

Name:

Jenny Hansen

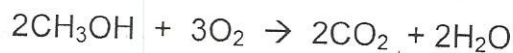
Chapter 12 Review - Stoichiometry

A. Use the word bank to fill in the paragraph.

Mass	Ratio	Actual	Products
Coefficients	Exothermic	Efficiency	Limiting

Stoichiometry is based on the Law of Conservation of mass. It is based on the relationship between the reactants and the products. In a balanced equation, the coefficients show the number of moles of particles. These numbers are used to form a mole ratio, which is used as a conversion factor. During reactions, the reactant that limits the extent of the reaction is called the limiting reactant. The percent yield shows the efficiency of a reaction. This is found by dividing the Actual yield by the theoretical yield.

B. Complete the table below, using the chemical equation below.

Methanol + oxygen \rightarrow carbon dioxide + water

Substance	Molar Mass (g/mol)	Number of Moles (coefficient)
Methanol <u>12+4+16</u>	<u>32 g/mol</u>	<u>2</u>
Oxygen gas <u>2(16)</u>	<u>32 g/mol</u>	<u>3</u>
Carbon dioxide	<u>44 g/mol</u>	<u>2</u>
Water	<u>18 g/mol</u>	<u>2</u>

1. What are the reactants? $\text{CH}_3\text{OH} + \text{O}_2$
 2. What are the products? $\text{CO}_2 + \text{H}_2\text{O}$
 3. If I have 25g of methanol, how many grams of water are produced?

$$\frac{25\text{g CH}_3\text{OH}}{32\text{g CH}_3\text{OH}} \times \frac{1\text{mol CH}_3\text{OH}}{2\text{mol H}_2\text{O}} \times \frac{18\text{g H}_2\text{O}}{1\text{mol H}_2\text{O}} = 14.06\text{g H}_2\text{O}$$

4. If I have 89g of oxygen gas, how many grams of carbon dioxide are produced?

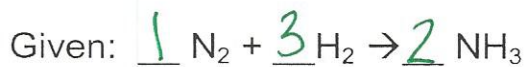
$$\frac{89\text{g O}_2}{32\text{g O}_2} \times \frac{1\text{mol O}_2}{3\text{mol O}_2} \times \frac{2\text{mol CO}_2}{1\text{mol CO}_2} \times \frac{44\text{g CO}_2}{1\text{mol CO}_2} = 81.5\text{g CO}_2$$

5. If there is 5g of methanol and 5g of oxygen gas, which is the limiting reactant?

$$\frac{5\text{g CH}_3\text{OH}}{32\text{g CH}_3\text{OH}} \times \frac{1\text{mol CH}_3\text{OH}}{2\text{mol H}_2\text{O}} = 0.15\text{mol H}_2\text{O}$$

$$\frac{5\text{g O}_2}{32\text{g O}_2} \times \frac{1\text{mol O}_2}{3\text{mol O}_2} \times \frac{2\text{mol H}_2\text{O}}{1\text{mol H}_2\text{O}} = 0.104\text{mol H}_2\text{O}$$

Oxygen Limits! 0.104 mol H₂O is the smaller answer.



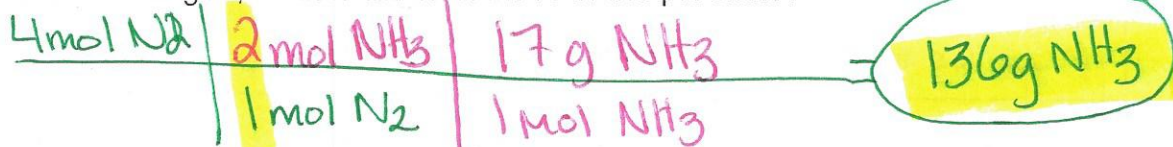
2

6. What is the mole ratio of:

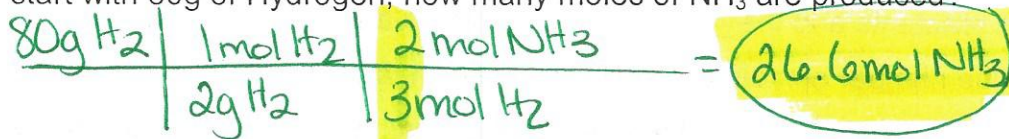
a. Nitrogen to hydrogen $1:3$
b. Hydrogen to ammonia $3:2$

c. Nitrogen to ammonia $1:2$
d. Ammonia to Hydrogen $2:3$

7. If you start with 4mol of Nitrogen, what is the total mass of the products?

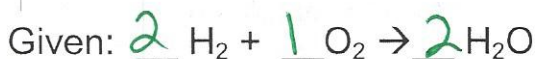


8. If you start with 80g of Hydrogen, how many moles of NH₃ are produced?

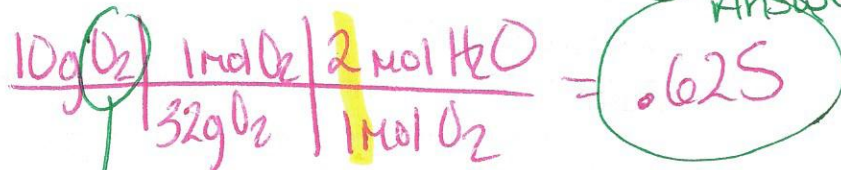
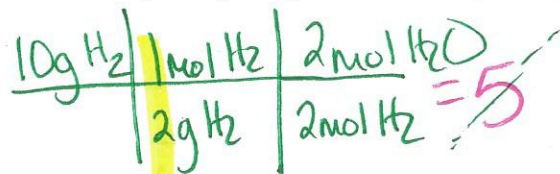


9. If 20.4g of NH₃ was produced in an experiment and the stoichiometry calculation (theoretical) was supposed to yield 29.2 grams, what is the percent yield?

