

## All Gas Laws Practice (#2)

$$K = C + 273.15$$

$$1 \text{ cm}^3 = 1 \text{ cc} = 1 \text{ mL}$$

$$\text{STANDARD TEMP} = 273.15 \text{ K}$$

STANDARD ATMOSPHERIC PRESSURE:

1\* atm    760\* mm Hg    760\* torr    101.3 kPa    14.7 psi

\* atm, mm Hg, torr are exact values

Values for R:

0.08206 (L atm / mol K) ,    8.314 (L kPa / mol K) ,    62.36 (L mm Hg / mol K) or (L torr/ mol K)

### BOYLE'S LAW

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

- 1) Correct the volume of 259 mL of oxygen gas at 745.00 mm Hg to the volume it would occupy at standard pressure.
- 2) The volume of carbon dioxide 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 of gas in a piston drum is observed to change from 62.4 mL to 47.3 mL as the pressure increases. The original pressure was 1.44 atm. What is the final pressure after the volume changed?
- 4) If 74.5 L of xenon gas are collected at a pressure of 28.0 psi, what volume would this sample of gas occupy if the pressure is changed to 32.0 psi?
- 5) The volume of a sample of helium is 200.50 L at standard pressure. If the volume is allowed to expand to 300.00 L, calculate the new pressure in torr.

### CHARLES' LAW

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

- 6) A sample of nitrogen gas is measured to be 907 cm<sup>3</sup> at 19 °C. What is its new volume at standard temperature?
- 7) A 3.44 m<sup>3</sup> container of chlorine gas is 289 K. Calculate the temperature if the volume compresses to 2.44 m<sup>3</sup>.
- 8) A 7.60 L piston container of oxygen gas is measured to be at -13 °C. If the container volume is allowed to expand to 10.00 L, what is the temperature?
- 9) A sample of argon gas at 98°C occupies 33.15 cc. Calculate the volume the gas would occupy at 111 °C.
- 10) 4.88 L of carbon monoxide gas has a temperature of 347 K. What would the new volume be if the temperature drops to 200. K?

### GAY-LUSSAC'S LAW

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

- 11) A sealed container of fluorine gas is measured at 988 mm Hg and 45.50 °C. What is the new pressure of the gas at 64.00 °C.?

- 12) A 0.678 atm sample of neon gas is 150. K. Calculate the temperature if the pressure is increased to 1.250 atm.
  - 13) What is the pressure of a sample of gas at 511 torr and 17 °C, if the temperature is raised to 75 °C?
  - 14) Calculate the temperature of a gas originally at 9.33 psi at 23 °C, if the pressure is adjusted to standard pressure.
  - 15) Calculate the pressure of a gas originally at 110.0 kPa at 28 °C, if the temperature is adjusted to standard temperature.
- 

### COMBINED GAS LAW

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

- 16) A 1750 cm<sup>3</sup> container of ammonia gas is exerting a pressure of 857 mm Hg while at a temperature of 130 °C. Calculate the pressure of this same amount of gas in a 2500 cm<sup>3</sup> container at a temperature of 27 °C.
  - 17) What would the volume of a gas be at STP, if it was originally 51.7 mL at 27 °C and 90.9 kPa?
  - 18) A 14.6 m<sup>3</sup> sample of hydrogen gas is measured to be 12.85 °C and 4.00 atm. What is the final temperature of the gas if it becomes 12.0 m<sup>3</sup> and 6.00 atm?
  - 19) What would the pressure of 8.00 L of a gas be at standard temperature, if it was originally 6.74 L at 76 °C and 125.4 kPa?
  - 20) A container of methane gas is measured to be 2.50 L, 12 atm, and 335 K. If the volume and pressure change to 1.75 L and 15 atm, what is the new temperature of the gas?
- 

### IDEAL GAS LAW

$$PV = nRT$$

- 21) How many moles of hydrogen gas will occupy a 5.00 L flask at -15 °C at 777.00 mm Hg?
- 22) What volume will be occupied by 0.766 mol of gas at 106 kPa and 15.5 °C?
- 23) A 0.769 L vessel contains 0.0945 mol of neon gas at 0.8488 atm. What is the Kelvin temperature of the gas?
- 24) Calculate the pressure, in kPa, of 3.19 mol of 4.88 L of carbon dioxide gas at standard temperature.
- 25) CHALLENGE: What is the molar mass of a gas if 450. mL has a mass of 0.975 g at 77.5 °C and 912 torr?