

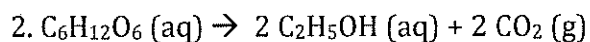
Stoichiometry Worksheet



a. How many moles of HF are needed to react with 0.300 mol of Na_2SiO_3 ?

b. How many grams of NaF form when 0.500 mol of HF reacts with excess Na_2SiO_3 ?

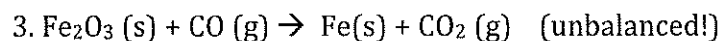
c. How many grams of Na_2SiO_3 can react with 0.800 g of HF?



a. How many moles of CO_2 are produced when 0.400 mol of $\text{C}_6\text{H}_{12}\text{O}_6$ reacts in this fashion?

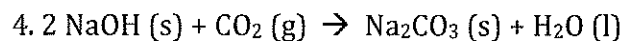
b. How many grams of $\text{C}_6\text{H}_{12}\text{O}_6$ are needed to form 7.50 g of $\text{C}_2\text{H}_5\text{OH}$?

c. How many grams of CO_2 form when 7.50 g of $\text{C}_2\text{H}_5\text{OH}$ are produced?



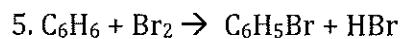
a. Calculate the number of grams of CO that can react with 0.150 kg of Fe_2O_3

b. Calculate the number of grams of Fe and the number of grams of CO₂ formed when 0.150 kg of Fe₂O₃ reacts



a. Which reagent is the limiting reactant when 1.85 mol NaOH and 1.00 mol CO₂ are allowed to react?

b. How many moles of Na₂CO₃ can be produced?



a. What is the theoretical yield of C₆H₅Br in this reaction when 30.0 g of C₆H₆ reacts with 65.0 g of Br₂?

b. If the actual yield of C₆H₅Br was 56.7 g, what is the percent yield?

Mixed Stoichiometry Practice

Name _____

Date _____ Period _____

Write and/or balance the following equations (remember the diatomic elements and to criss-cross charges for ionic compounds!!!) Use the mole ratios from the balanced equations to solve the following stoichiometry problems. Use units and labels in all conversions, and round your answer to sig figs.

1. Potassium chlorate decomposes into potassium chloride and oxygen gas.

Balanced Equation:

2. How many moles of oxygen are produced when 3.0 moles of potassium chlorate decompose completely?

3. Butane (C_4H_{10}) undergoes complete combustion.

Balanced Equation:

4. How many grams of CO_2 are produced when 88 g of O_2 are reacted with an excess of butane?

5. Water decomposes into hydrogen gas and oxygen gas by electrolysis.

Balanced Equation:

6. How many grams of hydrogen will be produced when 6.0 moles of oxygen are produced?

7. How many grams of water are required to produce 9.00 grams of hydrogen?

8. Cobalt(II) chloride reacts with fluorine in a single replacement reaction to produce cobalt(II) fluoride and chlorine gas.

Balanced Equation:

9. How many grams of fluorine are required to produce 290.8 g of cobalt(II) fluoride?

10. Balance the following equation. Strontium chloride reacts with sulfuric acid to produce hydrochloric acid and strontium sulfate.

Balanced Equation:

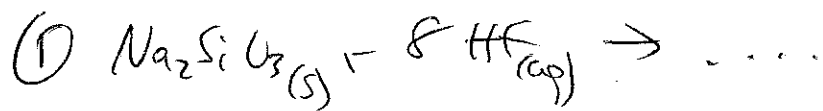
What is the mass of strontium chloride that reacts with 300.0 g of sulfuric acid?

