

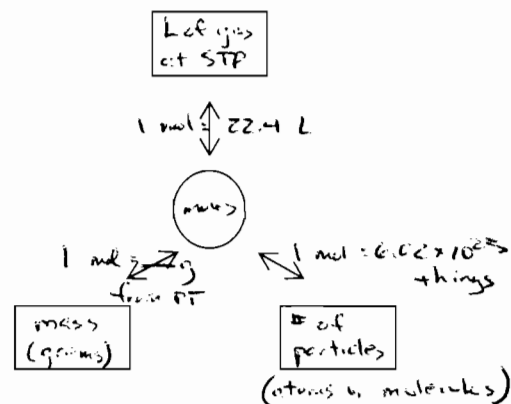
Unit 5 Practice Test: the mole & stoichiometry

Chow all of your work. Have fun! ☺

1. Complete the following table:

Standard notation	Scientific notation
0.00000055	5.5×10^{-7}
3500	3.5×10^3
230	2.3×10^2
.00043	4.3×10^{-4}
6.02×10^{23}	6.02×10^{23}

2. Complete the "mole map" to the right.
Fill in each box and label all the arrows!



3. What is a mole? What is it used for?

- a big group of things (6.02×10^{23})
- used for counting atoms & molecules

4. Find the volume of 7.6 moles of argon at STP. (1 step)

$$\frac{7.6 \text{ mol Ar} \mid 22.4 \text{ L}}{1 \text{ mol}} = 170.24 \text{ L}$$

5. Find the mass of 1.50 moles of C_3H_8 . (1 step)

$$\frac{1.50 \text{ mol } C_3H_8 \mid 44 \text{ g } C_3H_8}{1 \text{ mol } C_3H_8} = 66 \text{ g } C_3H_8$$

6. You have a silver ring with a mass of 3.5 grams. How many silver atoms is this? (2 steps)

$$\frac{3.5 \text{ g Ag} \mid 1 \text{ mol Ag} \mid 6.02 \times 10^{23} \text{ atoms}}{108 \text{ g Ag} \mid 1 \text{ mol Ag}} = 1.95 \times 10^{22} \text{ atoms}$$

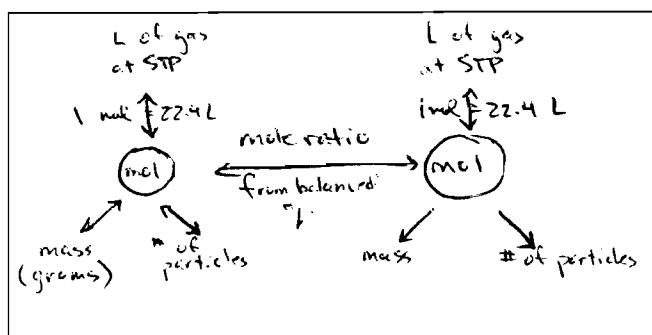
7. You have a 2 Liter bottle filled with helium gas at STP. How many helium atoms are there in the bottle? (2 steps)

$$\frac{2 \text{ L He} \mid 1 \text{ mol He} \mid 6.02 \times 10^{23} \text{ atoms}}{22.4 \text{ L He} \mid 1 \text{ mol He}} = 5.375 \times 10^{22} \text{ atoms}$$

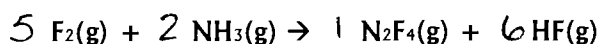
8. A small canister of CO_2 used in paintball guns contains .025 L of CO_2 at STP. How many grams of CO_2 is this?

$$\frac{0.025 \text{ L } CO_2 \mid 1 \text{ mol } CO_2 \mid 44 \text{ g } CO_2}{22.4 \text{ L } CO_2 \mid 1 \text{ mol } CO_2} = 0.049 \text{ g } CO_2$$

9. Complete the "Stoichiometry map" in the box. Label all arrows!



10. Balance and use the following equation:



a. How many moles of NH_3 are required to produce 40 moles of N_2F_4 ? (1 steps)

$$\frac{40 \text{ mol N}_2\text{F}_4}{1 \text{ mol N}_2\text{F}_4} \times \frac{2 \text{ mol NH}_3}{1 \text{ mol N}_2\text{F}_4} = 80 \text{ mol NH}_3$$

b. How many Liters of F_2 at STP are required to make 10 moles of HF ? (2 steps)

$$\frac{10 \text{ mol HF}}{6 \text{ mol HF}} \times \frac{5 \text{ mol F}_2}{1 \text{ mol HF}} \times \frac{22.4 \text{ L F}_2}{1 \text{ mol F}_2} = 186.7 \text{ L F}_2$$

c. How many grams of NH_3 are required to produce 4.65 grams of HF ? (3 steps)

$$\frac{4.65 \text{ g HF}}{20 \text{ g HF}} \times \frac{1 \text{ mol HF}}{6 \text{ mol HF}} \times \frac{2 \text{ mol NH}_3}{1 \text{ mol HF}} \times \frac{17 \text{ g NH}_3}{1 \text{ mol NH}_3} = 1.32 \text{ g NH}_3$$

11. Balance and use the following equation: $\underline{5} \text{ C}(\text{s}) + \underline{2} \text{ SO}_2(\text{g}) \rightarrow \underline{1} \text{ CS}_2(\text{l}) + \underline{4} \text{ CO}(\text{g})$

a. How many moles of carbon are needed to react with 5.44 moles of SO_2 ? (1 steps)

$$\frac{5.44 \text{ mol SO}_2}{2 \text{ mol SO}_2} \times \frac{5 \text{ mol C}}{1 \text{ mol SO}_2} = 13.6 \text{ mol C}$$

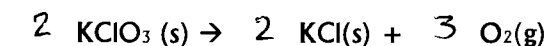
b. How many grams of carbon are needed to produce 7 moles of CS_2 ? (2 steps)

$$\frac{7 \text{ mol CS}_2}{1 \text{ mol CS}_2} \times \frac{5 \text{ mol C}}{1 \text{ mol CS}_2} \times \frac{12 \text{ g C}}{1 \text{ mol C}} = 420 \text{ g C}$$

c. How many grams of carbon are needed to react with 150 grams of SO_2 ? (3 steps)

$$\frac{150 \text{ g SO}_2}{64 \text{ g SO}_2} \times \frac{1 \text{ mol SO}_2}{2 \text{ mol SO}_2} \times \frac{5 \text{ mol C}}{1 \text{ mol SO}_2} \times \frac{12 \text{ g C}}{1 \text{ mol C}} = 70.3 \text{ g C}$$

12. Balance and use the following equation:



a. How many molecules of O_2 are produced by the decomposition of 6 grams of KClO_3 ? (3 steps)

$$\frac{6 \text{ g KClO}_3}{122.5 \text{ g KClO}_3} \times \frac{1 \text{ mol KClO}_3}{2 \text{ mol KClO}_3} \times \frac{3 \text{ mol O}_2}{1 \text{ mol KClO}_3} \times 6.02 \times 10^{23} \text{ molecules O}_2 = 9.44 \times 10^{22} \text{ molecules O}_2$$

b. Assuming the O_2 is at STP, what volume of oxygen would the answer for (a) occupy? (2 steps)

$$\frac{9.44 \times 10^{22} \text{ molecules O}_2}{6.02 \times 10^{23} \text{ molecules O}_2} \times \frac{1 \text{ mol O}_2}{1 \text{ mol O}_2} \times \frac{22.4 \text{ L O}_2}{1 \text{ mol O}_2} = 1.65 \text{ L O}_2$$