Unit 11 – Thermochemistry Twitter Review Questions

U11-1: Calculate the heat absorbed when 15.0 grams of ice is converted to water at the melting point.

- Answer: 5010 J

U11-2: It requires 45.6 Joules of energy to raise the temperature of 4.70 grams of an unknown metal by 25.0°C. Identify the metal.

- Answer: Zinc

U11-3: Between vaporization, sublimation, melting, and condensation: which process is the entropy of the system decreasing?

- Answer: Condensation

U11-4: Which side of the following reaction (reactants or products) is the entropy higher? $AB(s) + C_2(l) \rightarrow AC(g) + BC(g)$

- Answer: Product

U11-5: The energy required to start the reaction and thus form the activated complex is known as the ____.

- Answer: Activation Energy

U11-6: Which of the following is true in an exothermic reaction?
A) enthalpy products < enthalpy reactants < activated complex
B) enthalpy reactants < activated complex < enthalpy products
C) enthalpy products < activated complex < enthalpy reactants
D) enthalpy reactants < enthalpy products < activated complex

- Answer: A

U11-7: The average kinetic energy of water molecules is greatest in which of these samples?
A) 100 g at 25°C
B) 10 g at 55°C
C) 100 g at 45°C
D) 10 g at 35°C

- Answer: B

U11-8: What type of reaction (endothermic or exothermic) is shown in the following: $CH_4(g) + 2\ O_2(g) \rightarrow CO_2(g) + 2\ H_2O(g) + 831\ kJ$

- Answer: Exothermic

U11-9: As the temperature of a substance decreases, the average kinetic energy of its particles ____.

- Answer: Decreases

U11-10: How many kilojoules of heat energy are released when 50.0 grams of water are cooled from 70.0°C to 60.0°C?

- Answer: (-)2.10 kJ

U11-11: When ammonium chloride crystals are dissolved in water, the temperature of the water decreases. What does this temperature change indicate about the dissolving of ammonium chloride in water (endo or exo)?

- Answer: Endothermic → As ammonium chloride dissolves, it (system) absorbs energy from water (surrounding), and therefore making the water feel colder.

U11-12: A sample of water is heated from 10.0°C to 15.0°C by the addition of 125.4 Joules of heat. What is the mass of the water?

- Answer: 6.00 grams of water

U11-13: When 420 Joules of heat energy is added to 10.0 grams of water at 20.0°C, the final temperature of the water will be ____.

- Answer: 30.0°C

U11-14: How much energy (kJ) is required to vaporize 10.0 grams of water at 100°C?

- Answer: 22.6 kJ

U11-15: According to the law of thermodynamics, what is the directional flow of heat energy?

- Answer: Hot → Cold

U11-16: How much energy is needed to completely change 10.0 grams of ice to water at 0.00°C?

- Answer: 3,340 J

U11-17: If a 32.0 gram sample of metal (initially at 500°C) is placed in 125 grams of water at 25°C, the final temperature of the system is 37.5°C. What is the specific heat and most likely identify of the metal?

- Answer: C_p=0.441 J/g°C → Nickel

U11-18: Consider a potential energy diagram: Assuming a forward reaction, if the enthalpy of products is lower than the enthalpy of the reactants, then the reaction is ____.

- Answer: Exothermic

U11-19: Consider a potential energy diagram: If the enthalpy of reactants is 125 kJ and the enthalpy of products is 80 kJ, what is the enthalpy of the reaction?

- Answer: $\Delta Hrxn$ = -45 kJ

U11-20: Consider a potential energy diagram: If the enthalpy of activated complex is 145 kJ and the enthalpy of reactants is 120 kJ, then the activation energy for the reaction will be ____.

- Answer: Ea = 25 kJ

U11-21: Explain exactly how a catalyst speeds up a reaction if it is not directly consumed during the reaction.

- Answer: Lowers the activation energy and thus lowers the energy of the activated complex