

Unit 6 Study Guide

Name KEY

1. List 5 observations that indicate a chemical reaction has taken place.

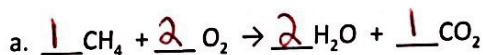
permanent color change, gas/bubbles form, precipitate forms, heat/light produced, odor produced

2. Decide if each is a physical or chemical change:

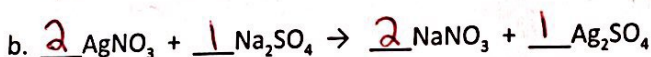
- a. a state change (melting, freezing, boiling) P
b. tearing something in half P

- c. breaking something into smaller pieces P
d. a piece of fruit rotting in the sun C
- odor, color change

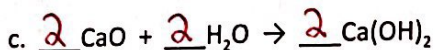
3. Classify the REACTION TYPE, then BALANCE each of the following equations.



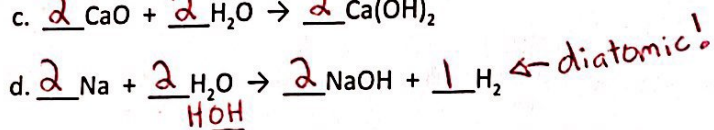
combustion



double dis.

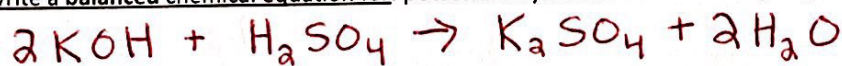


synthesis



single dis.

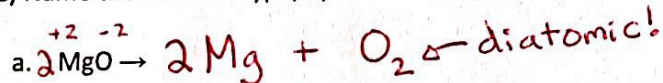
4. Write a balanced chemical equation for: potassium hydroxide reacts with hydrogen sulfate to create potassium sulfate and water.



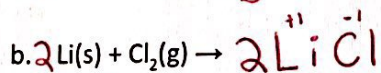
5. Translate this reaction into a sentence: $2 \text{ AgNO}_3 + \text{ Na}_2\text{S} \rightarrow \text{ Ag}_2\text{S} + 2 \text{ NaNO}_3$

Silver nitrate reacts with sodium sulfide to create silver sulfide and sodium nitrate

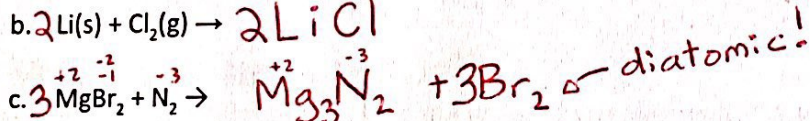
6. 1) Name the reaction type, 2) Predict the products [use subscripts!], 3) then balance the reaction [use coefficients!]



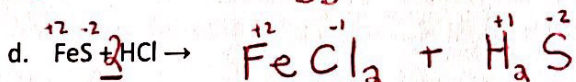
decomp.



synthesis

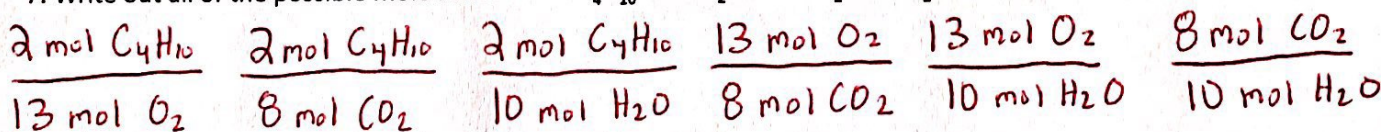


single dis.



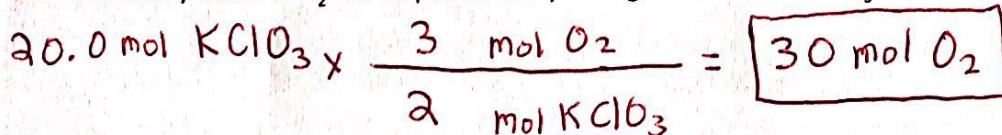
double dis.

