

AP Chemistry Summer Assignment 2021

Welcome to AP Chemistry! This course covers a lot of challenging concepts at a fast pace. We will be getting started right away and will not spend much time reviewing concepts you already know. This assignment is meant to be a review. If this assignment is very challenging for you and you do not feel like you have learned a majority of the concepts, then this course may not be for you. I am assuming that you have learned these skills and feel confident solving these types of problems. We will spend the first few weeks of the year going into some of the assigned chapters in more depth, so if you have some questions while you are doing the summer assignment, you will have a chance to ask. Your textbook is a great resource to utilize when you have a question about a concept. Looking forward to a wonderful year!

Textbook

Chemistry (AP Edition), 9th or 10th Edition
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ISBN-10: 1-133-61110-9 & 1-305-95773-3
ISBN-13: 978-1-133-61110-3 & 978-1-305-95773-2

Make sure you get the AP Edition!

Objectives

1. To review basic concepts you learned when you took Honors Chemistry
2. To practice math skills which you will need for AP Chemistry
3. To hit the ground running when we return in the fall

Assignment Details

1. Purchase the textbook (*make sure it is the AP Edition!*)
2. Read Unit 1 Syllabus
3. Read and review chapters 1 - 4 (Unit 1)
 - Time Management - *DO ONE CHAPTER A WEEK*
4. Complete **flashcards** for chapters 1 - 4; see Unit 1 syllabus for key terms
5. Complete **AP multiple choice** for chapters 1 - 4; found at the end of each chapter in the textbook. Outlined in the Unit 1 syllabus.
6. Complete the **AP Chemistry Summer Assignment Worksheet**
 - Includes a *math* assignment - 23 questions
 - Includes a *chemistry* assignment - 56 questions
7. The summer assignment worksheet will be collected on the first day of school
8. Review and begin to memorize the **AP Chemistry Memorization Assignment**
9. **DO NOT** leave all of this to the last minute - this will take a while to complete

Math Assignment

Supply the answers in the blanks. **No calculators please!** The multiple choice section of the AP exam **does not allow calculators and so you need to practice doing mental math without one.**

1. $1.62 \times 10^6 + 1.9 \times 10^5 =$ _____

2. $1.62 \times 10^6 - 1.9 \times 10^5 =$ _____

3. $3.72 \times 10^{-8} + 0.211 \times 10^{-7} =$ _____

4. $3.72 \times 10^{-8} - 0.211 \times 10^{-7} =$ _____

5. $(2.3 \times 10^4)(3.1 \times 10^4) =$ _____

6. square root of $9.0 \times 10^{-8} =$ _____

7. cube root of $8.0 \times 10^{-9} =$ _____

8. approximate square root of 3.2 = _____

9. $\frac{(2.6 \times 10^{-8})}{(0.52 \times 10^{-9})} =$ _____

10. $x =$ _____ if $10^x = 2$ and $\log(2) = 0.30$

11. $x =$ _____ if $\frac{x^2}{0.10} = 4.0 \times 10^{-9}$

12. $x =$ _____ if $xy = 16$ and $y^2 = 225$

13. $\frac{(2.4 \times 10^{-8})(0.25 \times 10^{-2})}{(1.5 \times 10^{-4})} =$ _____

14. $\log(1.0 \times 10^4) =$ _____

15. $\log(1.0 \times 10^{-4})$ _____

16. $\log(2.3 \times 10^{-5}) =$ _____

17. approximate value of $x =$ _____ if $(x + 0.1)(x) = 2.0 \times 10^{-8}$

18. $x =$ _____ if $x + y = 3$ and $x - y = 9$

19. $(0.001)(0.001) =$ _____

20. $\frac{3.42}{342} =$ _____

21. If a megabuck is one million dollars and a kilobuck is one thousand dollars, how many kilobucks is 342 dollars?

22. A ten cm candle is being burned at both ends. One end burns at the rate of one cm per hour; the other end burns at one-half cm per hour. How far from the center of the candle will the burning ends meet?

