

Reaction Rates

Section 17.1 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

transition state

activation energy

reaction rate

mol/(L·s)

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. This physical arrangement is known as the **(3)** _____. Every chemical reaction requires energy, and the minimum amount of energy that reacting particles must have to form the activated complex is the **(4)** _____. In a chemical reaction, the **(5)** _____ is the change in concentration of a reactant or product per unit time. It may be expressed using the units of **(6)** _____.

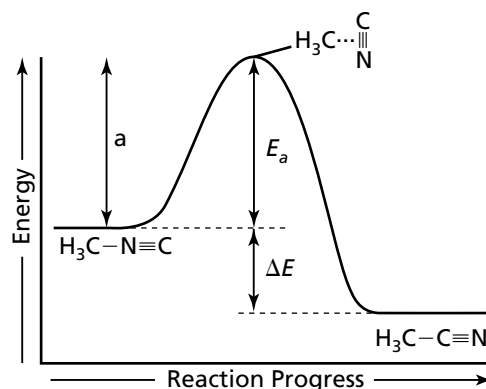
Use the energy diagram for the rearrangement reaction of methyl isonitrile to acetonitrile to answer the following questions.

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

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

9. What does the symbol E_a represent?

10. What does the symbol ΔE represent?



Section 17.1 *continued*

For each item in Column A, write the letter of the matching item in Column B.

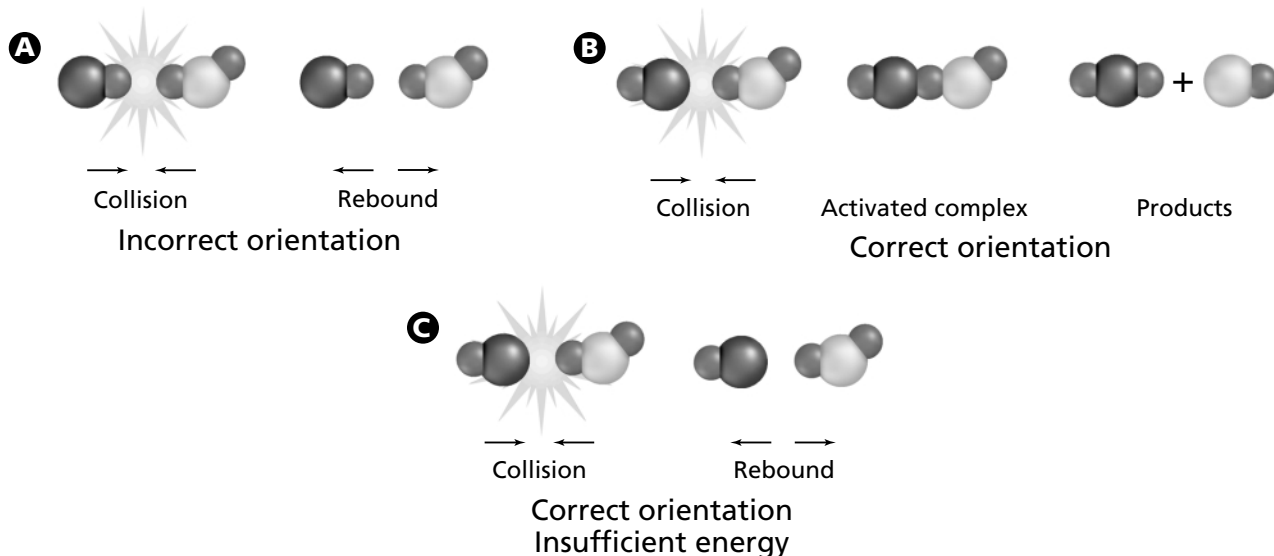
Column A

- _____ 11. Expresses the average rate of loss of a reactant
- _____ 12. Expressed as $\Delta\text{quantity}/\Delta\text{time}$
- _____ 13. Expresses the average rate of formation of a product

Column B

- a. average reaction rate
- b. positive number
- c. negative number

Use the figure below to answer the following questions.



14. What molecules collided in collisions A, B, and C? _____

15. What do the arrows represent?

16. Which collision(s) formed products? What were the products? _____

17. Explain why the other collision(s) did not form products.

18. Which collision(s) formed an activated complex? Identify the activated complex.
