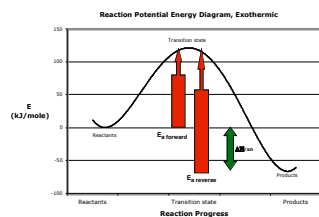


Chemistry 116
General Chemistry II

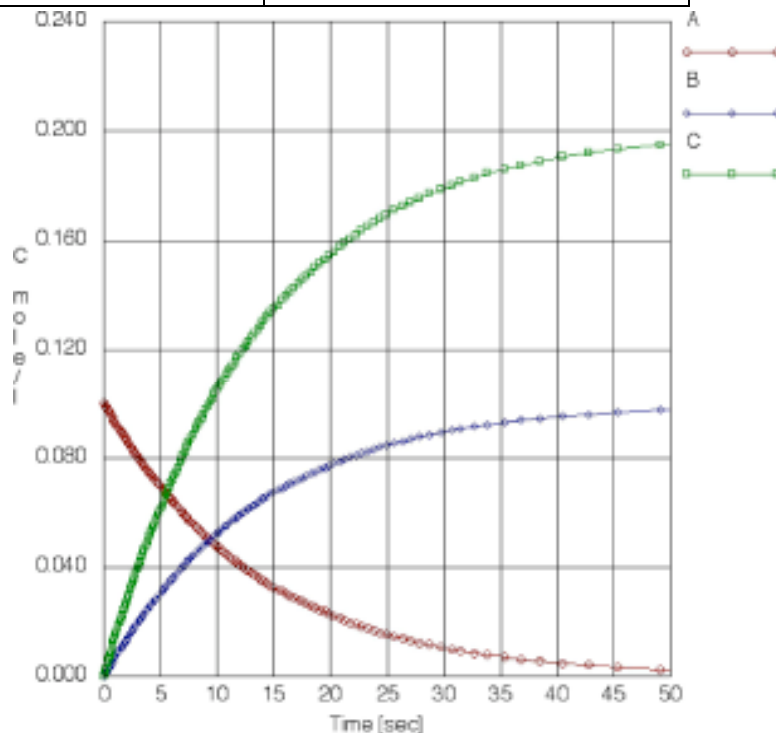
Kinetics Practice



$$R = 8.314 \times 10^{-3} \text{ kJ/mole}\cdot\text{K}$$

$$0.0^\circ\text{C} = 273.2 \text{ K}$$

- 1) Determine the reaction stoichiometry, order of reaction with respect to A, and the value of the rate constant for the graph shown on the right.
- 2) A first order reaction has $k = 0.440 \text{ min}^{-1}$ and the initial concentration of reactant is 0.840 M. What is the concentration of the reactant after 1.00 minute?
- 3) A second order reaction has $k = 7.35 \times 10^{-3} \text{ M}^{-1}\cdot\text{sec}^{-1}$ and the initial concentration of reactant is 0.120 M. What is the concentration of the reactant after 10.0 minutes?



A reaction has $k = 42.0 \text{ sec}^{-1}$ at 75.0°C and $k = 90.0 \text{ sec}^{-1}$ at 90.0°C .

- 4) Calculate E_a for this reaction.
- 5) Calculate the value of the preexponential factor for the reaction.
- 6) Calculate the value of the rate constant at 5.0°C .
- 7) A catalyst lowers the activation energy of a reaction from 164 kJ/mole to 121 kJ/mole at 37.0°C . Calculate the ratio $k_{\text{cat}}/k_{\text{uncat}}$.
- 8) a) A reaction has $\Delta H^\circ_{\text{rxn}} = -120. \text{ kJ/mol}$ and a forward activation energy, $E_a = 80. \text{ kJ/mol}$. What is the activation energy for the reverse reaction? Describe the reaction as endothermic or exothermic, and reversible or irreversible.
b) A reaction has $\Delta H^\circ_{\text{rxn}} = 5.0 \text{ kJ/mol}$ and a forward activation energy, $E_a = 55 \text{ kJ/mol}$. What is the activation energy for the reverse reaction? Describe the reaction as endothermic or exothermic, and reversible or irreversible.
- 9) A petroleum "cracking" reaction is the conversion of pentane gas into propane gas and ethene gas. Starting with just pentane, when the reaction reaches equilibrium at 500°C , the partial pressures of each gas in a sealed container are 2.00 atm for pentane and 5.29 atm for each product. Calculate the value of K_{eq} . Calculate the value of Q if a mixture of gases has $P_{\text{pentane}} = 0.50 \text{ atm}$, $P_{\text{propane}} = 4.50 \text{ atm}$ and $P_{\text{ethene}} = 2.00 \text{ atm}$. Which direction will the reaction go from those conditions? Calculate all equilibrium pressures.