23. A wooden cube three cm on edge is placed inside a cube box that is six cm on edge. How much free space is in the box?

Chemistry Assignment

Complete the following list of chemistry problems. They cover concepts you learned in first year chemistry. **If you get stuck, feel free to read through the appropriate section of your textbook.** Show all work on this copy.

1. Give an example of a homogeneous mixture and a heterogeneous mixture.

2. Do the following statements describe chemical or physical properties?
 - a. Oxygen gas supports combustion.
 - b. Fertilizers help to increase agricultural production.
 - c. Water boils below 100°C on top of a mountain.
 - d. Lead is denser than aluminum.
 - e. Uranium is a radioactive element.

3. Does each of the following describe a physical change or a chemical change?
 - a. The helium gas inside a balloon tends to leak out after a few hours.
 - b. A flashlight beam slowly gets dimmer and finally goes out.
 - c. Frozen orange juice is reconstituted by adding water to it.
 - d. The growth of plants depends on the sun's energy in a process called photosynthesis.
 - e. A spoonful of table salt dissolves in a bowl of soup.

4. Give the names of the elements represented by the following chemical symbols:

a. Li	e. As	i. Mg
b. F	f. Zn	j. U
c. P	g. Cl	k. Al
d. Cu	h. Pt	l. Si

5. Give the chemical symbols for the following elements:

- | | |
|--------------|--------------|
| a. potassium | f. plutonium |
| b. tin | g. sulfur |
| c. chromium | h. argon |
| d. boron | i. mercury |
| e. barium | j. krypton |

6. Classify each of the following substances as an element or compound:

- | | |
|-------------|----------|
| a. hydrogen | c. gold |
| b. water | d. sugar |

7. Classify each of the following as an element, compound, homogeneous mixture, or heterogeneous mixture:

- | | |
|---------------------------------|--------------------|
| a. seawater | e. milk shake |
| b. helium gas | f. air in a bottle |
| c. sodium chloride (table salt) | g. concrete |
| d. a bottle of soft drink | h. argon gas |

8. Name the SI units for expressing the following:

- | | |
|-----------|----------------|
| a. length | d. time |
| b. volume | e. energy |
| c. mass | f. temperature |

9. Write the numbers represented by the following prefixes:

- | | |
|----------|----------|
| a. mega | e. milli |
| b. kilo | f. micro |
| c. deci | g. nano |
| d. centi | h. pico |

10. What units do chemists usually use for the density of liquids and solids? For gas density? Explain the difference.
11. Bromine is a reddish-brown liquid. Calculate the density of bromine (in g/mL) if 586 g of the substance occupies 188 mL.
12. a. Normally the human body can only endure a temperature of 105°F for short periods of time without permanent damage to the brain or other vital organs. What is this temperature in degrees Celsius?
- b. Ethylene glycol is a liquid organic compound that is used as an antifreeze in car radiators. It freezes at -11.5°C. Calculate the freezing point temperature of ethylene glycol in degrees Fahrenheit.
- c. The temperature on the surface of the sun is about 6300°C. What is this temperature in degrees Fahrenheit?
- d. The ignition temperature of paper is 451°F. What is the temperature in degrees Celsius?

13. Convert the following temperatures to Kelvin:

- a. 113°C, the melting point of sulfur
- b. 37°C, the normal body temperature
- c. 357°C, the boiling point of mercury

14. Convert the following temperature to degrees Celsius:

- a. 77 K, the boiling point of liquid nitrogen
- b. 4.2 K, the boiling point of liquid helium
- c. 601 K, the melting point of lead

15. What is the number of significant figures in each of the following measurements?

- | | |
|---------------|---------------------------|
| a. 4867 mi | d. 2900 g |
| b. 56 mL | e. 40.2 g/cm ³ |
| c. 60,104 ton | f. 0.500 atm |

16. Carry out the following calculations as if they were calculations of experimental results; express each answer in the correct units with the correct number of significant figures.