7. Write out all of the possible mole ratios for: $2 \text{ C}_4\text{H}_{10} + 13 \text{ O}_2 \rightarrow 8 \text{ CO}_2 + 10 \text{ H}_2\text{O}$



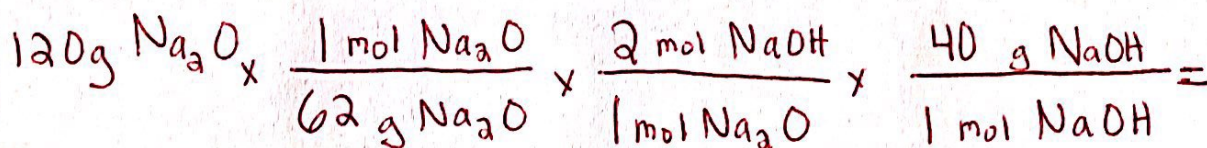
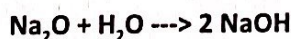
and flip all

8. How many moles of O₂ can be produced by letting 20.0 moles of KClO₃ react? $2 \text{ KClO}_3 \rightarrow 2 \text{ KCl} + 3 \text{ O}_2$



30 mol O₂

9. How many grams of NaOH are produced from 120 g of Na₂O?



154.8 g NaOH

10. Sulfur dioxide (SO₂) reacts with marble (CaCO₃) to produce CaSO₄ and CO₂ according to the following equation:
 $2 \text{CaCO}_3(\text{s}) + 2 \text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2 \text{CaSO}_4(\text{s}) + 2 \text{CO}_2(\text{g})$

a) How many moles of CO₂ can be produced when 4 moles of SO₂ react?

4 mol CO₂

$$4 \text{ mol SO}_2 \times \frac{2 \text{ mol CO}_2}{2 \text{ mol SO}_2} = \boxed{4 \text{ mol CO}_2}$$

b) How many moles of O₂ can be needed to react to produce 5.8 grams of CO₂?

0.065 mol O₂

$$5.8 \text{ g CO}_2 \times \frac{1 \text{ mol CO}_2}{44 \text{ g CO}_2} \times \frac{1 \text{ mol O}_2}{2 \text{ mol CO}_2} = \boxed{0.065 \text{ mol O}_2}$$

c) How many grams of CaSO₄ can be produced when 6.5 moles of SO₂ react?

884 g CaSO₄

$$6.5 \text{ mol SO}_2 \times \frac{2 \text{ mol CaSO}_4}{2 \text{ mol SO}_2} \times \frac{136 \text{ g CaSO}_4}{1 \text{ mol CaSO}_4} = \boxed{884 \text{ g CaSO}_4}$$

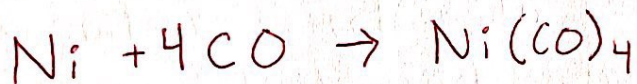
d) How many grams of calcium carbonate are used per 25.0 g of O₂?

156.25 g CaCO₃

$$25.0 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32 \text{ g O}_2} \times \frac{2 \text{ mol CaCO}_3}{1 \text{ mol O}_2} \times \frac{100 \text{ g CaCO}_3}{1 \text{ mol CaCO}_3} = \boxed{156.25 \text{ g CaCO}_3}$$

11. Nickel reacts with Carbon Monoxide to produce Ni(CO)₄ (a poisonous compound).

a) Translate this into a balanced chemical equation:



b) How many moles of CO would react with 109.4 g of Ni?

$$109.4 \text{ g Ni} \times \frac{1 \text{ mol Ni}}{59 \text{ g Ni}} \times \frac{4 \text{ mol CO}}{1 \text{ mol Ni}} = \boxed{7.42 \text{ mol CO}}$$

7.42 moles CO

12. $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$

a. What is your theoretical yield (in grams NO) if you start with 75.8 g NH₃?

b. If your actual yield is 125.3 g NO, what is your percent yield?

$$75.8 \text{ g NH}_3 \times \frac{1 \text{ mol NH}_3}{17 \text{ g NH}_3} \times \frac{4 \text{ mol NO}}{4 \text{ mol NH}_3} \times \frac{30 \text{ g NO}}{1 \text{ mol NO}} = \boxed{133.76 \text{ g NO}}$$

133.76 g NO
93.6%

$$\frac{125.3 \text{ g}}{133.76 \text{ g}} \times 100 = \boxed{93.6\% \text{ yield}}$$

13. $2\text{NaI} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{I}_2$

a. What is your theoretical yield (in grams NaCl) if you start with 106.8 g Cl₂?

b. If your actual yield is 80.6 g NaCl, what is your percent yield?

$$106.8 \text{ g Cl}_2 \times \frac{1 \text{ mol Cl}_2}{70 \text{ g Cl}_2} \times \frac{2 \text{ mol NaCl}}{1 \text{ mol Cl}_2} \times \frac{58 \text{ g NaCl}}{1 \text{ mol NaCl}} = \boxed{176.98 \text{ g NaCl}}$$

176.98 g NaCl
45.5%

$$\frac{80.6 \text{ g}}{176.98 \text{ g}} \times 100 = \boxed{45.5\% \text{ yield}}$$