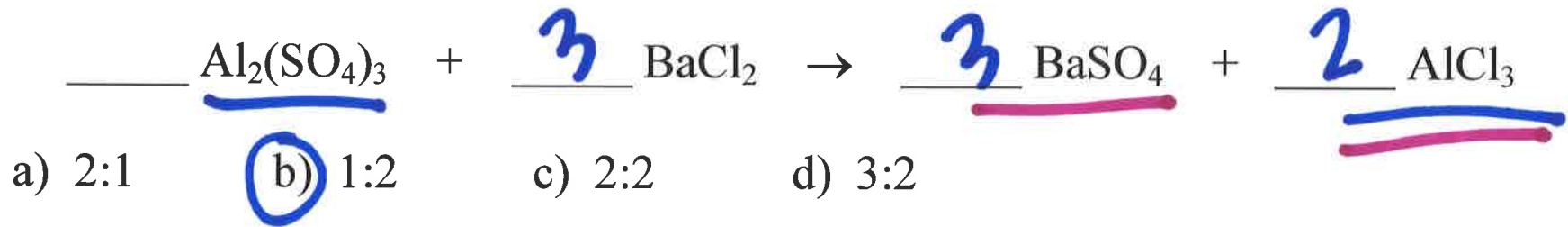


Stoichiometry Exam Review

Problems: SHOW WORK TO RECEIVE CREDIT

1. According to the reaction below, what is the mole ratio of aluminum sulfate to aluminum chloride?



2. From the same equation, what is the mole ratio between barium sulfate and aluminum chloride?

- a) 2:1 b) 1:2 c) 2:2 **(d)** 3:2

Look at coefficients!

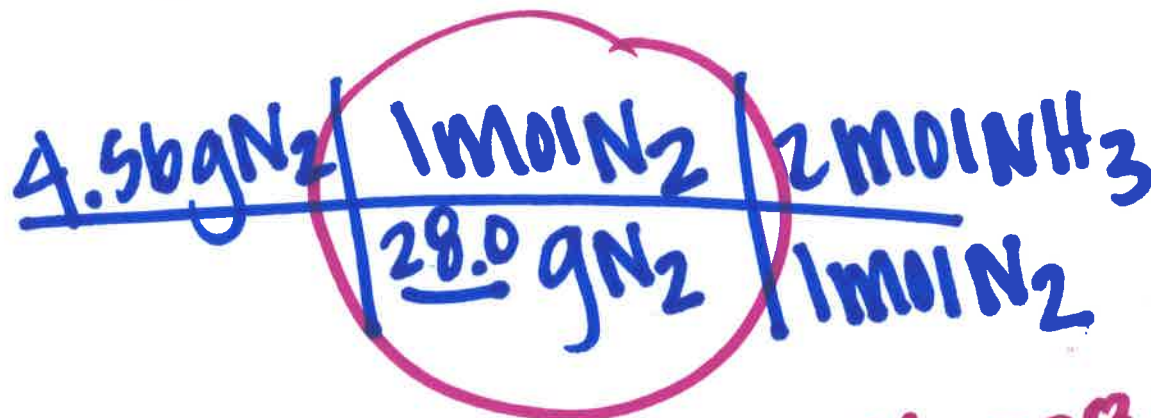
3. What conversion factor from the reaction below would you use to begin converting 4.56g of N₂ to moles of NH₃ produced?



