

Name: _____

Part 1 - Fill in the Blanks (1 pt. each)

STP:

Temperature: 0 °C 273 K

Pressure: 1 atm 760 torr 760 mmHg 101.325 kPa

$R=0.0821 \text{ Latm/molK}$

Part 2 - Gas Laws:

Write the equation next to the gas law (2pts each):

Boyle's Law:

$$P_1 V_1 = P_2 V_2$$

Charles' Law:

$$\frac{V_1}{T_1} = \frac{V_2}{T_2} \quad \text{OR} \quad V_1 T_2 = V_2 T_1$$

Gay-Lussac's Law:

$$\frac{P_1}{T_1} = \frac{P_2}{T_2} \quad \text{OR} \quad P_1 T_2 = P_2 T_1$$

Combined Gas Law:

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad \text{OR} \quad \frac{P_1 V_1 T_2}{T_1} = \frac{P_2 V_2 T_1}{T_2}$$

Dalton's Law of Partial Pressures: (must write both equations)

$$P_{\text{TOTAL}} = P_1 + P_2 + P_3 \dots$$

Ideal Gas Law:

$$PV = nRT$$

Part 2: Relationships

Remember the Ideal gas law and the demos you have seen. Please answer the following questions.

1. If you hold T constant and if P increases, what happens to V?

DECREASE

- a. Is this an inverse or direct relationship?

INVERSE

2. If you hold P constant and if V decreases, what happens to T?

DECREASE

- a. Is this an inverse or direct relationship?

DIRECT

3. If you hold P constant and if n increases, what happens to V?

INCREASE

- a. Is this an inverse or direct relationship?

DIRECT

Part 3: Problems

1. 2.50 L of a gas was at an unknown pressure. However, at standard pressure, its volume was determined to be 8.00 L. What was the unknown pressure in atmospheres?

(Charles' Law)

3.2 L

2. The temperature of a 4.00 L sample of gas is changed from 10.0 °C to 20.0 °C. What will the volume of this gas be at the new temperature if the pressure is held constant?

(Charles' Law)

4.14 L

3. An air sample at 107 kPa and -50.0°C has an initial volume of 3.00 L. If the temperature is raised to 100°C and the volume expands to 6.00 L, what will the new pressure be?

$$89.49 \text{ kPa}$$

4. The volume of hydrogen collected over water is 453 mL at 18°C and 780 mm Hg. What is the pressure dry gas alone? (vapor pressure of water at 18°C is 15.5 mmHg.)

$$V = 427.50 \text{ mL}$$

5. A mixture of 2 moles of H_2 , 3 moles of O_2 , 5 moles of CO_2 and 8 moles of N_2 exerts a total pressure of 900 torr. What is the partial pressure of EACH gas?

$$P_{\text{H}_2} = 100 \text{ mmHg}$$

$$P_{\text{O}_2} = 150 \text{ mmHg}$$

$$P_{\text{CO}_2} = 250 \text{ mmHg}$$

$$P_{\text{N}_2} = 400 \text{ mmHg}$$

6. What pressure will be exerted by 30g of O_2 at a temperature of 25°C and a volume of 500mL?

$$45.87 \text{ atm}$$

Gas Quiz

Name KEY

1. 50.0 mL of gas at a pressure of 2 atm and temperature of 25°C are heated to 50.0°C and the pressure is allowed to rise to 2.5 atm. What is the new volume?

COMBINED GAS LAW

43.36 L

2. 50.0 mL of gas at a temperature of 15.0°C are cooled so that the new volume is 10.0 mL. What is the new temperature in Kelvin?

Charles' LAW

57.6 K

3. 250.0 mL of gas are at 100.0°C and 760.0 mm Hg. If the gas contracts to 125 mL, and the temperature is lowered to -20.0°C, what will be the new pressure?

COMBINED GAS LAW

1031 mm Hg

4. What volume is occupied by 2 moles of gas 20.0°C and 400.0 kPa?

IDEAL GAS LAW

12.17 L

5. If .25 moles of oxygen are collected over water at 298 K and 750 mm Hg what will be the volume of the oxygen gas? (Hint: Vapor Pressure of H₂O at 25°C is 23.76 mm Hg)

IDEAL GAS LAW

6.39 L

6. A 5.0 L balloon has the pressure of 650 mm Hg. If the pressure changes to 1 atm what is the new volume?

BOYLE'S LAW

4.27 L

7. A balloon has the volume of 2.5 L indoors at 25°C. If the balloon is taken outside where the temperature is 0°C, what will be the new volume of the balloon?

CHARLES' LAW

2.29 L