

Chem 1100 Chapter Four Study Guide Answers

Outline

I. Molarity and solution concentrations

A. Definition of Molarity

B. Molarity Calculations

C. Dilution Problems

D. Stoichiometry problems with molarity

II. Electrolytes

A. Definition of electrolytes

B. Kinds of Electrolytes

1. Acids

2. Bases

3. Salts

C. Nonelectrolytes

D. Nomenclature of acids

E. Hydration and the Nomenclature of Hydrates

III. Solution reactions

A. Precipitation Reactions

B. Gas Evolution Reactions

C. Acid-Base (neutralization) reactions

D. Ionic and net ionic equations

E. Titrations and stoichiometry with solution reactions

IV. Oxidation Reduction (redox) reactions

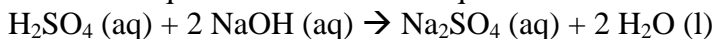
A. Oxidation states

B. Reactions

C. Oxidizing and Reducing Agents

Practice Problems

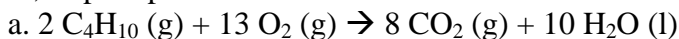
1. Write the ionic equation and net ionic equation for the following molecular equation.



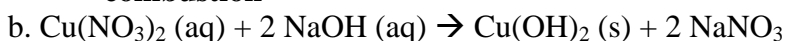
Ionic: $2 \text{H}^+ (\text{aq}) + \text{SO}_4^{2-} (\text{aq}) + 2 \text{Na}^+ (\text{aq}) + 2 \text{OH}^- (\text{aq}) \rightarrow 2 \text{Na}^+ (\text{aq}) + \text{SO}_4^{2-} (\text{aq}) + \text{H}_2\text{O} (\text{l})$

Net Ionic: $2 \text{H}^+ (\text{aq}) + 2 \text{OH}^- (\text{aq}) \rightarrow \text{H}_2\text{O} (\text{l})$

2. Give the type of reaction for each of the following as either an acid-base, combustion, gas evolution, or precipitation reaction.



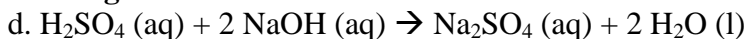
combustion



precipitation



gas evolution



acid-base

3. Salts, acids and bases are all examples of electrolytes, compounds that when added to water enable it to conduct electricity.

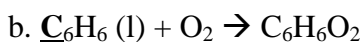
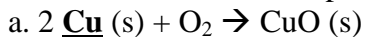
4. An excess of AgNO_3 was added to 100.0 mL of a MgCl_2 solution and 1.215 g of AgCl precipitate was formed. What is the concentration of the original MgCl_2 solution?

0.04238 mol/L

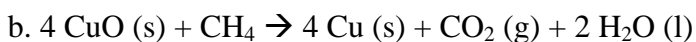
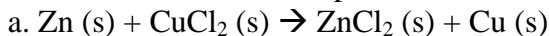
5. A 0.100 molar solution of NaOH was used to titrate 25.00 mL of a H_2SO_4 solution of unknown concentration. If it takes 12.50 mL of NaOH to titrate the H_2SO_4 , what is the concentration of the H_2SO_4 solution?

0.02500 mol/L

6. Underline the element or compound that is oxidized in the following reactions.



7. Underline the element or compound that is being reduced in the following reactions.



8. In an oxidation-reduction reaction the compound that causes another compound to be oxidized is known as a(n) oxidizing agent.

9. What is the oxidation state of the carbon in the following compounds?



10. When dissolved in water, of HClO₄, Ca(OH)₂, KOH, and HI, which are acids?

a. only HI

b. only KOH

c. HClO₄ and HI

d. Ca(OH)₂ and KOH

11. What is the concentration of HCl in the final solution when 65mL of a 12 M HCl solution is diluted with pure water to a total volume of 0.15 L?

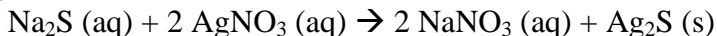
a. 28 M

b. 5.2 x 10³ M

c. 5.2 M

d. 2.8 x 10⁰² M

12. How many milliliters of 0.260 M Na₂S are needed to react with 25.00 mL of 0.315 M AgNO₃?



a. 41.3 mL

b. 60.6 mL

c. 15.1 mL

d. 30.3 mL

13. The reaction HNO₃ (aq) + KOH (aq) → KNO₃ (aq) + H₂O (l) is best classified as a(n)

a. precipitation reaction

b. oxidation-reduction reaction

c. acid-base neutralization reaction

d. single replacement reaction

14. HCl, NaOH, and NaCl are all classified as
- bases
 - nonelectrolytes
 - acids
 - electrolytes**
15. Which is the balanced net ionic equation for the reaction of CdCl₂ (aq) with Na₂S (aq)?
- $\text{Cd}^{2+}(\text{aq}) + 2 \text{Cl}^{-}(\text{aq}) + 2 \text{Na}^{+}(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{CdS}(\text{s}) + 2 \text{NaCl}(\text{aq})$
 - $\text{CdCl}_2(\text{aq}) + \text{Na}_2\text{S}(\text{aq}) \rightarrow \text{CdS}(\text{aq}) + 2 \text{NaCl}(\text{aq})$
 - $\text{Cd}^{2+}(\text{aq}) + 2 \text{Cl}^{-}(\text{aq}) + 2 \text{Na}^{+}(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{CdS}(\text{s}) + \text{Na}^{+}(\text{aq})$
 - $\text{Cd}^{2+}(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{CdS}(\text{aq})$**
16. Which of the following compounds is insoluble in water?
- Rb₂CO₃
 - NaNO₃
 - K₂SO₄
 - PbSO₄**
17. What is the oxidation number of the sulfur atom in H₂SO₄?
- +2
 - +4
 - 2
 - +6**
18. Which species functions as the oxidizing agent in the following redox reaction:
- $$\text{Zn}(\text{s}) + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Cu}(\text{s}) + \text{Zn}^{2+}(\text{aq})$$
- Cu²⁺(aq)**
 - Zn²⁺(aq)
 - Cu(s)
 - Zn(s)