Exam #2 Objectives

CHEM 1100 General Chemistry II

Text Reading

Chapter 14: sections 1-6

Homework Assignment

McGraw-Hill LearnSmart and Connect online assignments.

Concepts

1. Discuss the factors that can influence the rate of a reaction.
2. Demonstrate the ability to relate the rate of reaction between all the reactants and products.
3. Using a given rate law, calculate the rate of reaction.
4. Using the method of initial rates on experimental data, determine the exponents and write a rate law for a given chemical reaction.
5. Demonstrate the ability to determine the proper units for a rate constant based on the rate law.
6. Demonstrate the ability to write the relationship between concentration and time for zero, first, and second order reactions.
7. Graphically determine the order of a reaction.
8. Discuss collision and transition-state theory.
9. Graphically show the relationship between the potential energy of the reactants and products, the heat of reaction, and the activation energy for endothermic and exothermic reactions using transition state theory.
10. Demonstrate the ability to use the Arrhenius equation to show the relationship between activation energy, temperature, and the rate constant.
11. Given information about different sets of elementary processes, determine which could be a possible reaction mechanism for a given chemical reaction.
12. Demonstrate a working vocabulary of the following terms:

Arrhenius equation	first order	reaction mechanism
activation energy	half-life	second order
bimolecular	kinetics	termolecular
catalyst	order	transition state theory
collision theory	rate	unimolecular
E_a	rate constant	zero order
elementary process	rate-determining step	
exponent	rate law	

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13. Memorize and demonstrate the ability to use the following equation(s):

Zero Order:	$rate = k$	$[A]_t = -kt + [A]_0$	$t_{1/2} = \frac{[A]_0}{2k}$
First Order:	$rate = k[A]$	$\ln[A]_t = -kt + \ln[A]_0$	$t_{1/2} = \frac{\ln 2}{k}$
Second Order:	$rate = k[A]^2$	$\frac{1}{[A]_t} = kt + \frac{1}{[A]_0}$	$t_{1/2} = \frac{1}{k[A]_0}$

14. Recognize and demonstrate the ability to use the following equation(s) (you will be given these equations):

$$k = Ae^{-E_a/RT} \qquad \ln k = \left(\frac{-E_a}{R}\right)\left(\frac{1}{T}\right) + \ln A$$

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