

Chemistry 20 - Unit 2 - Combined Gas Law

Name: _____

You may find the following formulas and constants useful:

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

$$760.000 \text{ mmHg} = 101.325 \text{ kPa} = 1.00000 \text{ atm}$$

$$1000 \text{ mL} = 1.000 \text{ L}$$

1. 49.582 L of chlorine gas at STP is changed to 96.0 kPa at 45.0 C. What is the new volume?

$$P_1 = 101.325 \text{ kPa}$$

$$V_1 = 49.582 \text{ L}$$

$$T_1 = 273.15 \text{ K}$$

$$P_2 = 96.0 \text{ kPa}$$

$$V_2 = ?$$

$$T_2 = 318.15 \text{ K}$$

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

=

$$V_2 = 61.0 \text{ L}$$

2. A sample of fluorine gas with a volume of 39.94 L at SATP is changed to 111 kPa and 34.0 C. What is the new volume of the gas?

$$V_2 = 37.1 \text{ L}$$

3. A gas sample has a volume of 60.00L at 775 mmHg and 30.0 C. What is the volume at SATP?

$$V_2 = 61.0 \text{ L}$$

4. 48.0384 mL of hydrogen gas at 40.00 C and 110.0 kPa is changed to 10.00 C and 150.0 kPa. What is the new volume?

$$V_2 = 31.85 \text{ mL}$$

5. A sample of argon gas has a volume of 39.4829 mL at -23.947°C and 660 mmHg. The temperature increased to 39.94°C and the pressure to 887 mmHg. What is the new volume?

$$V_2 = 36.9 \text{ mL}$$

6. A sample of xenon gas has a volume of 120.00 mL at 25.00°C and 3 atm. What temperature would the gas be changed to if when the volume becomes 75.00 mL and the pressure becomes 8 atm?

$$T_2 = 496.9 \text{ K}$$

$$T_2 = 5 \times 10^2 \text{ K or } 2 \times 10^2 \text{ }^\circ\text{C}$$