

Chem 1100 Chapter Three Study Guide Answers

Outline

I. Molar Mass and Moles

A. Calculations of Molar Masses

B. Calculations of moles

C. Calculations of number of atoms from moles/molar masses

1. Avagadro's Number

II. Empirical Formula

III. Chemical Equations

A. Writing Chemical Equations

B. Balancing Chemical Equation

C. Using Chemical Equations (Stoichiometry)

1. Theoretical Yield

2. Limiting Reagent

3. Percent Yield

D. Symbols in Chemical Equations

1. Solid

2. Liquid

3. Gas

4. Aqueous

Practice Problems

1. What is the molar mass of methane (CH₄)?

16.05 g/mol

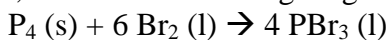
2. How many moles of carbon are there in a 40.00 g sample? How many atoms?

2.053 x 10²⁴ atoms

3. What is the percent oxygen in carbon dioxide?

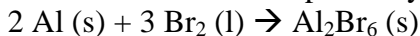
72.71%

4. If you react 10.0 g of phosphorus with 15.0 g of molecular bromine according to the following reaction, which is the limiting reagent?



Br₂ is limiting

5. If when 30.0 g of Al react with an excess of Br₂ according to the following reaction, 280.0 g of Al₂Br₆ is formed. What is the percent yield?

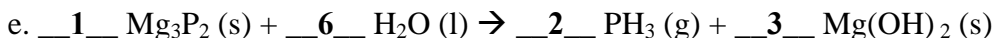
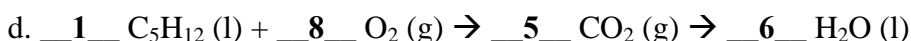
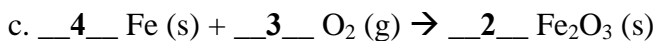
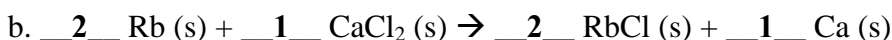
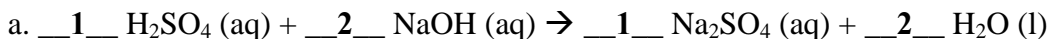


94.6 %

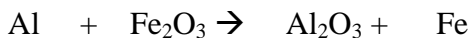
6. What is the symbol that denotes the addition of heat to a reaction and where is it placed in the equation?

Δ, goes over the arrow of a chemical equation (between the reactants and the products)

7. Balance the following chemical equations.



8. What is the sum of the coefficients when the following is balanced?



a. 4

b. 6

c. 12

d. 9

e. 8

9. How much will 359440 atoms of platinum weigh, in milligrams?

1.16 x 10⁻¹³ mg

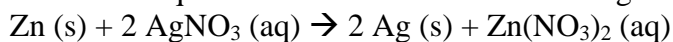
10. Calculate the percent by mass of aluminum in aluminum oxide.

55.92%

11. A 28.00 g sample of sodium reacts with an excess of water to form sodium hydroxide and hydrogen gas. What mass of hydrogen gas forms?

1.23 g

12. Zinc metal and aqueous silver nitrate react according to the equation:



When 5.00 g of Zn reacts with an excess of AgNO₃, 10.24 grams of silver are produced. What is the percent yield?

62.1%

13. When the equation $\text{K}_2\text{S}_2\text{O}_3 + \text{I}_2 \rightarrow \text{K}_2\text{S}_4\text{O}_6 + \text{KI}$ is balanced with the smallest integer coefficients, the coefficient of KI is:

- a. 1
- b. 2**
- c. 3
- d. 4
- e. 5

14. Combustion analysis of 3.1523 grams of C₄H₁₀ will yield _____ grams of CO₂.

9.548 g

15. Molecules of RNA contain the sugar D-ribose. This sugar is 40.00% C, 6.71% H and the rest oxygen by weight. What is the empirical formula for D-ribose?

- a. CH₂O**
- b. CH₃O
- c. CH₃O₂
- d. none of the above

16. A 53.00 g sample of strontium reacts with an excess of nitrogen to form strontium nitride. What mass of strontium nitride forms?

58.64 g

17. If 6.6 g of zinc react with 82.4 g of silver chloride to form solid silver and zinc chloride, what mass of silver forms?

21.78 g

18. How many carbon atoms are in a molecule of nicotine (empirical formula) if nicotine is made up of 74.0% C, 8.7% H, and 17.3% N by weight?

- a. 3
- b. 4
- c. 5**
- d. 6
- e. 7

19. A 97.00 g sample of fluorine gas reacts with an excess of hydrogen gas to form hydrogen fluoride. What mass of hydrogen fluoride forms?

102 g

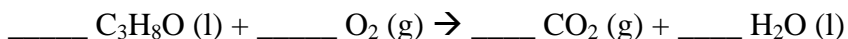
20. Sodium metal and water react to form hydrogen and sodium hydroxide. If 5.98 g of sodium react with water to form 0.26 g of hydrogen and 10.40 g of sodium hydroxide, what mass of water was consumed in the reaction?

- a. 10.66 g
- b. 4.68 g**
- c. 10.14 g
- d. 5.98 g

21. What is the chemical formula for strontium hydroxide?

- a. SrH₂
- b. SrOH₂
- c. SrOH
- d. Sr(OH)₂**

22. What is the stoichiometric coefficient for oxygen when the following equation is balanced using the lowest whole-number coefficients?



- a. 7
- b. 9**
- c. 3
- d. 5

23. What is the molar mass of aspartic acid, C₄O₄H₇N?

- a. 70 g/mol
- b. 43 g/mol
- c. 197 g/mol
- d. 133 g/mol**

24. How many chloride ions are there in 1.50 mol of aluminum chloride?

- a. 4.50 chloride ions
- b. 3.00 chloride ions

c. 9.03×10^{23} chloride ions

d. 2.71×10^{24} chloride ions

25. What is the mass of 0.154 mol of sulfur hexafluoride, SF₆?

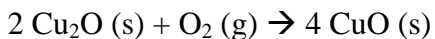
a. 22.5 g

b. 0.901 g

c. 8.33 g

d. 203 g

26. How many moles of CuO can be produced from 0.450 mol of Cu₂O in the following reaction?



a. 1.80 mol

b. 0.225 mol

c. 0.900 mol

d. 0.450 mol

27. 10 g of nitrogen is reacted with 5.0 g of hydrogen to produce ammonia according to the chemical equation shown below. Which one of the following statements is false?

a. Nitrogen is the limiting reagent

b. Hydrogen is the excess reactant

c. The theoretical yield of ammonia is 15 g

d. 2.8 grams of hydrogen are left over.

28. What is the empirical formula of ethyl fluoride if the compound contains 49.97% carbon, 10.51% hydrogen, and 39.52% fluorine by mass?

a. C₄H₁₀F₂

b. C₂H₅F

c. C₄H₁₀F₄

d. C₂₅F₂