(Actual) Experiment $\rightarrow \frac{20.4}{29.2} \times 100 = 69.8\%$
(theory) Calculated $\rightarrow 29.2$



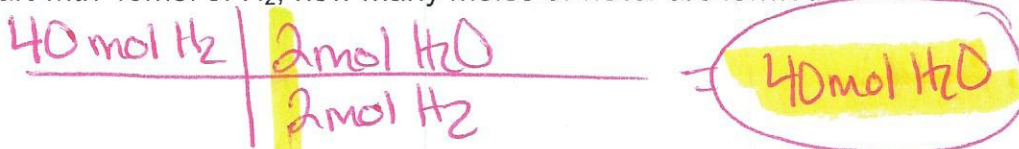
10. If 10.0g of hydrogen and 10.0g of oxygen react, what is the limiting reactant?



Smaller Answer

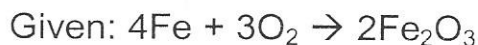
Oxygen is Limiting Reactant

11. If you start with 40mol of H₂, how many moles of water are formed?

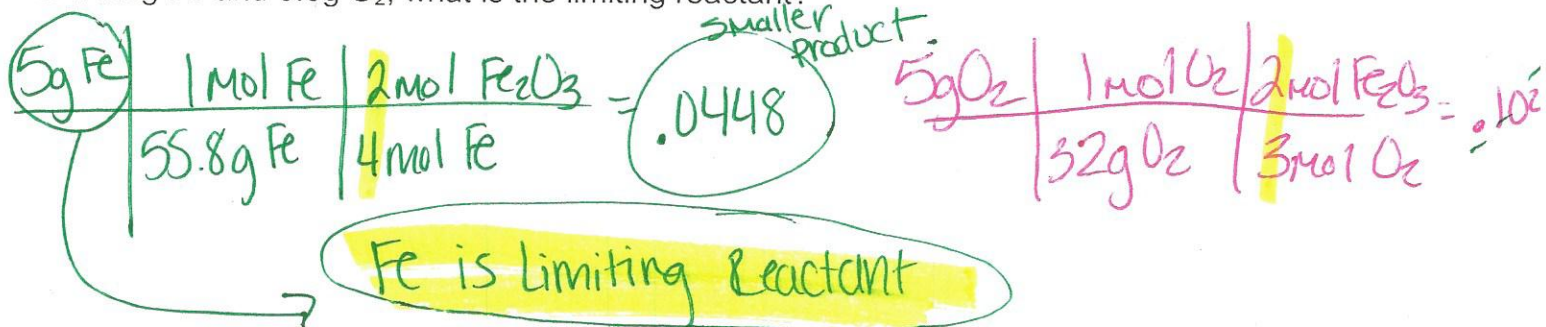


12. If 40g of water was produced in experimentation, but the stoichiometry calculations were supposed to yield 42.5 grams of water, what is the percent yield?

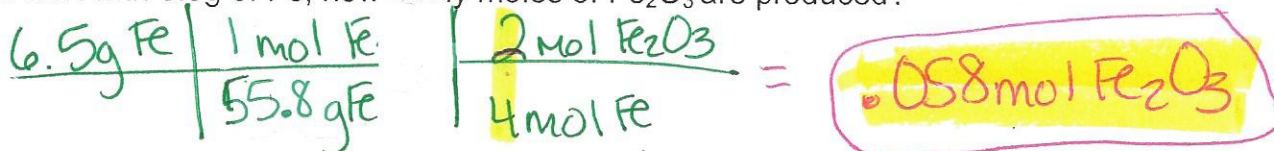
$\frac{40}{42.5} \times 100 = 94.1\%$



13. If 5.0g Fe and 5.0g O_2 , what is the limiting reactant?



14. If you start with 6.5g of Fe, how many moles of Fe_2O_3 are produced?



15. If 11g of Iron III oxide was produced in a lab experiment and the stoichiometry calculations were supposed to yield 12.5 g, what is the percent yield?

$$\frac{11\text{g Fe}_2\text{O}_3}{12.5} \times 100 = 88\%$$

C. REWIND/RECALL

How many significant figures are in the following numbers?

$\underline{3}$.00630 $\underline{4}$ 200.0 $\underline{2}$ 340 $\underline{4}$ 560.0
 $\underline{1}$ 30 $\underline{1}$ 0.003 $\underline{2}$ 0.080 $\underline{4}$ 50.01

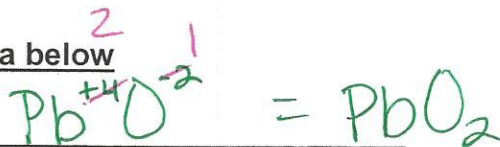
Answer the following mathematical problems in proper significant figures

$25.0 \times 2.0 = 50.$ or 50

$39.6 / 4.0 = 9.9$

Name the compound or write the formula below

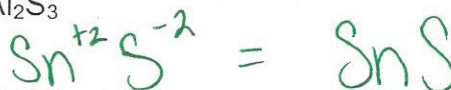
Lead IV oxide



Aluminum Sulfide



Tin II sulfide



Lead II oxide



Barium Phosphate

