Name _____ Date _____ Class _____

CHAPTER 16 STUDY GUIDE

# Reaction Rates

## Section 16.1 A Model for Reaction Rates

*In your textbook, read about expressing reaction rates and explaining reactions and their rates.*

**Use each of the terms below just once to complete the passage.**

| | | |
|---|---|---|
| collision theory | activated complex | mol/(L·s) |
| activation energy | reaction rate | |

According to the **(1)** _____, atoms, ions, and molecules must collide in order to react. Once formed, the **(2)** _____ is a temporary, unstable arrangement of atoms that may then form products or may break apart to reform the reactants. Every chemical reaction requires energy, and the minimum amount of energy that reacting particles must have to form the activated complex is the **(3)** _____. In a chemical reaction, the **(4)** _____ is the change in concentration of a reactant or product per unit time. It may be expressed using the units of **(5)** _____.

**Use the energy diagram for the rearrangement reaction of methyl isonitrile to acetonitrile to answer the following questions.**

**6.** What kind of reaction is represented by this diagram, endothermic or exothermic?

_____

**7.** What is the chemical structure identified at the top of the curve on the diagram?

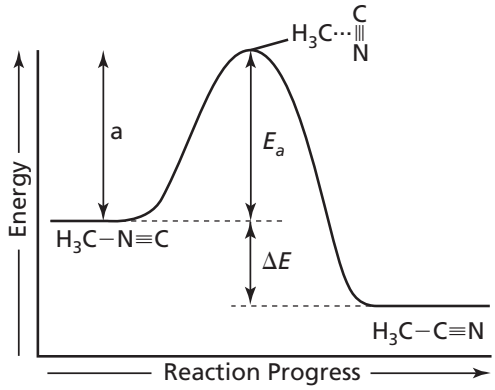
_____

**8.** What does the symbol $E_a$ represent?

_____

**9.** What does the symbol $\Delta E$ represent?

_____



## Section 16.2 Factors Affecting Reaction Rates

*In your textbook, read about the factors that affect reaction rates (reactivity, concentration, surface, area, temperature, and catalysts).*

**In the space at the left, write *true* if the statement is true; if the statement is false, change the italicized word to make it true.**

_____ **1.** *Decreasing* the concentration of reactants increases the collision frequency between reacting particles.

_____ **2.** A *heterogeneous* catalyst exists in a different physical state than the reaction it catalyzes.

_____ **3.** Increasing the *concentration* of a substance increases the kinetic energy of the particles that make up the substance.

_____ **4.** Catalysts increase the rates of chemical reactions by *raising* the activation energy of the reactions.

_____ **5.** *Increasing* the surface area of a reactant increases the rate of the reaction.

_____ **6.** Raising the temperature of a reaction increases the rate of the reaction by increasing the *energy* of the collisions between reacting particles.

**Answer the following questions.**

**7.** A chemist heated a sample of steel wool in a burner flame exposed to oxygen in the air. He also heated a sample of steel wool in a container of nearly 100% oxygen. The steel-wool sample in the container reacted faster than the other sample. Explain why.

_____

_____

**8.** Would the chemist have observed the same results if he used a block of steel instead of steel wool? Explain your answer.

_____

**9.** How would the reaction have differed if the steel wool was not heated?

_____