1-5. Multiple Choice [2 points each]

1. You have a sample of gas at 25°C. At what temperature does the sample have twice the average kinetic energy?
   a) 50°C   b) 273°C   c) 298°C   d) 323°C   e) 596°C

2. Consider 2 steel containers with the same volume, at the same temperature. You add helium gas (He) to one container and the same mass of argon gas (Ar) to the other. How do the pressures inside the containers compare?
   a) The pressures are the same.
   b) The pressure inside the tank filled with argon is about ten times greater than the pressure inside the tank filled with helium.
   c) The pressure inside the tank filled with helium is about ten times greater than the pressure inside the tank filled with argon.

3. A 20.0-g sample of a gaseous hydrocarbon (a compound consisting of only carbon and hydrogen) is placed in a balloon at 1.00 atm and 25°C. The volume of the balloon is 16.3 L. Determine the molecular formula for this compound.
   a) CH₃   b) CH₄   c) C₃H₈   d) C₃H₉   e) C₂H₆

4. Under which of the following conditions does a real gas act most ideally?
   a) P = 1.00 atm, T = 400.0°C
   b) P = 2.00 atm, T = 400.0°C
   c) P = 1.00 atm, T = 200.0°C
   d) P = 1.00 atm, T = 25K
   e) STP

5. How many of the following statements correctly complete the following?: In an exothermic reaction,
   • the reaction absorbs energy from the surroundings.
   • heat is a state function.
   • heat can be considered to be a reactant.
   • the products are more stable than the reactants.
   a) 0   b) 1   c) 2   d) 3   e) 4
6. Consider the flasks in the following diagram:

   ![Diagram of flasks with helium and neon, showing volumes and labels.]

   Volume = 3X            Volume = X

   Note: ● = Helium; ○ = Neon

   a. Which is greater, the initial pressure of helium or the initial pressure of neon? How much greater?  **Show all work. [3 points]**

   b. Assuming the connecting tube has negligible volume, show what this system will look like after the stopcock between the two flasks is open.  **[1 point]**

   c. After the stopcock is open, determine the **final partial pressure of neon** in terms of the initial pressure of neon.  Assume constant temperature.  **Show all work. [3 points]**

   d. After the stopcock is open, determine the **final pressure** in terms of the initial pressure of helium.  Assume constant temperature.  **Show all work. [3 points]**