11. Solid iron(III) oxide reacts with hydrogen gas to form iron and water.

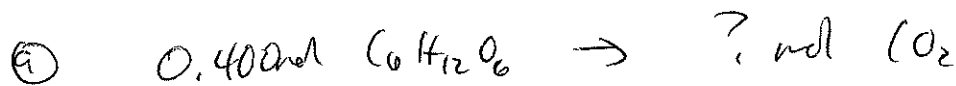
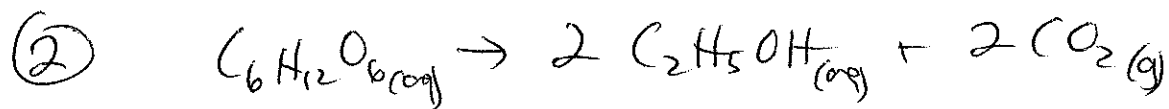
Balanced Equation:

12. How many grams of iron are produced when 450 grams of iron(III) oxide are reacted?

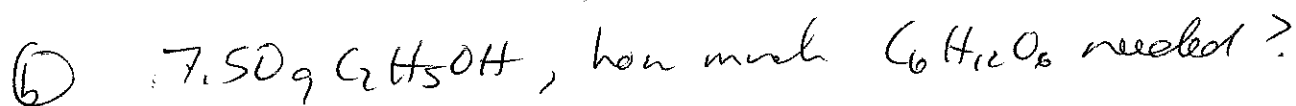
13. How many grams of water will be produced when 0.0155 moles of hydrogen gas react completely with iron(III) oxide?



see web page for solutions.



$$(0.400 \text{ mol C}_6\text{H}_{12}\text{O}_6) \left(\frac{2 \text{ mol CO}_2}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} \right) = 0.800 \text{ mol CO}_2 \text{ produced}$$

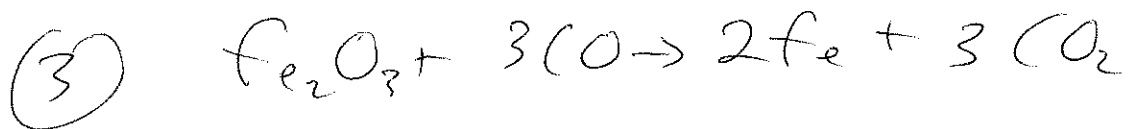


3 steps:

$$\text{i. } (7.50 \text{ g C}_2\text{H}_5\text{OH}) \left(\frac{1 \text{ mol C}_2\text{H}_5\text{OH}}{46 \text{ g C}_2\text{H}_5\text{OH}} \right) = 0.163 \text{ mol C}_2\text{H}_5\text{OH}$$

$$\text{ii. } (0.163 \text{ mol C}_2\text{H}_5\text{OH}) \left(\frac{1 \text{ mol C}_6\text{H}_{12}\text{O}_6}{2 \text{ mol C}_2\text{H}_5\text{OH}} \right) = 0.0815 \text{ mol C}_6\text{H}_{12}\text{O}_6$$

$$\text{iii. } (0.0815 \text{ mol C}_6\text{H}_{12}\text{O}_6) \left(\frac{180 \text{ g C}_6\text{H}_{12}\text{O}_6}{1 \text{ mol C}_6\text{H}_{12}\text{O}_6} \right) = 14.7 \text{ g C}_6\text{H}_{12}\text{O}_6$$



$$(a) \begin{array}{l} 0.150 \text{ kg} \\ 150 \text{ g} \end{array} \quad 7.9$$

$$\text{g} \rightarrow \text{mol} \quad (150 \text{ g Fe}_2\text{O}_3) \left(\frac{1 \text{ mol Fe}_2\text{O}_3}{159.7 \text{ g Fe}_2\text{O}_3} \right) = 0.94 \text{ mol Fe}_2\text{O}_3$$

