HITRAN2016 DATABASE PART II: OVERVIEW OF THE SPECTROSCOPIC PARAMETERS OF THE TRACE GASES

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The 2016 edition of HITRAN database [a] is available now [b]. This new edition of the database takes advantage of the new structure and can be accessed through HITRANonline (www.hitran.org) [c].

The line-by-line lists for almost all of the trace atmospheric species were updated in comparison with the previous edition HITRAN2012. These extended update covers not only updating few transitions of the certain molecules, but also complete replacements of the whole line lists, and as well as introduction of new spectroscopic parameters for non-Voigt line shape. The new line lists for NH_3, HNO_3, OCS, HCN, CH_3Cl, C_2H_2, C_2H_6, PH_3, C_2H_4, CH_3CN, CF_4, C_4H_2, and SO_3 feature substantial expansion of the spectral and dynamic ranges in addition of the improved accuracy of the parameters for already existing lines. A semi-empirical procedure was developed to update the air-broadening and self-broadening coefficients of N_2O, SO_2, NH_3, CH_3Cl, H_2S, and HO_2. We draw particular attention to flaws in the commonly used expression $n_{air} = 0.79n_{N_2} + 0.21n_{O_2}$ to determine the air-broadening temperature dependence exponent in the power law from those for nitrogen and oxygen broadening. A more meaningful approach will be presented. The semi-empirical line width, pressure shifts and temperature-dependence exponents of CO, NH_3, HF, HCl, OCS, C_2H_2, SO_2 perturbed by H_2, He, and CO_2 have been added to the database based on the algorithm described in Wilzewski et al.[d]. The new spectroscopic parameters for HT profile were implemented into the database for hydrogen molecule[e].

[a] The HITRAN database is supported by the NASA AURA program grant NNX14AI55G and NASA PDART grant NNX16AG51G.

[b] I. E. Gordon, L. S. Rothman, et al., J Quant Spectrosc Radiat Transf 2017; submitted.

[c] Hill C, et al., J Quant Spectrosc Radiat Transf 2013;130:51–61.

[d] Wilzewski JS,et al., J Quant Spectrosc Radiat Transf 2016;168:193–206.

[e] Wcisło P, et al., J Quant Spectrosc Radiat Transf 2016;177:75–91.