UNIT 5 WORKSHEET – THERMOCHEMISTRY, LIQUIDS, & SOLIDS

1. A gas absorbs 0.0 J of heat and then performs 15.2 J of work. The change in internal energy of the gas is
   A) –24.8 J
   B) 14.8 J
   C) 55.2 J
   D) –15.2 J
   E) none of these

2. Calculate the work for the expansion of CO_2 from 1.0 to 2.5 liters against a pressure of 1.0 atm at constant temperature.
   A) 1.5 L atm B) 2.5 L atm C) 0 D) –1.5 L atm E) –2.5 L· atm

3. Of energy, work, enthalpy, and heat, how many are state functions?
   A) 0 B) 1 C) 2 D) 3 E) 4

4. Which of the following statements correctly describes the signs of ***q*** and ***w*** for the following exothermic process at P = 1 atm and T = 370 K?
   $H_2O(g) \rightarrow H_2O(l)$
   A) q and w are negative.
   B) q is positive, w is negative.
   C) q is negative, w is positive.
   D) q and w are both positive.
   E) q and w are both zero.

5. One mole of an ideal gas is expanded from a volume of 1.00 liter to a volume of 10.00 liters against a constant external pressure of 1.00 atm. How much work (in joules) is performed on the surroundings? (T = 300 k; 1 L atm = 101.3 J)
   A) 456 J
   B) 912 J
   C) 2740 J
   D) 2870 J
   E) none of these

6. For a particular process q = 20 kJ and w = 15 kJ. Which of the following statements is true?
   A) Heat flows from the system to the surroundings.
   B) The system does work on the surroundings.
   C) ΔE = 35 kJ.
   D) All of the above are true.
   E) None of the above are true.

7. Which statement is *true* of a process in which one mole of a gas is expanded from state A to state B?
   A) When the gas expands from state A to state B, the surroundings are doing work on the system.
   B) The amount of work done in the process must be the same, regardless of the path.
   C) It is not possible to have more than one path for a change of state.
   D) The final volume of the gas will depend on the path taken.
   E) The amount of heat released in the process will depend on the path taken.

8. Which of the following statements is correct?
   A) The internal energy of a system increases when more work is done by the system than heat was flowing into the system.
   B) The internal energy of a system decreases when work is done on the system and heat is flowing into the system.
   C) The system does work on the surroundings when an ideal gas expands against a constant external pressure.
   D) All statements are true.
   E) All statements are false.

9. Which one of the following statements is *false*?
   A) The change in internal energy, ΔE, for a process is equal to the amount of heat absorbed at constant volume, q_v.
   B) The change in enthalpy, ΔH, for a process is equal to the amount of heat absorbed at constant pressure, q_p.
   C) A bomb calorimeter measures ΔH directly.
   D) If q_p for a process is negative, the process is exothermic.
   E) The freezing of water is an example of an exothermic reaction.

Use the following to answer questions 10-13:
Consider a gas in a 1.0 L bulb at STP which is connected via a valve to another bulb which is initially evacuated. Answer the following concerning what occurs when the valve between the two bulbs is opened.

10. What is true about the value of q?
    A) It is greater than zero.
    B) It is equal to zero.
    C) It is less than zero.

11. What is true about the value of ΔH?
    A) It is greater than zero.
    B) It is equal to zero.
    C) It is less than zero.

12. What is true about the value of w?
    A) It is greater than zero.
    B) It is equal to zero.
    C) It is less than zero.

13. What is true about the value of ΔE?
    A) It is greater than zero.
    B) It is equal to zero.
    C) It is less than zero.

14. Two metals of equal mass with different heat capacities are subjected to the same amount of heat. Which undergoes the smallest change in temperature?
    A) The metal with the higher heat capacity.
    B) The metal with the lower heat capacity.
    C) Both undergo the same change in temperature.
    D) You need to know the initial temperatures of the metals.
    E) You need to know which metals you have.