- a. $5.6792\text{ m} + 0.6\text{ m} + 4.33\text{ m}$
- b. $3.70\text{ g} - 2.9133\text{ g}$
- c. $4.51\text{ cm} \times 3.6666\text{ cm}$

17. Carry out the following conversions (you must use conversion factors):

a. 22.6 m to dm

b. 25.4 mg to kg

c. 556 mL to L

d. 10.6 kg/m^3 to g/cm^3

18. The average speed of helium at 25°C is 1255 m/s . Convert this speed to miles per hour (mph) using conversion factors.

19. Describe the contributions of the following scientists to our knowledge of atomic structure:

a. JJ Thomson

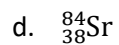
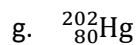
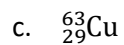
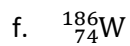
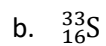
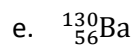
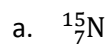
b. RA Millikan

c. Ernest Rutherford

d. James Chadwick

20. Describe the experimental basis for believing that the nucleus occupies a very small fraction of the volume of the atom.

21. Indicate the number of protons, neutrons, and electrons in each of the following species:



22. Define the following terms (include two examples of each):

a. alkali metals

b. alkaline earth metals

c. halogens

d. noble gases

23. Elements whose name ends with –ium are usually metals. Sodium is one example. Identify a nonmetal whose name ends with –ium.

24. Explain why the chemical formula HCl can represent two different chemical systems.

25. Name the following compounds:

- | | |
|------------------------------|----------------------------|
| a. KClO | h. Fe_2O_3 |
| b. Ag_2CO_3 | i. TiCl_4 |
| c. HNO_2 | j. NaH |
| d. KMnO_4 | k. Li_3N |
| e. CsClO_3 | l. Na_2O |
| f. KNH_4SO_4 | m. Na_2O_2 |
| g. FeO | n. $\text{Cu}(\text{OH})$ |

26. Write the formulas for the following compounds:

- | | |
|-------------------------------|-----------------------------------|
| a. rubidium nitrite | f. potassium dihydrogen phosphate |
| b. potassium sulfide | g. iodine heptafluoride |
| c. sodium hydrogen sulfide | h. ammonium sulfate |
| d. magnesium phosphate | i. silver perchlorate |
| e. calcium hydrogen phosphate | j. boron trichloride |

27. Write the formulas for the following compounds:

- | | |
|--------------------------------|---------------------------------|
| a. copper (I) cyanide | g. tin (II) fluoride |
| b. strontium chlorite | h. tetraphosphorous decasulfide |
| c. perbromic acid | i. mercury (II) oxide |
| d. hydroiodic acid | j. mercury (I) iodide |
| e. disodium ammonium phosphate | k. selenium hexafluoride |
| f. lead (II) carbonate | |

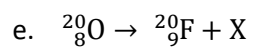
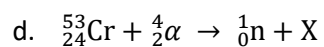
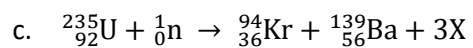
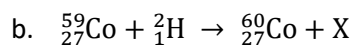
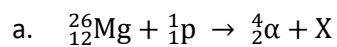
28. Write the formula of the common ion derived from each of the following:

- | | | | |
|-------|------|-------|-------|
| a. Li | c. I | e. Al | g. Mg |
| b. S | d. N | f. Cs | |

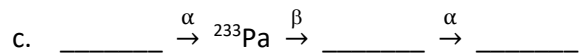
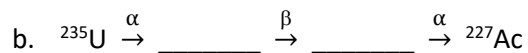
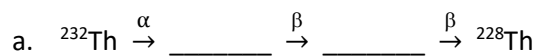
29. Fill in the blanks in the following table:

Cation	Anion	Formula	Name
			Magnesium bicarbonate
		SrCl_2	
Fe^{3+}	NO_2^-		
			Manganese (II) chlorate
		SnBr_4	
Co^{2+}	PO_4^{3-}		
Hg_2^{2+}	I^-		
		Cu_2CO_3	
			Lithium nitride
Al^{3+}	S^{2-}		

30. Complete the following nuclear equations and identify X in each case:



31. Fill in the blanks in the following radioactive decay series:

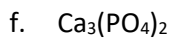
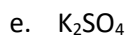
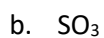


32. How many moles of cobalt (Co) atoms are there in 6.00×10^9 cobalt atoms?

33. How many moles of calcium (Ca) atoms are in 77.4 g of calcium?

34. How many atoms are present in 3.14 g of copper (Cu)?

35. Calculate the molar mass of each of the following substances:



36. How many molecules of ethane (C_2H_6) are present in 0.334 g of C_2H_6 ?

37. What are the empirical formulas of the compounds with the following compositions?

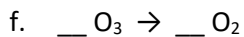
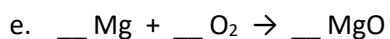
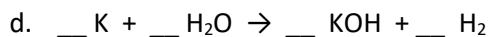
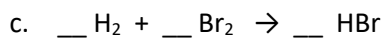
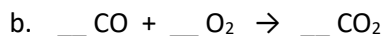
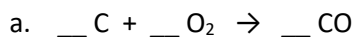
a. 40.1% C, 6.6% H, 53.3% O

b. 18.4% C, 21.5% N, 60.1% K

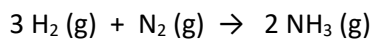
38. The anticaking agent added to Morton salt is calcium silicate, CaSiO_3 . This compound can absorb up to 2.5 times its mass of water and still remain a free-flowing powder. Calculate the percent composition of CaSiO_3 .

39. The empirical formula of a compound is CH. If the molar mass of this compound is about 78 g, what is the molecular formula?

40. Balance the following equations:



41. Ammonia is a principal nitrogen fertilizer. It is prepared by the following reaction between nitrogen and hydrogen:

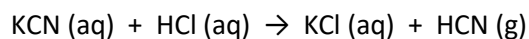


In a particular reaction, 6.0 moles of NH_3 were produced. How many moles of H_2 and how many moles of N_2 were reacted to produce this amount of NH_3 ?

42. When baking soda (sodium bicarbonate or sodium hydrogen carbonate, NaHCO_3) is heated, it releases carbon dioxide gas, which is responsible for the rising of dough in cookies, rolls and donuts.

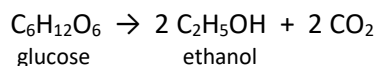
- Write the balanced equation for the decomposition of the compound (one of the products is Na_2CO_3).
- Calculate the mass of NaHCO_3 required to produce 20.5 g of CO_2 .

43. When potassium cyanide (KCN) reacts with acids, a deadly poisonous gas, hydrogen cyanide, HCN, is produced via the following reaction:



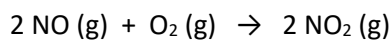
If a sample of 0.140 g of KCN is treated with excess HCl, calculate the amount (in grams) of HCN formed.

44. Fermentation is a complex chemical process during wine making in which glucose is converted into ethanol and carbon dioxide:



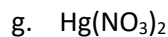
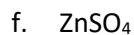
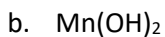
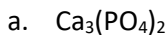
Starting with 500.4 g of glucose, what is the maximum amount of ethanol (in both grams and liters) that can be obtained by the process? (The density of ethanol is 0.789 g/mL)

45. Nitric oxide (NO) reacts with oxygen to form nitrogen dioxide (NO₂), a dark brown gas:

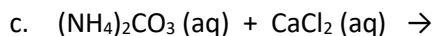
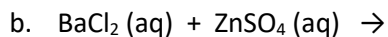
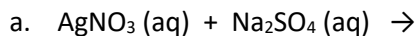


In one experiment, 0.886 mole of NO is mixed with 0.503 mole of O₂. Determine which of these two reactants is the limiting reactant then calculate the number of moles of NO₂ produced.

