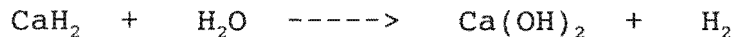


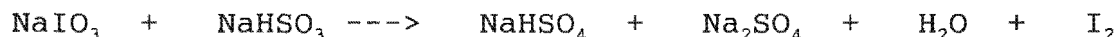
Chemistry I  
Chapter 11 Work Sheet

1. A portable hydrogen generator utilizes the reaction



How many grams of  $\text{H}_2$  can be produced by a 50.0 g cartridge of  $\text{CaH}_2$ ?

2. Iodine can be made by the reaction



To produce each kg of iodine, how much  $\text{NaIO}_3$  and how much  $\text{NaHSO}_3$  must be used?

3. How much  $\text{KClO}_3$  must be heated to obtain 3.50 g of oxygen in a decomposition reaction where potassium chloride is the other product?
4. How much iron (III) oxide will be produced by the complete oxidation of  $1.00 \times 10^2$  g of iron? The reaction is



5. In a rocket motor fueled with butane,  $\text{C}_4\text{H}_{10}$ , how many kilograms of liquid oxygen should be provided with each kilogram of butane to provide for complete combustion?



6. Chloropicrin,  $\text{CCl}_3\text{NO}_2$ , can be made cheaply for use as an insecticide by a process which utilizes the reaction



How much nitromethane,  $\text{CH}_3\text{NO}_2$ , is needed to form 500.0 g of chloropicrin?

7. Ethyl alcohol,  $\text{C}_2\text{H}_5\text{OH}$ , is made by the fermentation of glucose,  $\text{C}_6\text{H}_{12}\text{O}_6$ , as indicated by the following reaction



How many grams of alcohol can be made from 2.00 g of glucose?

8. How much 83.4% pure salt cake ( $\text{Na}_2\text{SO}_4$ ) could be produced from  $2.50 \times 10^2$  g of 94.5% pure salt?



9. In the Mond process for purifying nickel, the volatile nickel carbonyl,  $\text{Ni}(\text{CO})_4$ , is produced by the following reaction



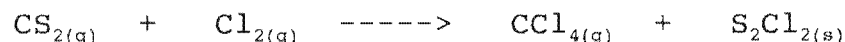
How much CO is used up in volatilizing each gram of nickel?

10. When copper is heated with an excess of sulfur,  $\text{Cu}_2\text{S}$  is formed. How many grams of  $\text{Cu}_2\text{S}$  could be produced if 100.0 g of copper is heated with 50.0 g of sulfur?
11. The reduction of  $\text{Cr}_2\text{O}_3$  by Al proceeds quantitatively on ignition of a suitable fuse.



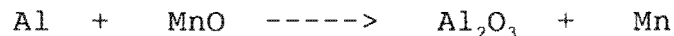
(a) How much metallic chromium can be made by bringing to reaction temperature a mixture of 5.0 g Al and 20.0 g  $\text{Cr}_2\text{O}_3$ ?  
 (b) Which reactant remains at the completion of the reaction, and how much?

12. A mixture of 1.00 kg of  $\text{CS}_2$  and 2.00 kg of  $\text{Cl}_2$  is passed through a hot reaction tube, where the following reaction takes place:



(a) How much  $\text{CCl}_4$  can be made by complete reaction of the limiting starting material? (b) Which starting material is in excess, and how much of it remains unreacted?

13. The following reaction proceeds until the limiting substance is all consumed.



A mixture containing 100.0 g Al and 200.0 g MnO was heated to initiate the reaction. Which initial substance remained in excess, and how much?

14. Determine the volume occupied by 4.0 g of oxygen at STP.
15. What volume of hydrogen will combine with 12 L of chlorine to form hydrogen chloride? What volume of hydrogen chloride will be formed? Assume STP.
16. What volume of hydrogen will unite with 6.0 L of nitrogen to form ammonia? What volume of ammonia will be produced? Assume STP.



17. What volume of  $O_2$  at STP is required for the complete combustion of 1.00 mole of carbon disulfide liquid? What volumes of  $CO_2$  and  $SO_2$  gas are produced at STP?
18. How many liters of oxygen, at STP, can be obtained from 100.0 g of potassium chlorate?



19. How many grams of zinc must be dissolved in sulfuric acid in order to obtain 500.0 mL of hydrogen gas at STP? (This is a single replacement reaction.)
20. Exactly 500.0 mL of a gas at STP has a mass of 0.581 g. The composition of the gas is as follows: C = 92.24%, H = 7.76%. Derive its molecular formula.