

CHAPTER 6 CHEMICAL KINETICS

Reflect on Your Learning

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- (a) Some possibilities include increasing temperature, using a higher concentration of reactants, increasing the surface area of the reactants if the system is heterogeneous, or adding a catalyst.
(b) Examples are, respectively: cooking food, using concentrated acid, starting a campfire with twigs, and using industrial catalysts.
- Answers will vary but the mechanism of the reaction involves collisions of octane and oxygen molecules in which single carbon-carbon and single carbon-hydrogen bonds are broken in succession down the hydrocarbon chain with reformation of bonds to form carbon dioxide and water molecules.
- Some reactant molecules have complex structures and strong chemical bonds which make reaction more difficult. Other reactions involve simple ions or molecules with weak or unstable chemical bonds in which most collisions result in reaction. Some reactions produce large amounts of heat that accelerate further reaction.

Try This Activity: Slowing the Browning Process

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- Apples react with oxygen from the air.
- The lemon juice is an antioxidant that slows the reaction.
- Temperature is the variable.
- Reducing the concentration of a reactant is investigated.
- Lemon juice, refrigeration, and removal of oxygen should all reduce rate.

6.1 RATE OF REACTION

PRACTICE

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Understanding Concepts

- $$r = \frac{\Delta c}{\Delta t}$$
$$= \frac{(0.200 \text{ mol/L})}{40 \text{ s}}$$
$$r = 0.0050 \text{ mol/(L}\cdot\text{s)}$$
- $$r = \frac{\Delta c}{\Delta t}$$
$$= \frac{(0.60 \text{ mol/L})}{5 \text{ min}}$$
$$r = 0.12 \text{ mol/(L}\cdot\text{min)}$$

PRACTICE

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Understanding Concepts

- Rate of reaction with respect to
 $\text{Fe}_{(\text{aq})}^{+2}$ consumption is $2.0 \times 10^{-1} \text{ mol Fe}_{(\text{aq})}^{+2}/(\text{L}\cdot\text{min})$
 $\text{H}_{(\text{aq})}^{+}$ consumption is $3.2 \times 10^{-1} \text{ mol H}_{(\text{aq})}^{+}/(\text{L}\cdot\text{min})$