(#7-3c)
Chemistry
Gas Stoichiometry

Dalton's law of Partial pressures

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

$n_{total} = n_1 + n_2 + n_3 + \ldots$

1. A balloon has a volume of 1 L of propane (C_3H_8) at STP. What is the number of moles of gas present in the balloon? $1L \cdot \frac{1mol}{22.4L} = 0.0446\ mol$
2. A balloon has a volume of 3 L of Oxygen gas at STP. What is the number of moles of gas present in the balloon? $3L \cdot \frac{1}{22.4} = 0.1339 mol$
3. The two balloons referenced in the previous problems are released into a single balloon. What is the new volume? $3L + 1L = 4L$
4. Based upon the two previous questions calculate the percent particles of propane and percent Oxygen in the new container? Propane $\frac{1}{4} = 25\%$ $3/4 = 75\%$
5. The two balloons are now placed in a 2L rigid container.
   a. What is the new total pressure inside of this container. $P = \frac{nRT}{V}$ $\frac{1.78 \cdot 0.0821 \cdot 273}{2L}$ $2atm$
   b. Calculate the partial pressure of the propane? $1/4$ of $2 = 0.5\ atm$
   c. Calculate the partial pressure of the O_2. $3/4 \cdot 2 = 1.5\ atm$

4L; 1atm
2L; 2atm

Student note: Pressure is proportional to the number of collisions with the inside wall of the container. The collisions are proportional to the number of particles. The ratio of particles is the same ratio of pressure.

6. A 2 L rigid container contains 10g of O_2 and 10g of CH_4 at 0°C. Answer the following questions.
   a. Student hypothesis: The number of particles of O_2 and CH_4 are equal in the container. Justify or nullify. No, 10g O_2 (32g/mol) 10g CH_4 (16) ← CH_4 is double
   b. What is the total pressure in the container? O_2 $10g \cdot \frac{1\ mol}{32g} = 0.312\ mol$ CH_4 $10g \cdot \frac{1}{16g} = 0.625\ mol$ → 0.937 mol $PV=nRT$ $P = \frac{nRT}{V}$ $\frac{0.937 \cdot 0.821 \cdot 273}{2L} = 10.5\ atm$
   c. Use PV=nRT to calculate the partial pressure of CH_4. $P = \frac{nRT}{V}$ $\frac{0.625 \cdot 0.0821 \cdot 273}{2L} = 7.0\ atm$
   d. With out a calculator, indicate the partial pressure of the O_2. O_2 $\frac{1}{3}$ $10.5 - 7 = 3.5$