**Unit 5 Thermochemistry Review**

**Define Essential Vocabulary:**

Energy:

Heat:

Temperature:

Heat vs. Temperature:

$Δ$H:

$Δ$E:

$Δ$H vs. $Δ$E:

Endothermic:

Exothermic:

Endothermic vs. Exothermic:

Specific Heat:

Joules (and kJ):

Calories (and Kcal):

Calorimeter:

**Potential Energy Diagrams:**

**1.**. Does this PE diagram represent and endothermic or

exothermic reaction?

2. What does point A represent?

3. What does point B represent?

4. What does point C represent?

5. What does point D represent?

6. Using the diagram, calculate the **Δ**H for the reaction shown.

**Specific Heat Problems:**

1. Water has a specific heat capacity of 4.18 J/g°C and iron has a specific heat capacity of 0.45J/g°C. If equal masses of iron and water have equal amounts of energy added, which will heat up more? Why?
2. Desert sand is very hot during the day and very cold at night. What does this tell you about the specific heat

 capacity of sand? Explain.

9. A 591 g brass candlestick has an initial temperature of 98.0°C. If 21,100J of heat is removed from the

 candlestick to lower its temperature to 6.8°C, what is the specific heat capacity of brass?

10. The specific heat of ethanol is 2.46 J/g-oC. Find the heat required to raise the temperature of 193 g of

 ethanol from 19 °C to 35 °C.

11. How many kJ of energy are needed to raise the temperature of 165 moles of water from 10.55 °C to 47.32 °C?

**Calorimetry**

12. A calorimeter contains 100.0 mL of room temperature water (25°C) and a 75.0 g sample of aluminum at

100.0°C is added to it. The final temperature in the calorimeter is 36°C. What is the specific heat capacity of

aluminum?

13. A sample of sodium bicarbonate (NaHCO3) is dissolved in a calorimeter and the following data is

collected. Use the following data to calculate the **Δ**Hsolution of sodium bicarbonate (the heat of dissolution or dissolving of sodium bicarbonate).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Volume ofWater | Mass of SodiumBicarbonate Used | Initial Temperature of Water | Final Temperature of Water | Specific Heat ofWater |
| 500.0 mL | 8.956 g | 23.2 C | 3.9 C | 4.184 J/g C |

**Enthalpy and Stoichiometry:**

14. Limestone (CaCO3) decomposes to form caves via the following reaction:

345.6 kJ + CaCO3 + H2SO4 → CaSO4 + CO2 + H2O

Is this reaction endothermic or exothermic?

How many kJ of energy are involved when 50.0 g of limestone is reacted with excess sulfuric acid?

15. Making cement can release a lot of heat through the following reaction

CaO + H2O → Ca(OH)2 + 150 kJ

Is this reaction endothermic or exothermic? If 100.0 g of calcium oxide reacts, how much heat is released?

**Use the following constants and figure to answer questions 15 –**

**All values are regarding water.**

 ΔHfusion= 334 J/g ΔHvaporization = 2264 J/g Cice = 2.09 J/g°C Csteam = 1.84 J/g°C



16. How much heat is involved if 192.5 g of water freeze? If 2.70 mols of water freezes?

Is the process endo-or exo-thermic?

17. How much heat is involved if 192.5 g of water melts? If 2.70 mols of water melts?

Is the process endo-or exo-thermic?

18. How much heat is absorbed when 4 g of water evaporates?

19. How much energy is released when 4 g of water condenses?

20. How much energy is absorbed when 100 g of water goes from 40 °C to 23 °C?

21. How much energy is involved when 75 g of water go from 106 °C to 98°C? Is the energy absorbed or released?

22. What amount of energy is put into a container with 2 L of water going from -10 °C to 101 °C?

**Additional Resources: Quizzes, lecture, Workbook Practice, Labs and other Worksheets available on my website.**