Cavity-Enhanced Measurements of Hydrogen Peroxide Absorption Cross Sections at Long Wavelengths: Implications for Hydroxyl Radical Production Indoors and Outdoors

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We used incoherent broadband cavity-enhanced absorption spectroscopy (IBBCEAS) to measure hydrogen peroxide (H_2O_2) absorption cross sections between 353 and 410 nm. These measurements expand previously published cross sections by 60 nm. We used these measured cross sections to calculate H_2O_2 photolysis rate constants in the lower troposphere at a range of solar zenith angles. Our results suggest that photolysis at wavelengths longer than those included in the current JPL recommendation may account for up to 28% of hydroxyl radical (OH) production from H_2O_2 photolysis under some conditions. We have also measured photon fluxes from several commonly-used indoor light sources including fluorescent, incandescent, and halogen bulbs, and have calculated OH production rates from H_2O_2 photolysis indoors. We predict that after certain cleaning events, OH production rates will be orders of magnitude greater than under background conditions.