All Gas Laws Practice (#2)

- *All gas temps must be in Kelvin. Convert if necessary:* **K = C + 273**
- *Different volume and pressure units can be used, as long as they are consistent throughout the problem.*
- *Remember…* **1 cm^3 = 1 mL**

BOYLE'S LAW $P_1V_1 = P_2V_2$ (constant temperature)

1) Correct the volume of 259 mL of oxygen gas at 112 kPa to the volume at 101.3 kPa (standard pressure).

2) The volume of CO_2 gas at 99.3 kPa was measured at 455 mL. What will be the volume if the pressure is adjusted to 202.6 kPa?

3) A volume is observed to change from 62.4 mL to 47.3 mL as the pressure increases. The original pressure was 117 kPa. What is the final pressure after the volume changed?

4) If 74.5 L of oxygen are collected at a pressure of 98.0 kPa, what volume would this sample of gas occupy if the pressure is changed to 90.4 kPa?

CHARLES' LAW $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ (constant pressure)

Correct the following volumes of gases for a change from the temperature indicated to standard temperature (273 K).

5) 907 cm^3 at 19 °C

6) 3.44 m^3 at 37 °C

7) 50.2 mL at -53 °C

8) 76.1 mL at 167 °C

Correct the following volumes of gases for the temperature changes indicated.

9) 6.67 L at 10 °C…… to 43 °C

10) 488 mL at 27 °C…… to -27 °C

GAY-LUSSAC'S LAW $\frac{P_1}{T_1} = \frac{P_2}{T_2}$ (constant volume)

Convert the following pressures of gases for the temperature changes indicated.

11) 988 mm Hg at 45 °C……. to 64 °C

12) 700. mm Hg at 22 °C…… to 89 °C

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13) 511 mm Hg at 17 °C……. to 75 °C

14) 122 mm Hg at 33 °C……. to 103 °C

Correct the following pressures of gases for a change from the temperature indicated to standard temperature (273 K).

15) 12.96 atm at 416 K

16) 4.98 atm at 337 K

COMBINED GAS LAW $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

17) A 1750 cm^3 container of ammonia gas is exerting a pressure of 275 kPa while at a temperature of 130 °C. Calculate the pressure of this same amount of gas in a 2500 cm^3 container at a temperature of 27 °C.

Correct the volumes of the following gases as indicated.

18) 51.7 cm^3 at 27 °C and 90.9 kPa…… to STP (0 °C and 101.3 kPa)

19) 14.6 m^3 at -12 °C and 78.6 kPa…… to 35 °C and 107 kPa

20) 67.4 mL and 76 °C and 125.4 kPa…… to STP (0 °C and 101.3 kPa)

IDEAL GAS LAW **PV = nRT**

21) How many moles of gas will occupy a 562 mL flask at -15 °C at 88.7 kPa?

22) What volume will be occupied by 0.766 mol of as at 106 kPa and 15.5 °C?

23) A 769 mL vessel contains 0.0945 mol of a gas at 98.6 kPa. What is the Kelvin temperature of the gas?

24) What is the molecular mass of a gas if 0.450 L has a mass of 0.975 g at 77.5 °C and 112 kPa?

Values for R, the ideal gas constant: (R varies with the pressure unit)	
0.08206	(L atm / mol K)
8.314	(L kPa /mol K), (J/ mol K), (m^3 Pa / mol K)
1.987	(cal / mol K)
62.36	(L mm Hg / mol K), (L torr/ mol K)