g: 4.56g N₂

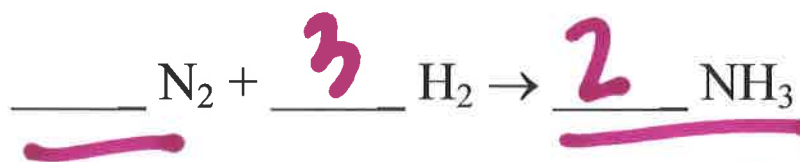
w: ? mol NH₃

1 mol N₂ = 2 mol NH₃



1 mol N₂ = 28.0g N₂

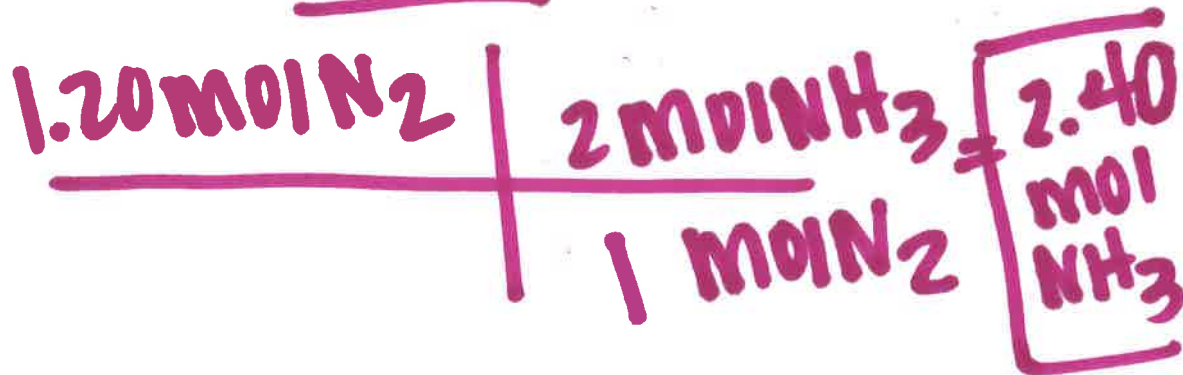
4. How many moles of NH₃ may be produced from 1.20 moles of N₂ assuming that hydrogen is excess.



g: 1.20 mol N₂

w: ? mol NH₃

1 mol N₂ = 2 mol NH₃



5. Calculate the number of moles of H_2 produced from 0.78 moles Ga and 1.92 moles HCl?

g: 0.78 mol Ga
 g: 1.92 mol HCl
 w: ? mol H_2
 2 mol Ga = 3 mol H_2
 6 mol HCl = 3 mol H_2



$$\frac{0.78 \text{ mol Ga}}{2 \text{ mol Ga}} \times \frac{3 \text{ mol H}_2}{3 \text{ mol H}_2} = 1.2 \text{ mol H}_2$$

$$\frac{1.92 \text{ mol HCl}}{6 \text{ mol HCl}} \times \frac{3 \text{ mol H}_2}{3 \text{ mol H}_2} = 0.960 \text{ mol H}_2$$

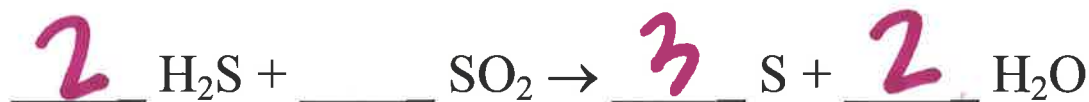
6. How many moles of H_2O_2 are required to react with 11.0 g of N_2H_4 according to the following reaction?

g: 11.0 g N_2H_4
 w: ? mol H_2O_2
 7 mol H_2O_2 = 1 mol N_2H_4



$$\frac{11.0 \text{ g N}_2\text{H}_4}{32.0 \text{ g N}_2\text{H}_4} \times \frac{1 \text{ mol N}_2\text{H}_4}{1 \text{ mol N}_2\text{H}_4} \times \frac{7 \text{ mol H}_2\text{O}_2}{7 \text{ mol H}_2\text{O}_2} = 2.41 \text{ mol H}_2\text{O}_2$$

7. How many grams of S are formed at STP from the reaction of 6.80 g of H₂S and 7.43 L SO₂ according to the following reaction?



g: 6.80g H₂S
 g: 7.43L SO₂
 W: ? g S
 2 mol H₂S = 3 mol S
 1 mol SO₂ = 3 mol S

$$\frac{6.80 \text{g H}_2\text{S}}{34.1 \text{g H}_2\text{S}} \times \frac{1 \text{mol H}_2\text{S}}{2 \text{mol H}_2\text{S}} \times \frac{3 \text{mol S}}{1 \text{mol S}} \times \frac{32.1 \text{g S}}{1 \text{mol S}} = 9.60 \text{g S}$$

$$\frac{7.43 \text{L SO}_2}{22.4 \text{L SO}_2} \times \frac{1 \text{mol SO}_2}{1 \text{mol SO}_2} \times \frac{3 \text{mol S}}{1 \text{mol S}} \times \frac{32.1 \text{g S}}{1 \text{mol S}} = 31.9 \text{g S}$$

8. Thin films of silicon, used in fabrication of electronic components, may be prepared by the decomposition of silane.

What mass (in g) of SiH₄ is required to prepare 0.2173 g of silicon?

