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Really Ch. 12 Practice  
Test

Name Sturman  
Key  
Period \_\_\_\_\_

Chemistry Chapter 11 "Practice Test"

1. Stoichiometry is the study of the quantitative relationships that exist in chemical reactions.
2. The Coefficients in a balanced equation indicate(s) the number of particles of each substance taking place in the reaction.
3. What is the first thing you must do in solving any stoichiometric equation? Balance the equation.
4. What is the molar ratio of hydrogen to oxygen in this equation?  
 $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$  2 mole H<sub>2</sub>  
1 mole O<sub>2</sub>
5. A balanced equation verifies the law of conservation of mass & energy.
6. What is the same in mass-mass, mass-volume and volume-volume problems? Sum of mass & energy.
7. In a chemical equation of gases, the coefficients represent the ratio of volume of reactants +
8. STP value for temperature is 0°C. For pressure 1 atm volume of products.
9. What is stoichiometric proportion? When reactants are available in the exact ratio as
10. Describe a limiting reactant and its role in a chemical reaction. described by the balanced
11. Which is always greater, actual yield or theoretical yield? equation.
12. What is percent yield and how is it determined?

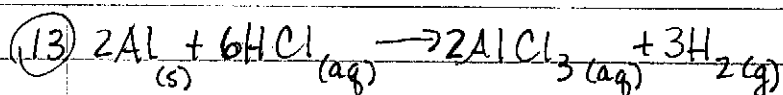
Problems

13. Aluminum reacts with HCl to produce aluminum chloride (AlCl<sub>3</sub>) and hydrogen gas. Write a balanced equation for the reaction and calculate the number of moles of HCl required to react with 0.87 mol of Al.
14. Calcium carbonate (CaCO<sub>3</sub>) combines with HCl to produce calcium chloride (CaCl<sub>2</sub>), water and carbon dioxide gas. Write the balanced equation for this reaction. How many moles of HCl are required to react with 2.5 mol of CaCO<sub>3</sub>? How many moles of CO<sub>2</sub> would be produced?
15. When 9.8 g of Al<sub>2</sub>O<sub>3</sub> decomposes, how many grams of aluminum metal are produced?
16. How many liters of HCl are produced by the reaction of 5.7L hydrogen with an equal amount of chlorine?
17. If 30.2 g of aluminum react with HCl to produce aluminum chloride and hydrogen gas, how many liters of hydrogen are produced at STP?
18. In a reaction of 15.3 g of NaCl with 60.8 g of Pb(NO<sub>3</sub>)<sub>2</sub>, how many grams of lead (II) chloride will be produced? What is the limiting reactant?
19. What is the percent yield of NaCl if 4.89 g Na reacts with excess Cl<sub>2</sub> gas to produce 10.6 g NaCl?

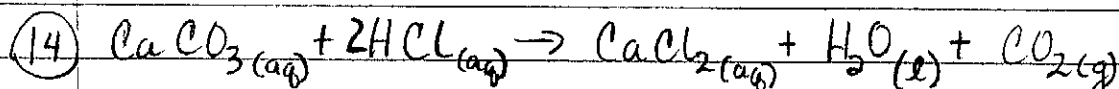
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sheet!

## Ch. 12 Practice Test Answers 10-19

- (10) A limiting reactant is the reactant that limits the amount of product formed in a chemical reaction.
- (11) The theoretical yield is always greater than the actual yield.
- (12) Percent yield is the percent of the expected yield that was actually obtained. It is determined by the equation:
- $$\% \text{ Yield} = \frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100\%$$

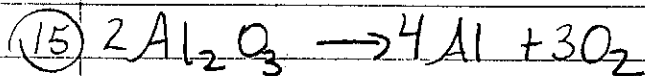


$$\frac{.87 \text{ mol Al}}{1} \cdot \frac{6 \text{ mol HCl}}{2 \text{ mol Al}} = 2.61 \rightarrow \boxed{2.6 \text{ mol HCl}}$$

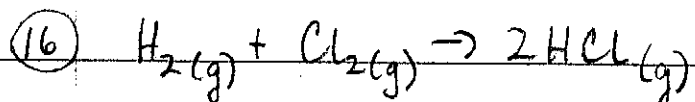


$$\frac{2.5 \text{ mol CaCO}_3}{1} \cdot \frac{2 \text{ mol HCl}}{1 \text{ mol CaCO}_3} = \boxed{5.0 \text{ mol HCl}}$$

$$\frac{2.5 \text{ mol CaCO}_3}{1} \cdot \frac{1 \text{ mol CO}_2}{1 \text{ mol CaCO}_3} = \boxed{2.5 \text{ mol CO}_2}$$

