

1E04: NUMERICAL MODELING OF H<sub>2</sub>-O<sub>2</sub> FLAMES INVOLVING ELECTRONICALLY-EXCITED SPECIES  
O<sub>2</sub>(A<sup>1</sup>Δ<sub>G</sub>), O(<sup>1</sup>D) AND OH(<sup>2</sup>Σ<sup>+</sup>).

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**Comment by Katharina Kohse-Hoeinghaus, Bielefeld University, Germany**  
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Collisional de-excitation will certainly be an important removal channel for your excited species. Did you consider that in the model? Which data did you use for describing the quenching processes?

**Reply by Ali Bourig**  
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It is worth noting that the radiative lifetime for O<sub>2</sub>(a) and O<sub>2</sub>(b) molecules is unusually long, 3900 s and 14 s respectively. Collisions with other molecules and diffusion to the electrodes may of course induce a much shorter lifetime. Nevertheless, a considerable lifetime (at least several milliseconds) has been observed in practical experiments. In our experimental set-up, excited oxygen is still easily detectable after leaving the generator.

In the model, chemical reactions rate constants in hydrogen-oxygen mixture in the presence of electronically-excited components are integrated. Electronically excited species are treated as chemical reagents with their own thermodynamic properties, and corresponding electronic energy exchange and quenching processes are considered as usual chemical reactions, expressed in the generalized Arrhenius form:  $k = A T^n \exp(-E/T)$ .

Some quenching reactions can be found below:

