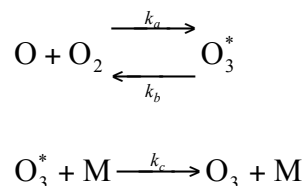
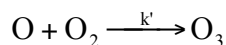


AIR POLLUTION MODELING (CEE 218C)

Ozone forms in both the troposphere and stratosphere by a three-body reaction involving monatomic oxygen (O), O₂, and a third body M (either N₂ or O₂). The kinetics of this process can be described using the following three elementary reactions:



- (a) Calculate the steady state concentration of O₃^{*} in terms of the concentrations of the other species, and the rate coefficients k_a, k_b, and k_c.
- (b) Plot the pseudo-second order rate coefficient k' versus [M] for the overall reaction process



- (c) Discuss the temperature sensitivity of the individual reactions listed above, and implications for the kinetics of the overall process.
- (d) What are the most important factors that determine the atmospheric optical depth at λ=300 nm? You may assume altitude = 0 m above mean sea level.
- (e) Giving specific chemical reactions, explain why ozone photolysis has a different impact on summertime photochemistry in Sacramento vs. Houston. Assume peak temperatures are similar in both cities – around 100°F.