*Gas Laws Worksheet*

**1 atm = 760.0 mm HG = 1.01.3 kPa = 760.0 torr**

Boyles Law Problems:

1. **If 22.5 L of nitrogen at 748 mmHg 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 205 kPa is allowed to expand to a volume of 12.0 L. 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 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.**

**Charles Law Problems:**

1. **Calculate the decrease in temperature when 6.00 L at 20.0oC is compressed to 4.00L.**
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 27.0oC. What is the volume at 132.0oC?**
4. **If 15.0 liters of neon at 25.0oC is allowed to expand to 45.0 liters, what must the new temperature be to maintain constant pressure?**

**Gay-Lussac’s Law:**

1. **The gases in a hair spray can are at a temperature of 27.0oC and a pressure of 30.0 lbs/in2. If the gases in the can reach a pressure of 90.0 lbs/in2 . , the can will explode. To what temperature must the gases be raised in order for the can to explode? Assume constant volume (630oC)**
2. **Maybelline Cousteau’s backup oxygen tank reads 900 mm Hg while on her boat, where the temperature is 27.0oC. 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 -183oC. What will the pressure in her backup tank be at that temperature? (270 mmHg)**

**Avogadro’s Law and Molar Volume at STP**

**( 1 mole of any gas = 22.4 L at STP)**

1. **50g of nitrogen N2) has a volume of \_\_\_\_\_ liters at STP. (20 L)**
2. **100g of oxygen (O2) is added to the gas in Question # 1. 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)**

**Combined Gas Law Problems:**

1. **A gas ball has a volume of 106.0 liters when the temperature is 45.0oC and the pressure is 740.00 mm Hg. What will its volume be at 20.0oC and 780.0 mm Hg?**
2. **If 10.0 L of oxygen at STP are heated to 512.0oC, what will be the new volume of gas if the pressure is also increased to 1520.0 mm Hg?**
3. **Gas is heated from 263.0 K to 298.0 K a temperature change of 35oand the volume is increased from 24.0 L to 35.0 L ( change of 11.0L) 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 100.mm Hg o 850.0 mm Hg as the volume of its container is increased by moving a piston from 85.0 ml to 350 ml. What would the final temperature be if the original temperature was 90.0oC?**