

(1)

## Ch. 15 Test Review Guide

15.1

- What is energy?
- What are the main units for measuring energy?
- What is specific heat ( $c$ )?
- What does the heat formula ( $q = m \times c \times \Delta T$ ) tell us?
- How do you find  $\Delta T$ ?

### Solve the following

1. How much energy ( $q$ ) is absorbed by  $H_2O$  when a piece of iron (heated before use) is placed into 30 g of water @  $22^\circ C$  and raises the temp of water to  $51^\circ C$ ? ( $c_{H_2O} = 4.184 \text{ J/g}^\circ C$ )

2. What is the mass of water that is required to absorb 296.01 J of energy when heated from  $53^\circ$  to  $75^\circ C$  ( $c_{H_2O} = 4.184 \text{ J/g}^\circ C$ )

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15-2

- what is a calorimeter?

- what is calorimetry?

### Calorimetry Lab

- How do you know which food item contained the highest amount of energy?

- Was all of the energy from the food absorbed by the water? Why or why not?

\* Use calorimetry ( $q = c \times m \times \Delta T$ ) to determine info. about metals used as heat/energy sources:

#### Solve

3. 120 g  $H_2O$  ↑ in temp. from  $20^\circ$  to  $35^\circ$  when a sample of metal ( $c = 0.89 \text{ J/g}^\circ\text{C}$ ) that was heated to  $99^\circ\text{C}$  was placed into it. What was the metal's mass? ( $c_{H_2O} = 4.184 \text{ J/g}^\circ\text{C}$ ) remember  $q_{H_2O} = q_{\text{metal}}$

4. 135 g of  $H_2O$  ↑ in temp from  $25^\circ$  to  $37^\circ$  when a 35 g sample of metal was heated to  $105^\circ\text{C}$  and then placed into the  $H_2O$ . What's the specific heat of metal?

(3)

15-3

- What is a thermochemical equation?
- What does the  $\Delta H$  of a thermo chem. equation tell us?
- What is:
  - $\Delta H_{\text{comb}}$  -
  - $\Delta H_{\text{vap}}$  -
  - $\Delta H_{\text{fus}}$  -
  - $\Delta H_{\text{cond}}$  -
  - $\Delta H_{\text{solid}}$  -
- How do you know if a rxn is endo- or exothermic?
- What does a  $-\Delta H = ?$
- What does a  $+\Delta H = ?$

### Solve the following

5. What is the amount of heat required to vaporize 2.5 mol of  $H_2O$  ( $\Delta H_{\text{vap}} = 40.7 \text{ kJ}$ )?

6. How much energy does it take to melt 28.9 g of solid Ethanol ( $C_2H_5OH$ )  $\Delta H_{\text{fus}} = 4.94 \text{ kJ/mol}$

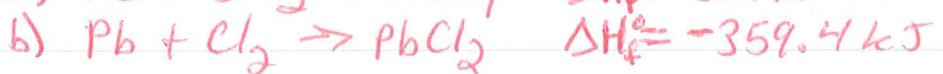
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15-4

- What does Hess's Law state?

- What is  $\Delta H_f^\circ$ ? Where do you find them?

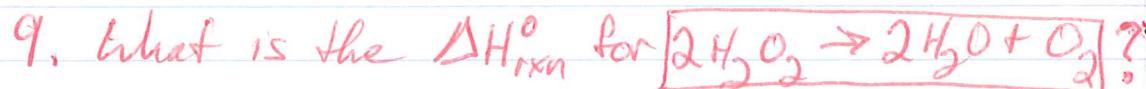
Solve the following



- What is the summation equation?

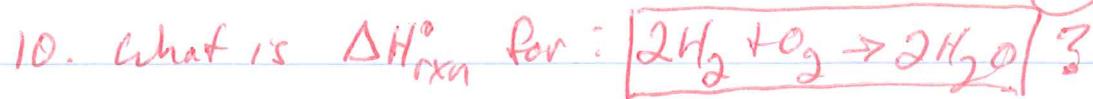
- Where are products & reactants found in chem. equations

Solve the following



\* use table R-11 pg. 975

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15-5

- What is a spontaneous rxn?

- What is Entropy (s)?

- What does the 2<sup>nd</sup> Law of Thermodynamics state?

- What do we know about exothermic rxns that are followed by an  $\uparrow$  in entropy?

- What is free energy?

- What is Gibbs Free Energy ( $G_{sys}$ )?

- What is the formula?

- What unit do we use for this?

$$-\Delta G_{sys} = \underline{\hspace{10cm}}$$

$$+\Delta G_{sys} = \underline{\hspace{10cm}}$$

Solve the following

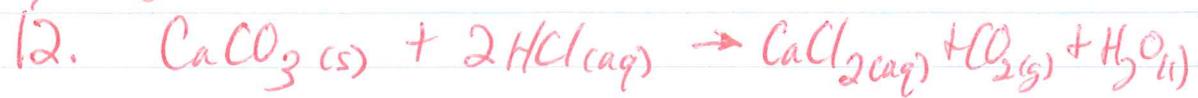


$$T = 298 K \quad \Delta H_{rxn}^\circ = +8.77 KJ \quad \Delta S_{rxn}^\circ = +8.25 J/K$$

Spontaneous or non-spontaneous?

(6)

$$\Delta G_{\text{sys}} = ?$$



$$T = 598 \text{ K} \quad \Delta H_{\text{rxn}}^\circ = -16.1 \text{ kJ} \quad \Delta S_{\text{rxn}}^\circ = +135.5 \text{ J/K}$$