} - 6090 cm^{-1} and 7590 cm^{-1} - 7710 cm^{-1} All data were obtained with tunable diode laser spectrometer coupled to pulsed, slit nozzle (0.1mm x 40mm) supersonic jet. Observed absorption spectra exhibit low rotational and Doppler temperature down to 20 K and as a result are significantly less congested compared to room temperature data. Spectral line positions have been determined with accuracy of 3x10^{-4}cm^{-1} by referencing to methane transitions in the same spectral regions.

Ammonia spectra are compared with existing FTIR data for assignment verifications and also with ExoMol CoYuTe linelist [1]. Agreement with the CoYuTe prediction is rather exeptional, with standart devidation between measured and predicted line position 0.056 cm^{-1} in the 7600 cm^{-1} band. The chloromethane spectra are partially assigned using effective Hamiltonnian approach and verified with GSCD. The data are also compared with theoretical Exomol linelists [2]. The overall agreement between the theory and experiment is lower than in the case of ammonia: The band origin for the $CH_3\,^{35}Cl$ $\nu_1 + \nu_4$ vibration is about 1.64 cm^{-1} higher than the experimental value.

[1] P.A. Coles *et al., Monthly Notices of the Royal Astronomical Society* **490**, 4638 (2019).
[2] A. Owens *et al., Monthly Notices of the Royal Astronomical Society* **479**, 3002 (2018).