

~ ~ ~ **GAS LAW PRACTICE #1** ~ ~ ~

- 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 cm³ = 1 mL**

BOYLE'S LAW

$$P_1V_1 = P_2V_2 \text{ (constant temperature)}$$

- 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 CO₂ 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

$$\frac{V_1}{T_1} = \frac{V_2}{T_2} \text{ (constant pressure)}$$

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

- 5) 907 cm³ at 19 °C
- 6) 3.44 m³ 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

$$\frac{P_1}{T_1} = \frac{P_2}{T_2} \text{ (constant volume)}$$

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

MORE ON THE BACK →

- 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 cm³ 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 cm³ container at a temperature of 27 °C.

Correct the volumes of the following gases as indicated.

- 18) 51.7 cm³ at 27 °C and 90.9 kPa..... to STP (0 °C and 101.3 kPa)
 19) 14.6 m³ 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

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?

<u>Values for R, the ideal gas constant:</u> (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)