## Unit 9 Outline- Thermodynamics, Reaction Rates, & Chemical Equilibrium Chapters 17 & 18

#### Essential Skills/ State Standards:

9-1. Describe how temperature and heat flow in terms of the motion of molecules (or atoms). (CSS: 7a)

9-2. Know that chemical processes & phase changes can either release energy (exothermic) or absorb energy (endothermic). (CSS: 7b, 7c)

9-3. Solve problems involving heat flow and temperature changes, using known values of specific heat (q= m · c · Δ T) & latent heat of phase change (q= m Δ H). (CSS: 7d)

9-4. Know the rate of reaction is the decrease in concentration of reactants or the increase in concentration of products with time & depends on such factors as: concentration, temperature, and pressure. (CSS: 8a, 8b)

9-5. Know the definition and role of activation energy & catalyst in a chemical reaction. (CSS: 8d\*, 8c)

9-6. Know how to use Le Chatchier's principle to predict the effect of changes in concentration, temperature, and pressure (CSS:

9-7. Know that equilibrium is established when the forward and reverse reaction rates are equal. (CSS: 9b)

#### Vecabulary.

- Condensation
- Freezing
- Vaporization
- Miching
- Bailing
   Sublimation

- Deposition
- I-Sept.
- Temperature
- Thermochemistry
- Exorthermic
- Endothermic

- Colorimeter
- · Joule
- Specific heat
- q=m ·c · △ T
- q=m Δ H emergetion
- g= m Δ H turns

- Heat of reaction
- Le Chatlier's principle
- Equilibrium
- Activation Energy
- Cotolyst

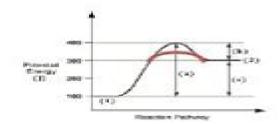
#### Study Guide (Use notes, worksheets, and labs in addition to this study guide)

- According to the collision theory, what 3 things must happen in order for two molecules to react?
   Must collide with each other, Must collide with enough energy. & in the correct orientation
- What is the importance of the activation energy in a chemical reaction? Amount of energy needed for a reaction to occur.
- Using the collision theory, explain if the following would increase/ decrease the rate of reaction:
   HCl(aq) + Mg(s) → MgCl<sub>2</sub>(aq) + H<sub>2</sub>(g)
  - a. Increase temp: Increase, molecules collide more
  - b. Increase HCI: Increase, more collisions because more reactants to collide.
- c. Increase pressure: Hard to say, wouldn't affect the reactants directly because none of them are gases.
  One of the products is a gas, so it might cause the gas particles to collide more with the reactants and could slow it down. Tough call., (this one won't be on the test).
  - d. Remove MgCl<sub>2</sub>: Increase, less products means less chance for them to interfere with reactant collisions
- e. Add H<sub>2</sub>: Decrease, more products mean they interfere more with reactants and the reactants would collide less.
- Identify the following terms with their correct letter from the graphs:
  - \* Reactants- 1

- \* Products- 2
- \* Activation energy (number/ letter & amount)-
- A (300 Joules)
- \* Is this reaction exothermic or endothermic?

#### Endothermic

 Explain how a catalyst affects the activation energy in a chemical reaction. (Also, show on the above graph what a catalyst might do). It lowers the activation energy (see on graph) Speeds it up by lowering the activation energy.



# **Reaction Rates And Equilibrium Test A Answers**

Shasha Hu

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