Use with textbook pages 272–277.

Different rates of reactions

1. Indicate whether each of the following would increase or decrease the rate of reaction.

(a) adding heat _____

(b) removing heat _____

(c) adding a catalyst _____

(d) diluting a solution _____

(e) removing an enzyme _____

(f) lowering the temperature _____

(g) increasing the temperature _____

(h) decreasing the surface area _____

(i) increasing the concentration of a solution

_____

(j) breaking a reactant down into smaller pieces

_____

2. Identify which situation would have a higher reaction rate. Then state the factor that affected the rate of reaction in each situation.

	Situation X	Situation Y	Situation with a higher reaction rate (X or Y)	Factor affecting the rate of reaction
(a)	1 g of sugar (cubes) 	1 g of sugar (grains) 		

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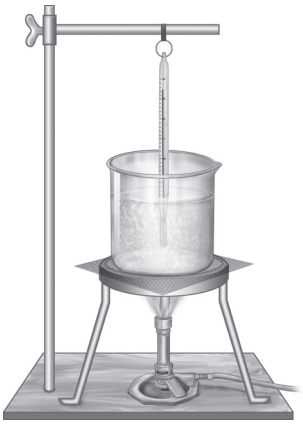
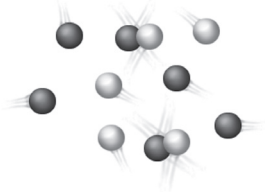
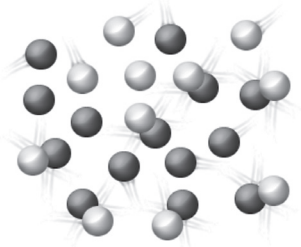
(b)	50 ºC 	0 ºC 		
(c)	low number of particles = few collisions 	high number of particles = more collisions 		
(d)	enzyme added 	no enzyme added 		
(e)	twigs 	logs 		

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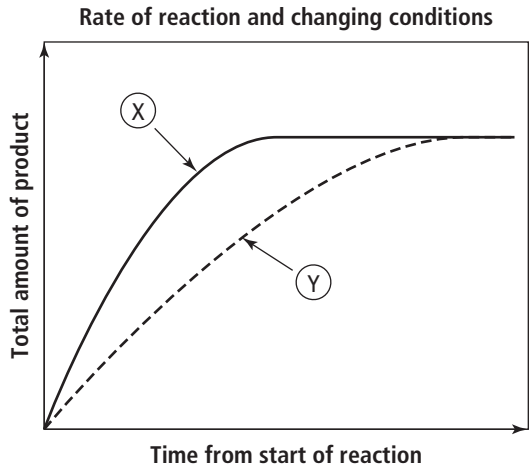
Four factors affecting the rate of reactions

Use the following graph to answer question 1.



1. The graph above shows the differences in the rate of reaction at different temperatures, concentrations, surface area, and the presence or absence of a catalyst. A steeper line represents a greater rate of reaction. Indicate which line (X or Y) each of the following are associated with.

(a) lower temperature _____ (b) higher temperature _____

(c) lower concentration _____ (d) higher concentration _____

(e) absence of a catalyst _____ (f) presence of a catalyst _____

(g) larger pieces (small surface area) _____

(h) smaller pieces (large surface area) _____

2. Which of the four factors affecting reaction rate is most important in each of the following examples? Choose from concentration, temperature, surface area, and catalyst.

(a) Raw carrots are cut into thin slices for cooking. _____

(b) Protein is broken down in the stomach by the enzyme pepsin. _____

(c) A woolly mammoth is found, perfectly preserved, near the Arctic. _____

(d) More bubbles appear when a concentrated solution of hydrochloric acid is added to a magnesium strip than when a dilute solution of the acid is added. _____

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Factors affecting the rate of chemical reactions

Match the Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
1. _____ catalyst **2.** _____ temperature **3.** _____ surface area **4.** _____ concentration **5.** _____ rate of reaction **6.** _____ catalytic converter	**A.** a measure of how much area of an object is exposed **B.** the amount of substance dissolved in a given volume of solution **C.** a measure of the average kinetic energy of all the particles in a sample of matter **D.** a substance that speeds up the rate of a chemical reaction without being used up itself or changed **E.** a measure of how quickly products form, or given amounts of reactants react, in a chemical reaction **F.** a stainless steel pollution-control device that converts poisonous gases from the vehicle's exhaust into less harmful substances

7. When you walk through a crowded hallway at school, you are more likely to bump into another person. To which of the following factors that affect rate of reaction is this analogy referring?

A. catalyst
B. temperature
C. surface area
D. concentration

8. Which of the following are true about how temperature affects the rate of reaction?

I.	heating causes the particles of the reactants to move more quickly
II.	lowering the temperature will raise the energy level of the particles
III.	increasing the temperature results in more collisions between the particles

A. I and II only
B. I and III only
C. II and III only
D. I, II, and III

9. Increasing which of the following will increase the frequency of collisions?

I.	temperature
II.	surface area
III.	concentration

A. I and II only
B. I and III only
C. II and III only
D. I, II, and III

10. Which of the following will lower the rate of reaction?

A. adding an enzyme to the reaction
B. decreasing the temperature from 40˚C to 10˚C
C. breaking a chunk of calcium up into smaller pieces
D. increasing the amount of solute dissolved in a solution

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