Critical Evaluation of the Photoabsorption Cross Section of CO_2 from 0.125 to 201.6 nm at Room Temperature

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Accurate ultraviolet photoabsorption cross sections of polyatomic molecules are essential tools for reliable modeling of the photochemistry of planetary atmospheres. Extensive experimental data already have been recorded and published, but they are of uneven spectral resolution and coverage, and in many cases, are unavailable in computer-readable forms needed for incorporation in modeling calculations. Furthermore, most laboratory investigations have been conducted at room temperature. Perhaps most serious is that there are relatively few published assessments or critical evaluations of absolute calibration and reliability, or which laboratory experiments should be most trusted.

Here we report the results of critical evaluation of the ultraviolet photoabsorption cross section of the carbon dioxide molecule, CO_2, the principal component of the atmospheres of Venus and Mars, and an important component of comets. By careful comparison and selection of data from published laboratory investigations we have assembled, documented, analyzed, recommended, and make available a data file of absorption cross sections at 25,016 wavelengths between 0.125 and 201.6 nm at room temperature.

Keywords: critical evaluation, photoabsorption, cross section, carbon dioxide, ultraviolet, Venus, Mars