

12

STOICHIOMETRY

Practice Problems

In your notebook, solve the following problems.

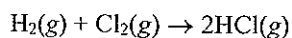
SECTION 12.1 THE ARITHMETIC OF EQUATIONS

Use the 3-step problem-solving approach you learned in Chapter 1.

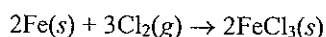
1. Two moles of potassium chloride and three moles of oxygen are produced from the decomposition of two moles of potassium chlorate, $\text{KClO}_3(s)$. Write the balanced equation. How many moles of oxygen are produced from 12 moles of potassium chlorate?
2. Using the equation from problem 1, how many moles of oxygen are produced from 14 moles of potassium chlorate?

SECTION 12.2 CHEMICAL CALCULATIONS

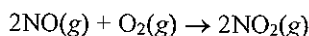
1. Calculate the number of moles of hydrogen chloride produced from 10 moles of hydrogen.



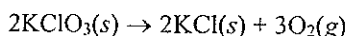
2. Calculate the number of moles of chlorine needed to form 14 moles of iron(III) chloride.



3. Calculate the number of grams of nitrogen dioxide that are produced from 4 moles of nitric oxide.

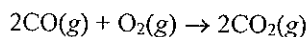


4. Calculate the mass of oxygen produced from the decomposition of 75.0 g of potassium chlorate.

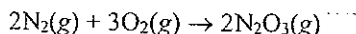


5. Calculate the mass of silver needed to react with chlorine to produce 84 g of silver chloride. (*Hint: Write a balanced equation first.*)

6. How many liters of carbon monoxide at STP are needed to react with 4.80 g of oxygen gas to produce carbon dioxide?

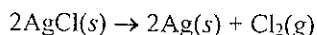


7. Calculate the number of liters of oxygen gas needed to produce 15.0 liters of dinitrogen trioxide. Assume all gases are at the same conditions of temperature and pressure.



SECTION 12.3 LIMITING REAGENT AND PERCENT YIELD

1. How many moles of water can be made from 4 moles of oxygen gas and 16 moles of hydrogen gas? What is the limiting reagent?
2. The burning of 18.0 g of carbon produces 55.0 g of carbon dioxide. What is the theoretical yield of CO_2 ? Calculate the percent yield of CO_2 .
3. Calculate the percent yield of $\text{Cl}_2(g)$ in the electrolytic decomposition of hydrogen chloride if 25.8 g of HCl produces 13.6 g of chlorine gas.
4. One method for reclaiming silver metal from silver chloride results in a 94.6% yield. Calculate the actual mass of silver that can be produced in this reaction if 100.0 g of silver chloride is converted to silver metal.



12**STOICHIOMETRY****Vocabulary Review**

Match the correct vocabulary term to each numbered statement. Write the letter of the correct term on the line.

Column A**Column B**

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|--|--------------------------|
| _____ 1. the starting materials in a chemical reaction | a. mole |
| _____ 2. a conversion factor derived from the coefficients of a balanced chemical equation interpreted in terms of moles | b. stoichiometry |
| _____ 3. the maximum amount of product that could be formed in a reaction | c. mass-mass calculation |
| _____ 4. the amount of a substance that contains 6.02×10^{23} representative particles of that substance | d. reactants |
| _____ 5. the substance completely used up in a chemical reaction | e. excess reagent |
| _____ 6. the ratio of how much product is produced compared to how much is expected, expressed as a percentage | f. theoretical yield |
| _____ 7. the calculations of quantities in a chemical reaction | g. limiting reagent |
| _____ 8. the actual amount of product in a chemical reaction | h. mole ratio |
| _____ 9. the substance left over after a reaction takes place | i. actual yield |
| _____ 10. a stoichiometric computation in which the mass of products is determined from the given mass of reactants | j. percent yield |