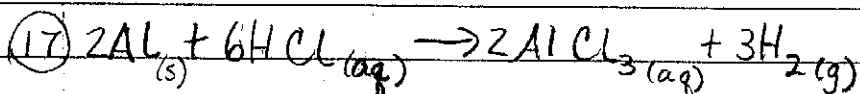


$$\frac{9.8 \text{ g Al}_2\text{O}_3}{1} \cdot \frac{1 \text{ mol Al}_2\text{O}_3}{102.0 \text{ g Al}_2\text{O}_3} \cdot \frac{4 \text{ mol Al}}{2 \text{ mol Al}_2\text{O}_3} \cdot \frac{27.0 \text{ g Al}}{1 \text{ mol Al}} = \boxed{5.2 \text{ g Al}}$$



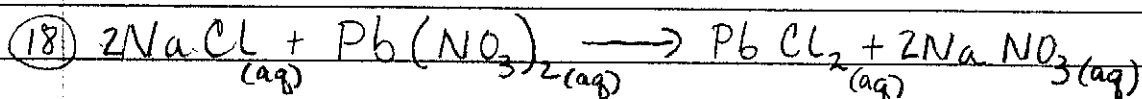
$$\frac{5.7 \text{ L H}_2}{1} \cdot \frac{2 \text{ L HCl}}{1 \text{ L H}_2} = 11.4 \text{ L} \Rightarrow \boxed{11 \text{ L HCl}}$$

$$\frac{5.7 \text{ L Cl}_2}{1} \cdot \frac{2 \text{ L HCl}}{1 \text{ L Cl}_2} = 11.4 \text{ L} \quad \text{Same!}$$



$$\frac{30.2 \text{ g Al}}{1} \cdot \frac{1 \text{ mol Al}}{27.0 \text{ g Al}} \cdot \frac{3 \text{ mol H}_2}{2 \text{ mol Al}} \cdot \frac{22.4 \text{ L H}_2}{1 \text{ mol H}_2} = \boxed{37.6 \text{ L H}_2}$$

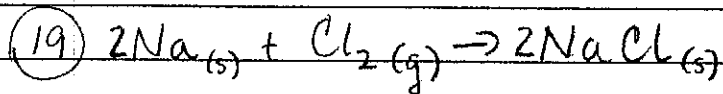
\* Assumption is that the aluminum is the limiting reactant since amount of HCl was given. HCl is considered the "excess" reactant.



$$\frac{15.3 \text{ g NaCl}}{1} \cdot \frac{1 \text{ mol NaCl}}{58.5 \text{ g NaCl}} \cdot \frac{1 \text{ mol PbCl}_2}{2 \text{ mol NaCl}} \cdot \frac{242.7 \text{ g PbCl}_2}{1 \text{ mol PbCl}_2} = 31.7 \text{ g PbCl}_2$$

$$\frac{60.8 \text{ g Pb}(\text{NO}_3)_2}{1} \cdot \frac{1 \text{ mol Pb}(\text{NO}_3)_2}{331.2 \text{ g Pb}(\text{NO}_3)_2} \cdot \frac{1 \text{ mol PbCl}_2}{1 \text{ mol Pb}(\text{NO}_3)_2} \cdot \frac{242.7 \text{ g PbCl}_2}{1 \text{ mol PbCl}_2} = 44.6 \text{ g}$$

∴  $\boxed{31.7 \text{ g PbCl}_2}$  will be produced, & NaCl is the limiting reactant.



$$\frac{4.89 \text{ g Na}}{1} \cdot \frac{1 \text{ mol Na}}{23.0 \text{ g Na}} \cdot \frac{2 \text{ mol NaCl}}{2 \text{ mol Na}} \cdot \frac{58.5 \text{ g NaCl}}{1 \text{ mol NaCl}} = 12.4 \text{ g NaCl}$$

$$\% \text{ Yield} = \frac{10.6 \text{ g NaCl}}{12.4 \text{ g NaCl}} \times 100\% = \boxed{85.5\%}$$