Name:_____Date:_____Period:_____

Gas Laws Worksheet

atm = 760.0 mm Hg = 101.3 kPa= 760 .0 torr

Boyle's Law Problems:

1. If 22.5 L of nitrogen at 748 mm Hg are compressed to 725 mm Hg at constant temperature. What is the new volume?

2. A gas with a volume of 4.0L at a pressure of 205kPa is allowed to expand to a volume of 12.0L. What is the pressure in the container if the temperature remains constant?

3. What pressure is required to compress 196.0 liters of air at 1.00 atmosphere into a cylinder whose volume is 26.0 liters?

4. A 40.0 L tank of ammonia has a pressure of 12.7 kPa. Calculate the volume of the ammonia if its pressure is changed to 8.4 kPa while its temperature remains constant.

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<u>**Charles' Law Problems:**</u>

1. Calculate the decrease in temperature when 6.00 L at 20.0 °C is compressed to 4.00 L.

2. A container containing 5.00 L of a gas is collected at 100 K and then allowed to expand to 20.0 L. What must the new temperature be in order to maintain the same pressure (as required by Charles' Law)?

3. A gas occupies 900.0 mL at a temperature of 27.0 °C. What is the volume at 132.0 °C?

4. If 15.0 liters of neon at 25.0 °C is allowed to expand to 45.0 liters, what must the new temperature be to maintain constant pressure?

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Guy-Lussac's Law

The gases in a hair spray can are at a temperature of $27^{\circ}C$ and a pressure of 30 lbs/in^2. If the gases in the can reach a pressure of 90 lbs/in^2, the can will explode. To what temperature must the gases be raised in order for the can to explode? Assume constant volume. ($630\ ^{\circ}C$)

2. Maybelline Cousteau's backup oxygen tank reads 900 mmHg while on her boat, where the temperature is $27^{\circ}C$. When she dives down to the bottom of an unexplored methane lake on a recently-discovered moon of Neptune, the temperature will drop down to $-183^{\circ}C$. What will the pressure in her backup tank be at that temperature? (270 mmHg)

Avogadros Law and Molar Volume at STP
(1 mole of any gas = 22.4 L at STP)
1. 50 g of nitrogen (N_2) has a volume of ____ liters at STP. (40 L)

2. 100 g of oxygen(O_2) is added to the gas in Question 16. What is the volume of the combined gases at STP. (110 L)

3. What is the density of carbon dioxide at STP? (2.0 g/L)

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Combined Gas Law Problems:

1. A gas balloon has a volume of 106.0 liters when the temperature is 45.0 °C and the pressure is 740.0 mm of mercury. What will its volume be at 20.0 °C and 780 .0 mm of mercury pressure?

2. If 10.0 liters of oxygen at STP are heated to 512 °C, what will be the new volume of gas if the pressure is also increased to 1520.0 mm of mercury?

3. A gas is heated from 263.0 K to 298.0 K and the volume is increased from 24.0 liters to 35.0 liters by moving a large piston within a cylinder. If the original pressure was 1.00 atm, what would the final pressure be?

4. The pressure of a gas is reduced from 1200.0 mm Hg to 850.0 mm Hg as the volume of its container is increased by moving a piston from 85.0 mL to 350.0 mL. What would the final temperature be if the original temperature was 90.0 °C?