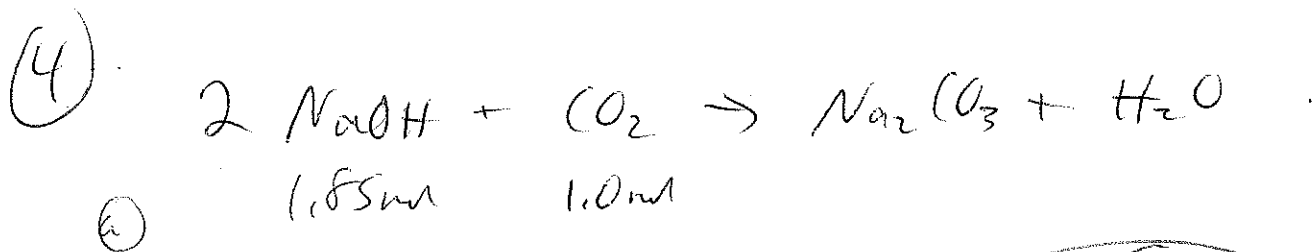
$$\text{mol} \rightarrow \text{mol} \quad (0.94 \text{ mol Fe}_2\text{O}_3) \left(\frac{3 \text{ mol CO}}{1 \text{ mol Fe}_2\text{O}_3} \right) = 2.82 \text{ mol CO}$$

$$\text{mol} \rightarrow \text{g} \quad (2.82 \text{ mol CO}) \left(\frac{28 \text{ g CO}}{1 \text{ mol CO}} \right) = 78.96 \text{ g CO}$$

$$(b) \quad (0.94 \text{ mol Fe}_2\text{O}_3) \left(\frac{2 \text{ mol Fe}}{1 \text{ mol Fe}_2\text{O}_3} \right) = 1.88 \text{ mol Fe}$$
$$(1.88 \text{ mol Fe}) \left(\frac{55.85 \text{ g Fe}}{1 \text{ mol Fe}} \right) = 105 \text{ g Fe}$$

$$(0.94 \text{ mol Fe}_2\text{O}_3) \left(\frac{3 \text{ mol CO}_2}{1 \text{ mol Fe}_2\text{O}_3} \right) = 2.82 \text{ mol CO}_2$$

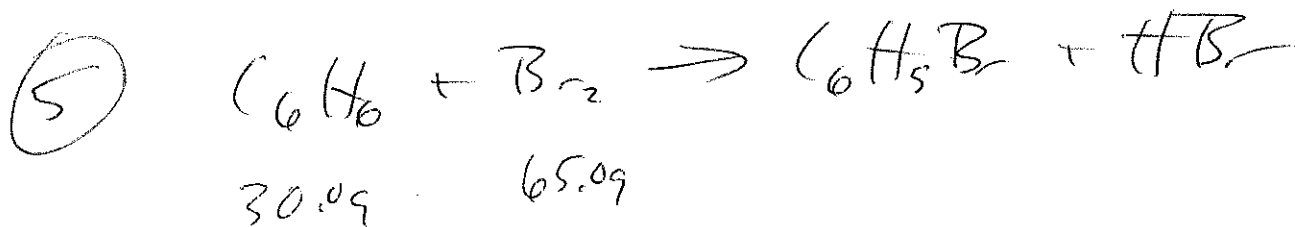
$$(2.82 \text{ mol CO}_2) \left(\frac{44 \text{ g CO}_2}{1 \text{ mol CO}_2} \right) = 124.1 \text{ g CO}_2$$



$$(1 \text{ mol CO}_2) \left(\frac{2 \text{ mol NaOH}}{1 \text{ mol CO}_2} \right) = 2 \text{ mol NaOH} \quad \text{LR}$$

$$(1.85 \text{ mol NaOH}) \left(\frac{1 \text{ mol CO}_2}{2 \text{ mol NaOH}} \right) = 0.925 \text{ mol CO}_2 \quad \text{XS}$$

b) $(1.85 \text{ mol NaOH}) \left(\frac{1 \text{ mol Na}_2\text{CO}_3}{2 \text{ mol NaOH}} \right) = 0.925 \text{ mol Na}_2\text{CO}_3$

