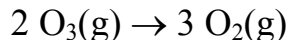


1. Short Answers

- (a) Explain the circumstances under which one uses the steady state approximation to derive rate laws from hypothetical reaction mechanisms.
- (b) A reaction is found to have an equilibrium constant $K_{\text{eq}} = 500$ at 300°C . If you discover a catalyst that lowers the activation energy by a factor of 2 under these conditions, what will be the new K_{eq} ?
- (c) Define homogeneous catalysis and give an example.

2. Arrhenius Law and Kinetics

The decomposition of ozone ($\text{O}_3(\text{g})$) proceeds according to the elementary process



At 25°C , you begin with a closed vessel containing nothing but 1 atm pressure of ozone. You discover that the total pressure in the vessel rises to 1.012 atm in 60 seconds. How long would it take for the same pressure rise to occur at 50°C if the activation energy for the reaction is assumed to be approximately the O-O bond energy (146 kJ/mol)?