46. Characterize the following compounds as soluble or insoluble in water:

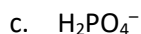
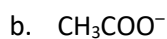
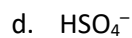


47. Write the net ionic equations for the following reactions:

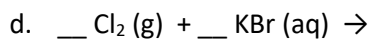
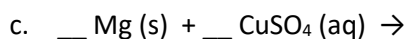
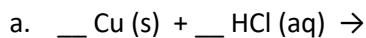


48. Give the Arrhenius and Bronsted definitions of an acid and a base. Why are the Bronsted definitions more useful in describing acid-base properties?

49. Identify each of the following species as a Bronsted acid, base, or both:



50. Predict the outcomes of the reactions represented by the following equations by using the activity series and then balance the equations:



51. How many moles of MgCl_2 are present in 60.0 mL of 0.100 M MgCl_2 solution?

52. How many grams of KOH are present in 35.0 mL of a 5.50 M solution?

53. Calculate the molarity of each of the following solutions:

a. 29.0 g of ethanol ($\text{C}_2\text{H}_5\text{OH}$) in 545 mL of solution

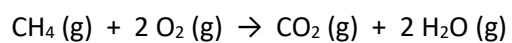
b. 15.4 g of sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) in 74.0 mL of solution

c. 9.00 g of sodium chloride (NaCl) in 86.4 mL of solution

54. A sample of nitrogen gas kept in a container of volume 2.3 L and a temperature of 32°C exerts a pressure of 4.7 atm. Calculate the number of moles of gas present. *(Note: The AP curriculum tends to present pressures in atm rather than kPa. As a result, the value for R will be $0.0821 \text{ L}\cdot\text{atm}/\text{mol}\cdot\text{K}$ instead of $8.31 \text{ L}\cdot\text{kPa}/\text{mol}\cdot\text{K}$)}*

55. Given that 6.9 moles of carbon monoxide gas are present in a container with volume 30.4 L, what is the pressure of the gas (in atm) if the temperature is 62°C?

56. Methane, the principal component of natural gas, is used for heating and cooking. The combustion process is:

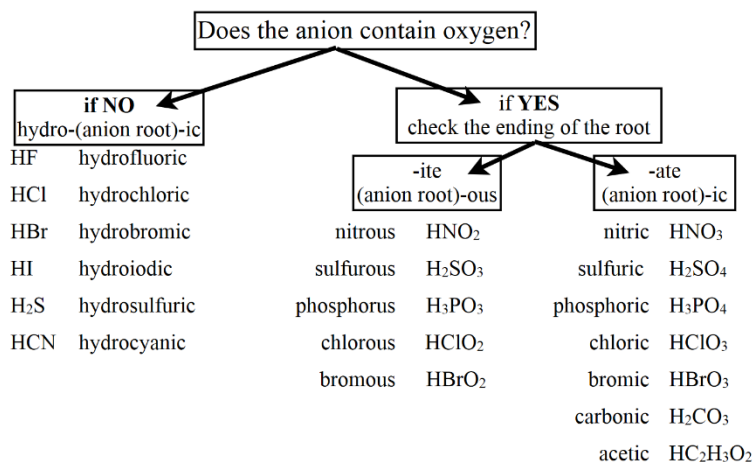


If 15.0 moles of CH_4 are reacted, what is the volume of CO_2 in liters produced at 23.0°C and 0.985 atm?

Memorization Assignment

Naming Acids:

(learn the patterns; don't just memorize the names!)



