

CHEMILUMINESCENT REACTIONS OF OXYGEN-IODINE SYSTEMS

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The reactions of O atoms with iodine containing molecules and the kinetics of the IO radical are of relevance to the removal of tropospheric ozone. These reactions, along with energy transfer processes involving electronically excited states of O₂, are also relevant to a new class of oxygen-iodine lasers that employ discharge excitation.

Pulsed photolysis of CF₃I/N₂O/N₂ mixtures and direct laser excitation of O₂ in the presence of I₂ have been used to investigate the iodine oxygen kinetics. The primary findings of this study are that O₂(a¹Δ) is generated by the reactions IO+O→I+O₂(a) and I+I+O₂→I₂+O₂(a). O₂(b) and O₂(a) are removed by I₂ with rate constants of 5.8×10^{-11} and $< 5 \times 10^{-16}$ cm³ s⁻¹, respectively. The branching fraction for the physical quenching channel O₂(b)+I₂→O₂(a)+I₂ was found to be 0.4. Re-measurement of the rate constant for O₂(a)+O₂(X)→2O₂(X) yields a value of 9.3×10^{-19} cm³ s⁻¹. This result is somewhat lower than previous estimates.