Section 4A Review

Name: 1) Match each of the relationships below with an appropriate graph. Each number can be used once, more than once, or not at all.



a) Standard temperature is <u></u>degrees Celsius.

b) Standard pressure is $\frac{760}{100}$ torr.

c) Absolute zero is _____ Kelvin.

4) Fill in the chart below. Show work in the space below the table and use units.

| | Pressure | Temperature | Moles | R | Volume |
|----|----------|-------------|----------|--------------------------------|---------------------|
| a) | 1.02 atm | 300 K | 0.81 mol | 0.0821 atm L/mol K | 19.6L |
| b) | 762 mmHg | 273K | 2.16 mol | 0.0821 atm L/mol K | 48.3 L |
| c) | 101 kPa | 0 °C | 997 mol | 8.314 Pa m ³ /mol K | 22.4 m ³ |
| d) | 137 Pa | 20 °C | 0.38 mol | 8.314 Pa m³/mol K | 6.76 m ³ |

a) R = 1.02 (V) = 0.81 (0.0821) 300 V = 19.6Lc) (101,000 Pa) 22.4 = n (8.314) 273 n = 997 mol

P= 137Pa

d) P(6.76) = 0.38 (8.314) 293

b) (762/760) 48.3 = 2.16 (0.0821) T = 273K

5) The gas in a balloon has a volume of 4.00 L at 100 kPa. The balloon is released into the atmosphere, and the gas in it expands to 8.00 L. What is the pressure on the balloon at the new volume.

100 (4.00) = P2(8.00) P2= 50 KPA

6) If the temperature of a 2.50 m³ sample of gas is 20 $^{\circ}$ C, what volume would the gas occupy at 127 $^{\circ}$ C?

$$\frac{2.50}{293} = \frac{V_2}{400}$$
 $V_2 = 3.41 \text{ m}^3$

7) A sample of gas has a pressure of 1.5 psi at 10 K. What will be the new temperature at constant volume if the pressure is increased to 45 psi?



8) A sample of CO occupies 45 m³ at 750 K and 1450 torr. What is the volume at STP?

 $\frac{1450(45)}{750} = \frac{760(V_2)}{273} \quad V_2 = 31 \text{ m}^3$

9) A gas is collected in a lab in a container that is 2.0 L. The conditions of the lab are 104 kPa and 15 °C. The gas has a mass of 6.60 g. What is the molar mass of the gas?

 $D = \frac{M}{V} = \frac{6.60}{2.0} = 3.39/L \qquad M = \frac{3.3(0.0821)}{(104/101.325)} = 769/mol$

10) Calculate the number of grams in 16.0 L of CH_4 at 300 K and 500 mm Hg.

 $\left(\frac{500}{740}\right)$ 16.0 = n (0.0821) 300 N= 0.427 mol $\left(\frac{16.09}{100}\right) = 6.849$

11) A sample of ethane initially occupies 0.850 L at 50 kPa and 227 OC is compressed to a volume of 150 mL. To what temperature will the gas need to be cooled to lower the pressure to 6.9 psi?

6. 9psi (101.325 KPa) = 47.6 KPa $\frac{50(850)}{500} = \frac{47.6(150)}{T_2}$ Tz = 83.9K

12) The atmospheric pressure of the room is 745 torr. If the air is made up of nitrogen and oxygen, and the partial pressure of the oxygen is 164 torr, what is the partial pressure of the nitrogen?

745 - 164 = 581 torr

| Answers to Problems: | | | | | | | | | | |
|----------------------|-----------|-------------|------------|------------|--------------|--|--|--|--|--|
| 4a) 19.6 L | 4b) 273 K | 4c) 997 mol | 4d) 137 Pa | 5) 50 kPa | 6) 3.41 m³ | | | | | |
| 7) 300 K | 8) 31 m³ | 9) 76 g/mol | 10) 6.84 g | 11) 83.9 K | 12) 581 torr | | | | | |

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