
HRMS, 24th Colloquium, Dijon, France, 24 - 28 Aug, 2015

**ADDITION TO THE HITRAN DATABASE OF LINE-SHAPE
PARAMETERS DUE TO THE PRESSURE OF H₂, HE and CO₂. PART 1:
SO₂, NH₃, HF, HCL, OCS and C₂H₂**

**J. S. WILZEWSKI^{a,b}, I. E. GORDON^a, R. V. KOCHANOV^{a,c}, C. HILL^{a,d},
L. S. ROTHMAN^a,**

^a*Atomic and Molecular Physics, Harvard-Smithsonian Center for Astrophysics, 60
Garden Street, 02138 Cambridge MA, USA,*

^b*Department of Physics, Technische Universität Dresden, 01062 Dresden, Germany,*

^c*Laboratory of Quantum Mechanics of Molecules and Radiative Processes, Tomsk
State University, 36 Lenin Avenue, 634050 Tomsk, Russia,*

^d*Department of Physics and Astronomy, University College London, Gower Street,
London WC1E 6BT, UK*

The goal of this work is to increase the potential of the HITRAN database [1] towards the interpretation and modeling of the spectra of atmospheres dominated by noble gases (gas giants) or carbon dioxide (planets like Venus and Mars). Line-broadening coefficients, line shifts and temperature dependence exponents for molecules of planetary interest perturbed by H₂, He and CO₂ are being assembled from both experimental and theoretical studies, and their extrapolations. The first step in this direction was made by us in Li et al. [2] where we created complete datasets of H₂- and CO₂-broadened lines of CO. In this work we have extended this study to six more molecules: SO₂, NH₃, HF, HCl, OCS and C₂H₂. Semi-empirical approaches used in this work will be described for each system. Every line for these molecules now has the relevant parameters with their uncertainties and source information, which will be accessible through HITRANonline (www.HITRAN.org).

The present work helps to identify the need for further investigations of broadening, shifting and the temperature dependence of spectral lines in planetary environments. A “wishlist” for additional studies in this area will be presented at the meeting.

This work has been supported by NASA Planetary Atmospheres Grant NNX13AI59G and the German-American Fulbright Commission.

References

[1] L. S. Rothman et al. JQSRT. 130, 4-50 (2013)

[2] G. Li et al. ApJS. 216, 15 (2015)