Name: _____
Hour: ____ Date: _____

Chemistry: *Practice Problems for the Gas Laws*

Do the following problems, showing your work and including all proper units.

Graham's Law

1. At 350^{o}C, nitrogen has a velocity of 800 m/s. Find the velocity of hydrogen at the same temperature.

2. At room temperature, acetylene (C_2H_2) has a velocity of 480 m/s. At the same temperature, an unknown noble gas has a velocity of 267 m/s. What is the unknown gas?

Gas Laws with One Term Constant

3. A sample of gas has an initial volume of 25 L and an initial pressure of 3.5 atm. If the pressure changes to 1.3 atm, find the new volume, assuming that the temperature remains constant.

4. A sample of neon is at 89^{o}C and 123 kPa. If the pressure changes to 145 kPa and the volume remains constant, find the new temperature, in ^{o}C.

Combined Gas Law

5. A gas at STP occupies 28 cm^3 of space. If the pressure changes to 3.8 atm and the temperature increases to 203^{o}C, find the new volume.

6. A sample of sulfur dioxide (SO_2) is initially at a temperature of 133^{o}C, a volume of 20 L, and a pressure of 850 mm Hg. If the volume changes to 25 L and the temperature increases to 181^{o}C, find the new pressure.

Ideal Gas Law

7. 25 g of methane (CH_4) has a pressure of 450 kPa at 250^{o}C. Find the volume occupied by the gas.

8. A sample of gas has a volume of 5.0 L when at a temperature of 310 K and a pressure of 220 kPa.

   a) Find the number of moles of gas.

   b) If there are 56 g of the gas, which noble gas is it?

Open-End Manometers: For each manometer, find the pressure of the confined gas in kPa.

9. 10.

Gas Stoichiometry

11. a) Write a balanced chemical equation for the combustion of methane to form carbon dioxide and water.

   b) If the methane has a volume of 0.65 L when under 100 kPa of pressure and at a temperature of 305 K, find the mass of oxygen that is needed to use up all of the methane.

Answers:

1. 2993 m/s
2. mm ~ 84 g, Kr
3. 67 L
4. 154^{o}C
5. 12.8 cm^3
6. 760 mm Hg
7. 15 L

8a. 0.43 moles

8b. mm ~ 131 g, Xe
9. 154.6 kPa
10. 77.1 kPa

11b. 1.64 g O_2