

## CHM 130: Chapter 16 Practice Problems

1. Check all of the following changes that *increase* the **rate of a reaction**:
  - a. increasing temperature
  - b. decreasing temperature
  - c. increasing the concentration of reactants
  - d. decreasing the concentration of reactants
  - e. increasing the activation energy
  - f. decreasing the activation energy
  - g. adding a catalyst
2. Check all of the following that result from an *increase in temperature*:
  - a. The reaction rate increases.
  - b. The reaction rate decreases.
  - c. Molecules move faster.
  - d. Molecules move slower.
  - e. Reactant molecules collide more often.
  - f. Reactant molecules collide less often.
  - g. More reactants have the required activation energy.
  - h. More reactants have the correct collision geometry.
  - i. The activation energy decreases.
3. Check 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. Check all of the following that are true for **an endothermic 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.
5. Check 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 ( $\Delta H$ ).
  - f. Adding a catalyst will decrease heat of a reaction ( $\Delta H$ ).
  - g. A catalyst is never consumed (i.e., used up) in a reaction.
  - h. A catalyst is always consumed (i.e., used up) in a reaction.
  - i. A catalyst eases the collision geometry requirement, so more reactants collide as needed.

6. Check all of the following that are true for 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 reactants does not change.
  - c. Products are being produced and consumed at the same rate, so the concentration of products does not change.
  - d. The concentration of reactants and products are not changing.
  - 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.