

CHM 106  
Exam I Topics

CHAPTER 12: Chemical Kinetics

Reaction rates

Differential rate laws

Method of initial rates

Integrated rate laws:

$$0 \text{ order: } [A] = -kt + [A]_0$$

$$1^{\text{st}} \text{ order: } \ln [A] = -kt + \ln [A]_0$$

$$2^{\text{nd}} \text{ order: } \frac{1}{[A]} = kt + \frac{1}{[A]_0}$$

Half life

Reaction mechanisms

Collision theory

Reaction progress diagrams

Arrhenius equation:

$$\ln k = -\frac{E_a}{R} \frac{1}{T} + \ln A$$

$$\ln \frac{k_1}{k_2} = \frac{E_a}{R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right)$$

Catalysis

CHAPTER 13: Chemical Equilibrium

Law of mass action

Equilibrium constant

Gaseous equilibria

$$K_p = K(RT)^{\Delta n}$$

Heterogeneous equilibria

Reaction quotient

Solving equilibrium problems

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Low concentration approximation

Le Châtelier's principle

Changes in concentrations

Changes in pressure/volume

Changes in temperature

The equations listed on this sheet will be given (but not identified) on the exam, along with any constants (like R) that you may need.