Mixed Gas Laws Worksheet



= 101.3 kPa

Dalton’s Law: Ptotal = P1 + P2 + P3 +… *(The total pressure of a mixture of gases = the sum of all of the partial pressures of each of the gases within the mixture)*

Gay-Lussac’s Law: P1 = P2

 T1 T2

(Direct Relationship)

**Use the gas laws we have learned, above, to solve the following problems:**

1) How many moles of gas occupy 98 L at a pressure of 2.8 atmospheres and a temperature of 292oK? ***(Ideal)***

2) A balloon is filled with 35.0 L of helium in the morning when the temperature is 20.0oC. By noon the temperature has risen to 45.0oC. What is the new volume of the balloon? ***(Charles’)***

3) A 35 L tank of oxygen is at 315 K with an internal pressure of 190 atmospheres. How many moles of gas does the tank contain? ***(Ideal)***

4) A balloon that can hold 85 L of air is inflated with 3.5 moles of gas at a pressure of 1.0 atmosphere. What is the temperature in oC of the balloon? ***(Ideal)***

5) CaCO3 decomposes at 1200oC to form CO2 gas and CaO. If 25 L of CO2 are collected at 1200oC, what will the volume of this gas be after it cools to 25oC? ***(Charles’)***

6) A helium balloon with an internal pressure of 1.00 atm and a volume of 4.50 L at 20.0oC is released. What volume will the balloon occupy at an altitude where the pressure is 0.600 atm and the temperature is –20.0oC? ***(Combined)***

7) A constant volume of oxygen is heated from 100°C to 185°C. The initial pressure is 4.1 atm. What is the final pressure? ***(Gay-Lussac’s)***

8) A 75 L container holds 62 moles of gas at a temperature of 215oC. What is the pressure in atmospheres inside the container? ***(Ideal)***

9) 6.0 L of gas in a piston at a pressure of 1.0 atm are compressed until the volume is 3.5 L. What is the new pressure inside the piston? ***(Boyle’s)***

10) A gas canister can tolerate internal pressures up to 210 atmospheres. If a 2.0 L canister holding 3.5 moles of gas is heated to 1350oC, will the canister explode? ***(Ideal)***

11) The initial volume of a gas at a pressure of 3.2 atm is 2.9 L. What will the volume be if the pressure is increased to 4.0 atm? ***(Boyle’s)***

12) Air contains oxygen, nitrogen, carbon dioxide, and trace amounts of other gases. What is the partial pressure of oxygen (PO2) at **101.3kPa of total pressure** if it’s known that the partial pressures of nitrogen, carbon dioxide, and other gases are 79.1kPa, 0.040kPa, and 0.94kPa, respectively? ***(Dalton’s)***

13) A sample of 25L of NH3 gas at 10°C is heated at constant pressure until it fills a volume of 50L. What is the new temperature in °C? ***(Gay-Lussac’s)***

14) Determine the total pressure of a gas mixture that contains oxygen, nitrogen and helium in the following partial pressures of 2.0atm for oxygen, 4.7atm for nitrogen and **253.25kPa** for helium. ***(Dalton’s)***

15) An ideal gas occupies 400ml at 270 mm Hg and 65°C. If the pressure is changed to 1.4 atm and the temperature is increased to 100°C, what is the new volume? ***(Combined)***

Answers:

1. 11 mol
2. 38.0 L
3. 260 mol
4. 23 ⁰C
5. 5.1⁰C
6. 6.87L
7. 5.0 atm
8. 33 atm
9. 1.7 atm
10. 233 atm 🡪 YES!
11. 2.3 L
12. 21.2 kPa
13. 293⁰C
14. 9.2 atm
15. 112 mL