

Chem11 Gases : Quiz 1 - 60

The Laws of Boyle, Charles, Gay-Lussac, and the Combined Gas Law.

1) **Boyle's Law** ($P_1V_1 = P_2V_2$); assume T is constant.

a) One atmosphere of pressure equals _____ kPa (to one decimal)

b) A sample of gas has a volume of 330 mL and a pressure of 98 kPa. What volume will it occupy at a pressure of 55 kPa ? _____

c) The volume of a gas at a pressure of 0.75 atmospheres is 4.2 L. Find the pressure when the volume has been compressed to 2.3 L.

d) If the volume of a gas doubles, what happens to the pressure ?
_____ .

2) **Charles' Law** ($V_1/T_1 = V_2/T_2$); assume P is constant.

Note : The Kelvin temperature = The Celsius temperature + 273.

a) What is the Celsius temperature of 0 K ? _____

b) A sample of gas occupies 180. mL at 295 K. Find the volume it occupies at a temperature of 345 K. _____

c) A gas occupies a volume of 0.56 L at a temperature of 27°C. Find the temperature the gas (in degrees Celsius) when the volume it occupies is 0.29 L. _____

3) **Gay-Lussac's Law** ($P_1/T_1 = P_2/T_2$); assume V is constant.

a) A sample of gas occupies 7.3 L at a temperature of 13°C and a pressure of 15 kPa. Find the pressure when the temperature is raised to 129°C. _____

b) If the Kelvin temperature is reduced to one-third of its original value, what happens to the pressure ? _____ .

c) If the pressure of a gas is 0.72 kPa at 27°C, find the Celsius temperature if the pressure is decreased to 0.38 kPa. _____

4) **Combined Gas Law**
$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

Note : **S.T.P.** means **Standard Temperature and Pressure.**
(0.0°C, 1.0 atmosphere of pressure, or 101.3 kPa)

a) A quantity of gas occupies a volume of 2.3 L at 22°C and 87 kPa.
Find the volume at S.T.P. _____ .

b) A quantity of gas has a volume of 0.23 L at 20.0°C and 2.5 atmospheres. Find the pressure if the volume is increased to 0.84 L and the temperature is decreased to -40.0°C. _____ .

c) A sample of gas has a volume of 440 mL, a temperature of 68°C, and a pressure of 65 kPa. Find the temperature (in degrees Celsius) when the volume is decreased to 220 mL and the pressure is decreased to 22 kPa. _____

d) If the pressure of a gas doubles and the absolute temperature is halved, what happens to the volume of a gas ? _____

Answers : 1)a) 101.3, b) 590 ml, c) 1.4 atm, d) It is halved. 2)a) -273°C, b) 211 ml, c) -120°C, 3)a) 21 kPa, b) P decreases to one-third of its original value. c) -110°C, 4)a) 1.8 L, b) 0.54 atm, c) -220°C, d) It becomes one-quarter of what it was.