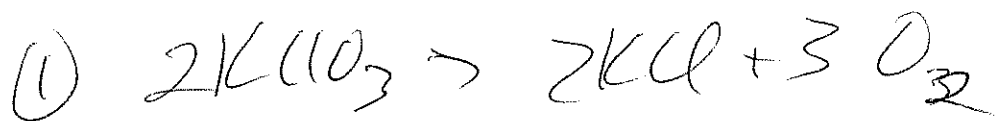


a) $(30.0 \text{ g C}_6\text{H}_6) \left(\frac{1 \text{ mol C}_6\text{H}_6}{78 \text{ g C}_6\text{H}_6} \right) = 0.385 \text{ mol C}_6\text{H}_6 \quad \text{LR}$

$$(65.0 \text{ g Br}_2) \left(\frac{1 \text{ mol Br}_2}{159.8 \text{ g Br}_2} \right) = 0.41 \text{ mol Br}_2$$

$$(0.385 \text{ mol C}_6\text{H}_5\text{Br}) \left(\frac{156.9 \text{ g C}_6\text{H}_5\text{Br}}{1 \text{ mol C}_6\text{H}_5\text{Br}} \right) = 60.4 \text{ g C}_6\text{H}_5\text{Br}$$

b) actual = 56.7, $90 = \frac{56.7}{60.4} \times 100 = 93.9\% \text{ yield}$



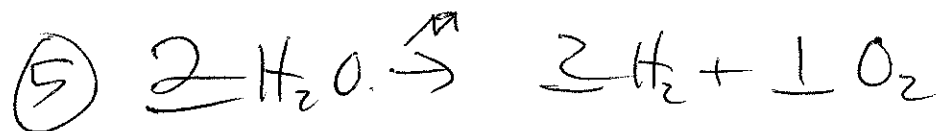
$$(3.0 \text{ ml KClO}_3) \left(\frac{3 \text{ ml O}_2}{2 \text{ ml KClO}_3} \right) = 4.5 \text{ ml O}_2$$



$$\text{i. } (88\text{g O}_2) \left(\frac{1 \text{ ml O}_2}{32\text{g O}_2} \right) = 2.75 \text{ ml O}_2$$

$$\text{ii. } (2.75 \text{ ml O}_2) \left(\frac{8 \text{ ml CO}_2}{13 \text{ ml O}_2} \right) = 1.69 \text{ ml CO}_2$$

$$\text{iii. } (1.69 \text{ ml CO}_2) \left(\frac{44 \text{ g CO}_2}{1 \text{ ml CO}_2} \right) = 74.4 \text{ g CO}_2$$



$$\textcircled{6} \quad \text{g?} \quad 6.0 \text{ mol}$$

$$\text{i.} \quad (6.0 \text{ mol O}_2) \left(\frac{2 \text{ mol H}_2}{1 \text{ mol O}_2} \right) = 12.0 \text{ mol H}_2$$

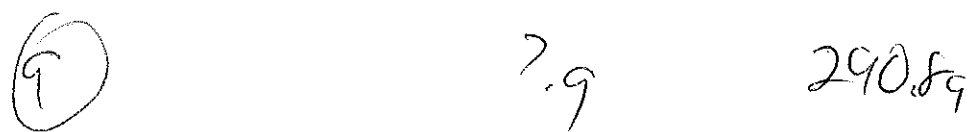
$$\text{ii.} \quad (12.0 \text{ mol H}_2) \left(\frac{2 \text{ g H}_2}{1 \text{ mol H}_2} \right) = 24.0 \text{ g H}_2$$

$$\textcircled{7} \quad ? \text{ g} \quad 9.0 \text{ g H}_2$$

$$\text{i.} \quad (9.0 \text{ g H}_2) \left(\frac{1 \text{ mol H}_2}{2 \text{ g H}_2} \right) = 4.5 \text{ mol H}_2$$

$$\text{ii.} \quad (4.5 \text{ mol H}_2) \left(\frac{2 \text{ mol H}_2\text{O}}{2 \text{ mol H}_2} \right) = 4.5 \text{ mol H}_2\text{O}$$