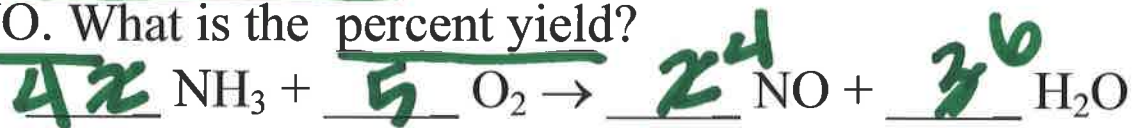


g: 0.2173g Si
 W: ? g SiH₄
 1 mol Si = 1 mol SiH₄

$$\frac{0.2173 \text{g Si}}{28.1 \text{g Si}} \times \frac{1 \text{mol Si}}{1 \text{mol Si}} \times \frac{1 \text{mol SiH}_4}{1 \text{mol SiH}_4} \times \frac{32.1 \text{g SiH}_4}{1 \text{mol SiH}_4} = 0.2482 \text{g SiH}_4$$

$$0.2482 \text{g SiH}_4$$

9. The reaction of 0.68 g of NH₃ with excess O₂ according to the following reaction yields 0.98 g of NO. What is the percent yield?



$$2 + 3 = 5$$

g: 0.68 g NH₃

w: ? g NO

actual: 0.98 g NO

4 mol NH₃ = 4 mol NO

0.68 g NH ₃	1 mol NH ₃	4 mol NO	30.0 g NO
17.0 g NH ₃	4 mol NH ₃	1 mol NO	

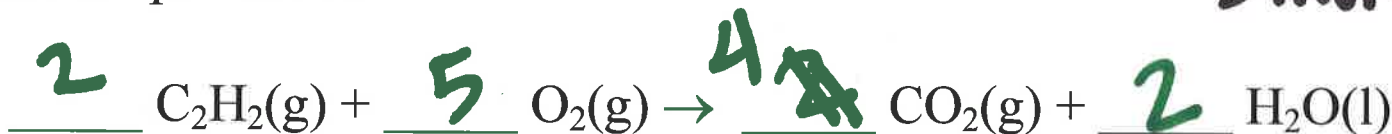
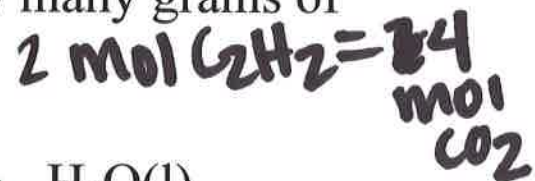
theor. → 1.2 g NO

$$\% \text{ yield} = \frac{A}{T} \times 100$$

$$\frac{0.98 \text{ g NO}}{1.2 \text{ g NO}} \times 100 =$$

82%
yield

10. A chemist combines 6.32 g of C_2H_2 and 12.2 g of oxygen. How many grams of carbon dioxide are produced?



$g: 6.32 \text{ g } C_2H_2$

$g: 12.2 \text{ g } O_2$

$w: ? \text{ g } CO_2$

$6.32 \text{ g } C_2H_2 \mid 1 \text{ mol } C_2H_2 \mid 4 \text{ mol } CO_2 \mid 44 \text{ g } CO_2 = 21.4 \text{ g } CO_2$

$12.2 \text{ g } O_2 \mid 1 \text{ mol } O_2 \mid 4 \text{ mol } CO_2 \mid 44 \text{ g } CO_2 = 13.4 \text{ g } CO_2$

What is the limiting reactant? O_2

How many grams excess reagent remain after the previous reaction? $2.35 \text{ g } C_2H_2$

$g: 12.2 \text{ g } O_2$

$w: ? \text{ g } C_2H_2$

$2 \text{ mol } C_2H_2 = 5 \text{ mol } O_2$

$12.2 \text{ g } O_2 \mid 1 \text{ mol } O_2 \mid 2 \text{ mol } C_2H_2 \mid 26.0 \text{ g } C_2H_2$

avail - used = remain used
 $6.32 \text{ g } C_2H_2 - 3.97 \text{ g } C_2H_2 = 2.35 \text{ g } C_2H_2 \text{ remain}$

Know the following terms:

stoichiometry **the relationship between the quantities of substances taking part in a reaction. Always use molar ratios!**

percent yield $\frac{\text{actual}}{\text{theoretical}} \times 100 = \% \text{ yield}$

actual yield **amount of product actually obtained in an experiment (measured or given in problem)**

theoretical yield **amount of product that should have been obtained in an experiment. (calculated)**

gram formula mass **also known as molar mass. The mass (in grams) of one mole of a substance.**

Law of Conservation of Mass **mass & # of atoms are always conserved in a reaction.**

Excess reagent **also known as "excess reactant"! The reactant that is NOT used up in an experiment.**

Limiting reagent **also known as "limiting reactant!"**
The reactant that is used up in a reaction.

Mol-mol ratio **ratio of moles of one substance to moles of another. Found using coefficients from balanced chemical equations.**

**Good luck
on your
test! 😊**