

## 18.1

## RATES OF REACTION

## Section Review

## Objectives

- Describe how to express the rate of a chemical reaction
- Identify four factors that influence the rate of a chemical reaction

## Vocabulary

- rate
- collision theory
- activation energy
- activated complex
- transition state
- inhibitor

## Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

- \_\_\_\_\_ 1 \_\_\_\_\_ measure the speed of any change that occurs within \_\_\_\_\_ 1. \_\_\_\_\_  
 a time interval. Collision theory states that particles \_\_\_\_\_ 2 \_\_\_\_\_ when \_\_\_\_\_ 2. \_\_\_\_\_  
 they collide, provided that they have enough \_\_\_\_\_ 3 \_\_\_\_\_. \_\_\_\_\_ 3. \_\_\_\_\_
- The rate at which a chemical reaction occurs is determined \_\_\_\_\_ 4. \_\_\_\_\_  
 by an \_\_\_\_\_ 4 \_\_\_\_\_ energy barrier. The activation energy is the \_\_\_\_\_ 5 \_\_\_\_\_ \_\_\_\_\_ 5. \_\_\_\_\_  
 energy that reactants must have to be converted to \_\_\_\_\_ 6 \_\_\_\_\_. The \_\_\_\_\_ 6. \_\_\_\_\_  
 higher the activation energy barrier, the \_\_\_\_\_ 7 \_\_\_\_\_ the reaction. \_\_\_\_\_ 7. \_\_\_\_\_
- Chemists help reactants overcome the activation barrier in a \_\_\_\_\_ 8. \_\_\_\_\_  
 number of ways. Two effective methods are to increase the \_\_\_\_\_ 8 \_\_\_\_\_ \_\_\_\_\_ 9. \_\_\_\_\_  
 at which the reaction is done or use a \_\_\_\_\_ 9 \_\_\_\_\_. Rates of reaction \_\_\_\_\_ 10. \_\_\_\_\_  
 can also be increased by \_\_\_\_\_ 10 \_\_\_\_\_ the concentration of reactants.

## Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- \_\_\_\_\_ 11. An increase in temperature will increase the rate of a reaction.

- \_\_\_\_\_ 12. A catalyst is considered as a reactant in a chemical reaction.
- \_\_\_\_\_ 13. The speed of a reaction can be increased by increasing reactant concentration or decreasing particle size.
- \_\_\_\_\_ 14. An enzyme is a biological catalyst.

## Part C Matching

Match each description in Column B to the correct term in Column A.

### Column A

- \_\_\_\_\_ 15. rate
- \_\_\_\_\_ 16. collision theory
- \_\_\_\_\_ 17. activation energy
- \_\_\_\_\_ 18. transition state
- \_\_\_\_\_ 19. activated complex
- \_\_\_\_\_ 20. inhibitor

### Column B

- a. synonym for an activated complex
- b. speed of a change that occurs over time
- c. substance that interferes with the action of a catalyst
- d. Particles can react to form products when they collide, provided they have enough kinetic energy.
- e. an unstable arrangement of atoms that forms momentarily at the peak of the activation energy barrier
- f. minimum energy that particles must have in order to react

## Part D Questions and Problems

Answer the following question and solve the following problem in the space provided.

21. An ice machine can produce 120 kg of ice in 24 hours. Express the rate of ice production in kg/h.
22. Which of the following will increase the rate of a reaction?
- increase particle size
  - increase temperature
  - decrease concentration
  - add a catalyst