PHOTODISSOCIATION AND PHOTOIONIZATION IN SPACE: RECENT UPDATES TO THE LEIDEN VUV CROSS SECTION DATABASE

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VUV photons are important drivers of chemical processes in space. Thus, it is important to accurately characterize and constrain photorates in different radiation fields. This is done by utilizing photodissociation and photoionization cross sections of individual atoms and molecules which have been available in the Leiden VUV Photodissocation and Photoionization cross section database. Experimental and theoretical advances in the past decade or so have allowed multiple new cross sections to be obtained, particularly photoionization cross sections of radicals. The database is hereby updated by including these more recent cross sections and is also expanded with several astronomically relevant species. The cross sections have been used to calculate photodissociation and photoionization rates in several different radiation fields as well as from cosmic ray induced VUV fluxes. The reduction of rates in shielded regions has also been calculated as a function of dust, molecular and atomic hydrogen, atomic carbon, and self-shielding column densities. The relative importance of these shielding types is molecule/atom dependent, as well as the assumed dust absorbance. All the data are publicly available from the Leiden VUV cross section database.1 The Leiden VUV cross section database has been updated with 14 new astrophysically relevant molecular species and 16 updates to previous entries. A brief introduction to cross sections, particularly the measurements of photoionization cross sections of radicals, the calculation of photorates, shielding, and current/future challenges will be given.

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