What is Dalton's Law of Partial Pressures?

Worksheet

Dalton's law: P_total = P + P + P + ... Each gas contributes pressure independently, unaffected by the others.

$$P_{total} = P_1 + P_2 + P_3 + \cdots$$

Questions

1. In a 10 L container, N at 0.6 atm and O at 0.4 atm are mixed. Total pressure is

A) 0.2 atm
B) 0.6 atm
C) 1.0 atm
D) 10 atm

2. Air is 78% N. If atmospheric pressure is 760 mmHg, partial pressure of N is

A) 78 mmHg
B) 122 mmHg
C) 593 mmHg
D) 760 mmHg

3. Dalton's law assumes

A) gases react with each other
B) gases occupy negligible volume
C) gases have no partial pressures
D) temperature is constant and gases don't interact

4. Two gases in a container have partial pressures 3 atm and 2 atm. A third gas is added, bringing total to 6 atm. Partial pressure of the third

A) 1 atm
B) 5 atm
C) 6 atm
D) 11 atm

5. A mixture of gases contains 0.6 atm N, 0.2 atm O and 0.1 atm Ar. What is the total pressure?

6. Air at sea level is approximately 78% N, 21% O and 1% Ar. If total pressure is 1 atm, what are the partial pressures?

7. In a sealed container, H has partial pressure 0.4 atm and O has 0.5 atm. If you add He to reach 1.1 atm total, what is the partial pressure of He?

8. Define: What is Dalton's law of partial pressures?

9. Define: Do gases in a mixture interact?

10. Define: What is partial pressure?

Answer Key

1. C) 1.0 atm - P_total = 0.6 + 0.4 = 1.0 atm (volume doesn't matter, only partial pressures).

2. C) 593 mmHg - P_N2 = 0.78 760 = 592.8 593 mmHg.

3. D) temperature is constant and gases don't interact - Dalton's law works when ideal gas assumptions hold and gases don't chemically react.

4. A) 1 atm - P = 6 (3 + 2) = 1 atm.

5. P_total = P_N2 + P_O2 + P_Ar P_total = 0.6 + 0.2 + 0.1 = 0.9 atm

6. P_N2 = 0.78 1 = 0.78 atm P_O2 = 0.21 1 = 0.21 atm P_Ar = 0.01 1 = 0.01 atm Check: 0.78 + 0.21 + 0.01 = 1.0 atm

7. P_total = P_H2 + P_O2 + P_He 1.1 = 0.4 + 0.5 + P_He P_He = 1.1 0.9 = 0.2 atm

8. The total pressure of a gas mixture is the sum of partial pressures: P_total = P + P + ...

9. No - each gas exerts pressure independently, as if alone in the container.

10. The pressure a single gas would exert if it alone occupied the entire volume.