Strong Acids:

(assume all other acids are weak)

HCl	hydrochloric acid
HBr	hydrobromic acid
HI	hydroiodic acid
HNO ₃	nitric acid
H ₂ SO ₄	sulfuric acid
HClO ₃	chloric acid
HClO ₄	perchloric acid

Solubility Rules:

If a substance does not fit into one of the rules above, assume it is **INSOLUBLE** and should be written as a molecule (not ionized). This isn't perfect, but will cover most situations unless you are given other information in the question to determine if a compound is soluble or not.

ALWAYS SOLUBLE IF IN A COMPOUND	EXCEPT WITH
Alkali ions, NH ₄ ⁺	No Exceptions
NO ₃ ⁻ , C ₂ H ₃ O ₂ ⁻ , ClO ₄ ⁻ , ClO ₃ ⁻	No Exceptions
Cl ⁻ , Br ⁻ , I ⁻	Pb ²⁺ , Ag ⁺
SO ₄ ²⁻	Pb ²⁺ , Ag ⁺ , Hg ₂ ²⁺ , Ca ²⁺ , Sr ²⁺ , Ba ²⁺

Polyatomic Ions:

By learning the four **bolded "-ate" ions** below, and knowing that one less oxygen (same charge) turns the name to **-ite**, and two less oxygens (if possible) turns the name to **hypo-xxx-ite** and one more oxygen (if possible) turns the name to **per-xxx** will make learning all eighteen ions in the chart below as easy as learning just four.

HYPO- (2 less O)	-ITE (1 less O)	-ATE	PER- (1 more O)
	nitrite NO ₂ ⁻	nitrate NO₃⁻	
	sulfite SO ₃ ²⁻	sulfate SO₄²⁻	
	phosphite PO ₃ ³⁻	phosphate PO₄³⁻	
hypochlorite ClO ⁻	chlorite ClO ₂ ⁻	chlorate ClO₃⁻	perchlorate ClO ₄ ⁻
hypobromite BrO ⁻	bromite BrO ₂ ⁻	bromate BrO₃⁻	perbromate BrO ₄ ⁻
hypoiodite IO ⁻	iodite IO ₂ ⁻	iodate IO₃⁻	periodate IO ₄ ⁻

Misc. Ions:

hydroxide OH ⁻	carbonate CO ₃ ²⁻	acetate C ₂ H ₃ O ₂ ⁻	ammonium NH ₄ ⁺
cyanide CN ⁻	bicarbonate HCO ₃ ⁻	permanganate MnO ₄ ⁻	

Practice your times tables. Go to www.tablestest.com or www.timestables.me.uk/ or some other times & division practice site. The multiple choice section of the AP Exam (and thus our class exams) does not allow calculators, so you must get good at your times tables. You will use a calculator on Free Response (problem type) questions.

Unit 1 Overview: Chapters 1 – 4

As part of your AP Chemistry Summer Assignment 2021, please read and review Chapters 1 – 4 of your textbook. During your review, you must:

1. Complete **flashcards** for all of the *key terms* in each chapter
2. Complete the **AP multiple choice** questions for each chapter
3. Complete the recommended problems for each chapter (*optional*)

The key terms and assigned problems for each chapter are specified below. It is suggested that you aim to complete **one chapter a week**. Good luck!

Chapter 1: Chemical Foundations

(Week 1)

Chapter Sections:

1.1	Chemistry: An Overview	1.6	Learning to Solve Problems Systematically
1.2	The Scientific Method	1.7	Dimensional Analysis
1.3	Units of Measurement	1.8	Temperature
1.4	Uncertainty in Measurement	1.9	Density
1.5	Significant Figures and Calculations	1.10	Classification of Matter

Key Terms:

