Partial Pressure Calculations

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1. (last updated 5-18-04)
(brown370)A mixture made from 6.00g O_2 and 9.00g CH_4 is placed in a 15.0L vessel at 0°C. What is the partial pressure of each gas, and what is the total pressure in the vessel?

$6g \cdot \frac{1\ mol}{32g} = 0.187\ mol$ $\quad 9g \cdot \frac{1\ mol}{16g} = 0.562\ mol$ $\quad \frac{.562 \cdot .0821 \cdot 273}{15}$ $\quad 0.839$

total = $P = \frac{nRT}{V}$ $\quad \frac{.187 \cdot .0821 \cdot 273}{15L} = 0.279\ atm$ $\quad 1.1\ atm$

4. (last updated 5-18-04)
(brady446) What are the mole fractions and mole percents of nitrogen and oxygen in air when their partial pressures are 160 torr O_2 and 600 Torr for nitrogen? Assume no other gasses.

O_2 $\frac{160}{760} = .21$ $\quad 21\%$ $\quad N_2$ $\frac{600}{760} = .78$ ← mole fraction $\quad 78\%$ ← mole Percent

5. Baking soda decomposes producing gases. These gases are used as leavening agents in baked goods. (makes them rise and get fluffy).

$$2NaHCO_3(s) \Rightarrow H_2O(g) + Na_2CO_3(s) + CO_2(g)$$

a. Student hypothesis: The products of the reaction will contain equal moles, mass and the partial pressures will also be equal. Justify or nullify this statement.

Moles + Partial Pressures are equal – mass is not due to different molar masses

b. A 25 gram sample of baking soda is decomposed in a 1L container at 0° determine the partial pressure of water

$25g \cdot \frac{1\ mol}{84g} \cdot \frac{1\ H_2O}{2} = 0.148\ mol\ H_2O$

$P = \frac{nRT}{V}$ $\quad \frac{0.148 \cdot .0821 \cdot 273}{1L}$

3.3 ATM