

## Chapter 16 & 17 Exercises - KEY

### Chapter 16

- List four changes that will increase the rate of a reaction: **There are many ways, here are just four:**
  - Addition of a catalyst**
  - Geometry of the molecules**
  - Increasing Temperature**
  - Increasing Concentration**
- Explain how each of these four changes increases the reaction rate:
  - Adding a catalyst lowers the activation energy**
  - The correct geometry allows for more successful collisions**
  - Increases the frequency of collisions and the energy of the collisions**
  - Increases the frequency of collisions**
- Circle all of the following that are true for an exothermic reaction:
  - The energy of the reactants is higher than the energy of the products.**
  - The energy of the products is higher than the energy of the reactants.
  - Energy is required for the reaction to occur, so heat can be shown as a reactant.
  - Energy is released when the reaction occurs, so heat can be shown as a product.**
  - Since energy is absorbed by the reaction, the surroundings feel colder after the reaction.
  - Since energy is released by the reaction, the surroundings feel hotter after the reaction.**
- Circle all of the following that are true about a catalyst:
  - Adding a catalyst increases the rate of a reaction.**
  - Adding a catalyst decreases the rate of a reaction.
  - Adding a catalyst increases the activation energy for a reaction.
  - Adding a catalyst decreases the activation energy for a reaction.**
  - Adding a catalyst will increase heat of a reaction ( $\Delta H$ ).
  - Adding a catalyst will decrease heat of a reaction ( $\Delta H$ ).
  - A catalyst is never consumed in a reaction.**
  - A catalyst is always consumed in a reaction.
  - A catalyst eases the collision geometry requirement, so more reactants collide as needed.**
- Circle all of the following that are true about a system at equilibrium:
  - The rate of the forward reaction is equal to the rate of the reverse reaction.**
  - Reactants are being produced and consumed at the same rate, so the concentration of the reactants does not change.**
  - Products are being produced and consumed at the same rate, so the concentration of the products does not change.**
  - The concentration of reactants and products are not changing. (There is no NET change!)**
  - The concentration of reactants must be equal to the concentration of products.
  - Since the concentration of reactants and products are not changing, everything has stopped.
- Draw a reaction profile for an exothermic reaction. Be sure to indicate the products, reactants, activation energy, label the axis and the  $\Delta H$ .

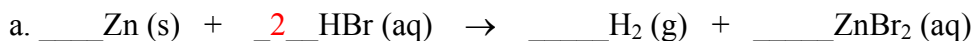
See Lecture Notes or Text

Chapter 17

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

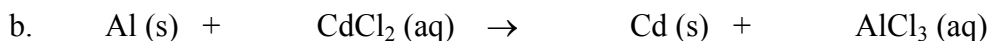
- a.  $\text{H}_2$             H:   0
- b.  $\text{Al}_2\text{O}_3$         Al:  +3         O:  -2
- c.  $\text{KCl}$             K:  +1         Cl:  -1
- d.  $\text{MnO}_2$         Mn:  +4         O:  -2
- e.  $\text{Br}_2$             Br:   0
- f.  $\text{Mg}$             Mg:   0
- g.  $\text{NH}_3$         N:  -3         H:  +1
- h.  $\text{N}_2\text{O}$         N:  +1         O:  -2
- i.  $\text{CO}_2$         C:  +4         O:  -2

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



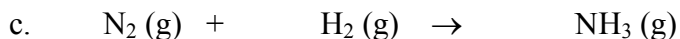
The reactant oxidized is   Zn  , so it is the   reducing   agent.

The reactant reduced is   HBr  , so it is the   oxidizing   agent.



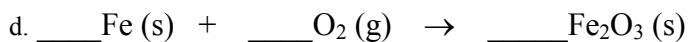
The reactant oxidized is   Al  , so it is the   reducing   agent.

The reactant reduced is   CdCl<sub>2</sub>  , so it is the   oxidizing   agent.



The reactant oxidized is   H<sub>2</sub>  , so it is the   reducing   agent.

The reactant reduced is   N<sub>2</sub>  , so it is the   oxidizing   agent.



The reactant oxidized is   Fe  , so it is the   reducing   agent.

The reactant reduced is   O<sub>2</sub>  , so it is the   oxidizing   agent.