The Reaction Process

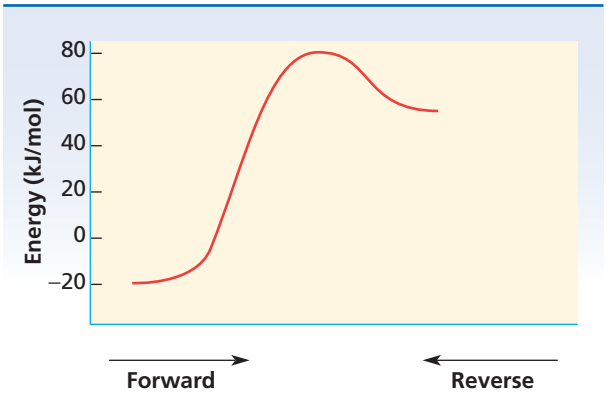
SECTION 1 REVIEW

1. a. What is the collision theory?
   b. According to this theory, what two conditions must be met for a collision between reactant molecules to be effective in producing new chemical species?
2. a. What condition must be met for an activated complex to result from the collision of reactant particles?
   b. Where, in terms of energy, does the activated complex occur along a typical reaction pathway?
3. In a reversible reaction, how does the activation energy required for the exothermic change compare with the activation energy required for the endothermic change?
4. Would you expect the following equation to represent the mechanism by which propane, C_3H_8, burns? Why or why not?
   $C_3H_8(g) + 5O_2(g) \longrightarrow 3CO_2(g) + 4H_2O(g)$
5. The decomposition of nitrogen dioxide $2NO_2 \longrightarrow 2NO + O_2$ occurs in a two-step sequence at elevated temperatures. The first step is $NO_2 \longrightarrow NO + O$. Predict a possible second step that, when combined with the first step, gives the complete reaction.

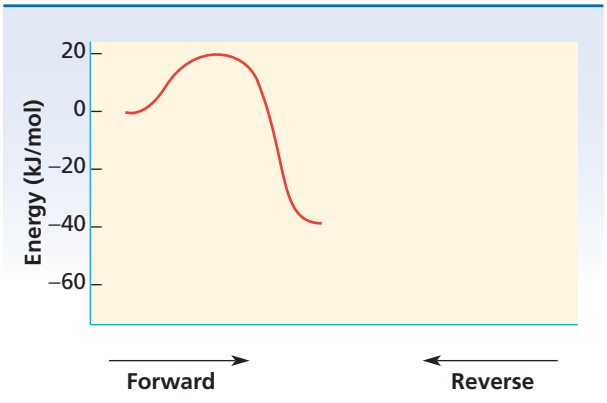
PRACTICE PROBLEMS

6. For each of the energy diagrams provided below, label the reactants, products, ΔE, E_a, and E_a'. Also determine the values of ΔE for the forward and reverse reactions, and determine the values of E_a and E_a'. (Hint: See Sample Problem A.)

a.



b.



c.