Unit 5 Test – Humza Khokhar

Multiple Choice /10

1. Which of the following are characteristics of atoms and molecules in the gas state?
   I. They display rotational motion II. They have high kinetic energy III. They are held together by weak ionic bonds
   a. I only
   b. II only
   c. I and II only
   d. II and III only
   e. I, II, and III
2. When a sealed one litre flask of gas is cooled, what happens to the gas molecules?
   a. They move farther apart
   b. They collide more often with the walls of the flask
   c. They increase their vibrational motion
   d They move more slowly
   e. Their intermolecular forces decrease.
3. Which of the following is described by the statement, "The pressure of a fixed amount of gas is inversely proportional to its volume at constant temperature"
   a. Charles's Law
   b. Boyle's law
   c. Kinetic molecular theory of gases
   d. Montgolfier's law
   e. Gay- Lussac's law
4. Which of the following assumptions are made by the kinetic molecular theory of gases?
   I. Gas molecules move randomly in all directions II. Gas molecules exhibit negligible intermolecular forces. III. Gas molecules have negligible volume
   a. I and II only
   b. I and III only
   c. I only
   d. II only
   e. I,II and III
5. A sample of gas is in a sealed flexible container at a fixed temperature. If the pressure on the container is reduced by half, the volume will
   a. increase by a factor of 2
   b. increase by a factor of 4
   c. increase by a factor of 1
   d. decrease by a factor of 2
   e. decrease by a factor of 4

6. What temperature on the Kelvin scale corresponds to -35^{0}C?
   a. 238
   b. 293
   c. 308
   d. 333
   e. 35
7. What gas laws are combined to generate the combined gas law?
   a. Gay-Lussac's law and Boyle's law
   b. Avogadro's law and the law of combining volumes
   c. Charles's law and Boyle's law **AND Gay-Lussac's law**
   d. Ideal gas law and Avogadro's law
   e. Gay- Lussac's law and Dalton's law of partial pressures.
8. Which of the following conditions represent STP?
   a. 98kPa, 273.15K
   b. 100kPa, 298.15K
   c. 101.325kPa, 298.15K
   d. 101. 325kPa, 273.15K
   e. 100kPa, 273.15K
9. What volume will be occupied by 8.00g of helium gas at STP
   a. 11.2L
   b. 22.4 L
   c. 33.6L
   d. 44.8 L
   e. 56.0L
10. Methane CH_4 reacts with steam to produce synthesis gas which is a mixture of carbon monoxide and hydrogen. The unbalanced chemical equation for the reaction is
    CH_4 (g) + H_2O (g) ---→CO (g) + H_2 (g)
    What mass of hydrogen is produced if 275L of methane is used at STP
    a. 12.3g
    b. 24.7g
    c. 37.1g
    d. 49.4g
    e. 74.2g

Problem Solving /20 marks

1. A Weather balloon with a volume of 2.00 x 10^3L at a pressure of 96.3kPa rises to an altitude of 1.00 x 10^3 m, where the atmospheric pressure is measured to be 60.8kPa. Assuming there is no change in temperature or amount of gas, what is the final volume of the weather balloon? (5 marks)

2. A birthday balloon is filled to a volume of 1.50L of helium gas in an air- conditioned room at 294K. The balloon is then taken outdoors on a warm sunny day and left to float as a decoration. The volume of the balloon expands to 1.55L. Assuming that the pressure and amount of gas remain constant, what is the air temperature outdoors in kelvins? (5 marks)

3. Find the temperature in ^oC of 2.5mol of gas that occupies a volume of 56.5L at a pressure of 1.20atm (5 marks)

4. A 1.58g of gas occupies a volume of 500.0mL at STP. Calculate the molar mass of the gas (5 marks)