Chapter 16 & 17 Exercises - KEY

Chapter 16

1. List four changes that will increase the rate of a reaction: There are many ways, here are just four:
   a. Addition of a catalyst

   b. Geometry of the molecules

   c. Increasing Temperature

   d. Increasing Concentration

2. Explain how each of these four changes increases the reaction rate:
   a. Adding a catalyst lowers the activation energy

   b. The correct geometry allows for more successful collections

   c. Increases the frequency of collisions and the energy of the collisions

   d. Increases the frequency of collisions

3. Circle all of the following that are true for an exothermic reaction:
   a. The energy of the reactants is higher than the energy of the products.
   b. The energy of the products is higher than the energy of the reactants.
   c. Energy is required for the reaction to occur, so heat can be shown as a reactant.
   d. Energy is released when the reaction occurs, so heat can be shown as a product.
   e. Since energy is absorbed by the reaction, the surroundings feel colder after the reaction.
   f. Since energy is released by the reaction, the surroundings feel hotter after the reaction.

4. Circle all of the following that are true about a catalyst:
   a. Adding a catalyst increases the rate of a reaction.
   b. Adding a catalyst decreases the rate of a reaction.
   c. Adding a catalyst increases the activation energy for a reaction.
   d. Adding a catalyst decreases the activation energy for a reaction.
   e. Adding a catalyst will increase heat of a reaction (ΔH).
   f. Adding a catalyst will decrease heat of a reaction (ΔH).
   g. A catalyst is never consumed in a reaction.
   h. A catalyst is always consumed in a reaction.
   i. A catalyst eases the collision geometry requirement, so more reactants collide as needed.

5. Circle all of the following that are true about a system at equilibrium:
   a. The rate of the forward reaction is equal to the rate of the reverse reaction.
   b. Reactants are being produced and consumed at the same rate, so the concentration of the reactants does not change.
   c. Products are being produced and consumed at the same rate, so the concentration of the products does not change.
   d. The concentration of reactants and products are not changing. (There is no NET change!)
   e. The concentration of reactants must be equal to the concentration of products.
   f. Since the concentration of reactants and products are not changing, everything has stopped.

6. Draw a reaction profile for an exothermic reaction. Be sure to indicate the products, reactants, activation energy, label the axis and the ΔH.

See Lecture Notes or Text

7. Determine the oxidation number for each of the following:

a. H_2 H: __0__

b. Al_2O_3 Al:_+3____ O:__-2__

c. KCl K:__+1___ Cl:__-1__

d. MnO_2 Mn:__+4__ O:___-2____

e. Br_2 Br:__0___

f. Mg Mg:__0___

g. NH_3 N:___-3___ H:___+1___

h. N_2O N:___+1___ O:___-2__

i. CO_2 C:___ +4___ O:__-2___

8. For the following, balance the equation, determine the oxidation numbers, then answer the questions:

a. ____Zn (s) + _2__HBr (aq) → _____H_2 (g) + _____$ZnBr_2$ (aq)

The reactant oxidized is ___Zn_____, so it is the ____reducing_____ agent.
The reactant reduced is ____HBr_____, so it is the ___oxidizing_____ agent.

b. ____Al (s) + ____$CdCl_2$ (aq) → _____Cd (s) + _____$AlCl_3$ (aq)

The reactant oxidized is _____Al_____, so it is the ___ reducing _____ agent.
The reactant reduced is _____$CdCl_2$____, so it is the __ oxidizing _____ agent.

c. ____N_2 (g) + ____H_2 (g) → _____NH_3 (g)

The reactant oxidized is ____H_2_____, so it is the ____ reducing _____ agent.
The reactant reduced is ___ N_2_____, so it is the __ oxidizing _____ agent.

d. ____Fe (s) + ____O_2 (g) → _____Fe_2O_3 (s)

The reactant oxidized is ____Fe_____, so it is the __ reducing _____ agent.
The reactant reduced is ____ O_2_____, so it is the ___ oxidizing _____ agent.