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AASERT 98 Student Research in Chemiluminescence

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Abstract: Vacuum ultraviolet radiation from rocket plumes offers a unique high- altitude diagnostic observable for identifying and tracking incoming missiles. The interaction of rocket motor combustion products C2H2, C2O, and C2 with the atmospheric constitutents O and O2 was shown to lead to CO(4-X) (4+) **chemiluminescence**. The spectra and kinetics of the reactions were studied in a heatable pseudo-static photochemical reactor and in fast-flow reactors. The O + C2O and C2 + O2 reactions were shown to proceed through excited C2O2 intermediates. The **chemiluminescence** from C2 + O2 was used as the diagnostic for rate coefficient determinations; the results compared well to laser-induced fluorescence measurements, which led to k(293-1250 K) = 1.1 x 10(-11)exp(-392 K/ T)cu cm molecule(-1)s (-1). In addition to 4+ radiation, the C2 + O2 reaction produced an apparent continuum in the vuv, probably due to C2O2 radiation to a repulsive ground state. This suggests the possibility for developing a chemical laser for the vuv.

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