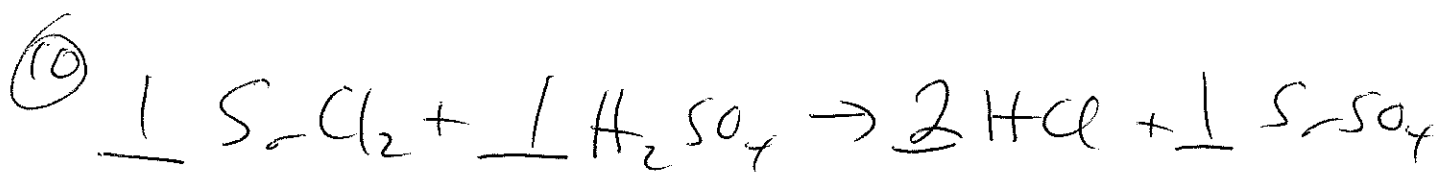
$$\text{iii.} \quad (4.5 \text{ mol H}_2\text{O}) \left(\frac{18 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \right) = 81 \text{ g H}_2\text{O}$$



$$(290.8 \text{ g COF}_2) \left(\frac{1 \text{ mol COF}_2}{96.9 \text{ g COF}_2} \right) = 3.0 \text{ mol COF}_2$$

$$(3.0 \text{ mol COF}_2) \left(\frac{1 \text{ mol F}_2}{1 \text{ mol COF}_2} \right) = 3.0 \text{ mol F}_2$$

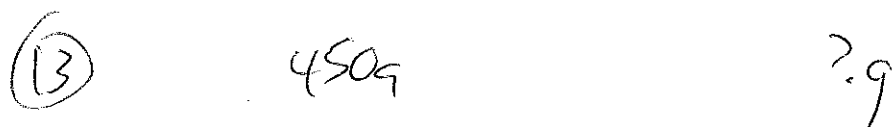
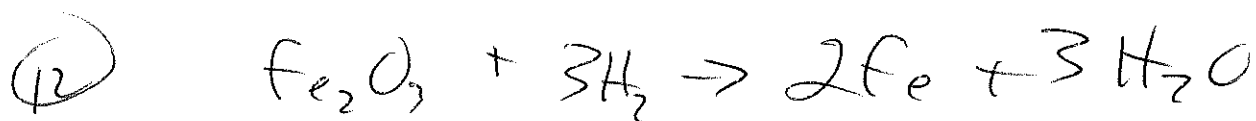
$$(3.0 \text{ mol F}_2) \left(\frac{38 \text{ g F}_2}{1 \text{ mol F}_2} \right) = 114.0 \text{ g F}_2$$



$$(300 \text{ g H}_2\text{SO}_4) \left(\frac{1 \text{ mol H}_2\text{SO}_4}{98 \text{ g H}_2\text{SO}_4} \right) = 3.06 \text{ mol H}_2\text{SO}_4$$

$$(3.06 \text{ mol H}_2\text{SO}_4) \left(\frac{1 \text{ mol SrCl}_2}{1 \text{ mol H}_2\text{SO}_4} \right) = 3.06 \text{ mol SrCl}_2$$

$$(3.06 \text{ mol SrCl}_2) \left(\frac{158.5 \text{ g SrCl}_2}{1 \text{ mol SrCl}_2} \right) = 485 \text{ g SrCl}_2$$



$$(450 \text{ g Fe}_2\text{O}_3) \left(\frac{1 \text{ mol Fe}_2\text{O}_3}{159.7 \text{ g Fe}_2\text{O}_3} \right) = 2.82 \text{ mol Fe}_2\text{O}_3$$

$$(2.82 \text{ mol Fe}_2\text{O}_3) \left(\frac{2 \text{ mol Fe}}{1 \text{ mol Fe}_2\text{O}_3} \right) = 5.64 \text{ mol Fe}$$

$$(5.64 \text{ mol Fe}) \left(\frac{55.85 \text{ g Fe}}{1 \text{ mol Fe}} \right) = 315 \text{ g Fe}$$