- | | | |
|----------------------------|-------------------------|------------------------|
| • Scientific Method | • Accuracy | • Solution |
| • Measurement | • Precision | • Pure Substance |
| • Hypothesis | • Random Error | • Physical Change |
| • Theory | • Systematic Error | • Distillation |
| • Model | • Exponential Error | • Filtration |
| • Natural Law | • Unit Factor Method | • Chromatography |
| • Law of Mass Conservation | • Dimensional Analysis | • Paper Chromatography |
| • SI System | • Density | • Compound |
| • Mass | • Matter | • Chemical Change |
| • Weight | • States of Matter | • Element |
| • Uncertainty | • Homogenous Mixture | |
| • Significant Figures | • Heterogeneous Mixture | |

End of Chapter Problems:

Required: All AP Multiple Choice (1 – 10)

Recommended: 17, 20, 23, 26, 28, 30, 35, 36, 37, 39, 43, 47, 51, 59, 65, 69, 73, 75, 81, 83; 111 - 118

Chapter Sections:

2.1	The Early History of Chemistry	2.5	The Modern View of Atomic Structure
2.2	Fundamental Chemical Laws	2.6	Molecules and Ions
2.3	Dalton's Atomic Theory	2.7	An Introduction to the Periodic Table
2.4	Early Experiments to Characterize the Atom	2.8	Naming Simple Compounds

Key Terms:

- | | | |
|-------------------------------|------------------------|-----------------------------|
| • Law of Conservation of Mass | • Atomic Number | • Polyatomic Ion |
| • Law of Definite Proportion | • Mass Number | • Periodic Table |
| • Law of Multiple Proportions | • Chemical Bond | • Metal |
| • Atomic Masses | • Covalent Bond | • Nonmetal |
| • Atomic Weights | • Molecule | • Group (Family) |
| • Avogadro's Hypothesis | • Chemical Formula | • Alkali Metals |
| • Cathode-Ray Tubes | • Structural Formula | • Alkaline Earth Metals |
| • Electrons | • Space-filling model | • Halogens |
| • Radioactivity | • Ball-and-stick model | • Noble Gases |
| • Nuclear Atom | • Ion | • Period |
| • Nucleus | • Cation | • Binary Compounds |
| • Proton | • Anion | • Binary Ionic Compounds |
| • Neutron | • Ionic Bond | • Oxyanions |
| • Isotopes | • Ionic Solid | • Binary Covalent Compounds |

End of Chapter Problems:

Required: All AP Multiple Choice (1 – 16)

Recommended: 17, 19, 21, 22, 23, 29, 33, 34, 36, 41, 44, 47, 53, 55, 57, 61, 67, 72, 74, 76, 80, 87, 88, 98, 101, 103, 105

Chapter Sections:

3.1	Counting by Weighing	3.7	Determining the Formula of a Compound
3.2	Atomic Masses	3.8	Chemical Equations
3.3	The Mole	3.9	Balancing Chemical Equations
3.4	Molar Mass	3.10	Stoichiometry Calculations
3.5	Learning to Solve Problems	3.11	The Concept of Limiting Reactant
3.6	Percent Composition of Compounds		

Key Terms:

- | | | |
|--------------------------|-----------------------|---------------------|
| • Chemical Stoichiometry | • Average Atomic Mass | • Avogadro's Number |
| • Mass Spectrometer | • Mole | • Molar Mass |

- Conceptual Problem Solving
- Mass Percent
- Empirical Formula
- Molecular Formula
- Chemical Equation
- Reactants
- Products
- Balancing a Chemical Equation
- Mole Ratio
- Stoichiometric Mixture
- Limiting Reactant
- Theoretical Yield
- Percent Yield

End of Chapter Problems:

Required: All AP Multiple Choice (1 – 17)

Recommended: 27, 31, 32, 37, 39, 41, 48, 65, 68, 71, 73, 78, 79, 81, 83, 95, 97, 99, 101, 105, 110, 115, 119, 137, 38, 44, 47, 49, 51, 52, 55, 75, 85, 87, 91, 96, 100, 109, 124

Chapter 4: Stoichiometry

(Week 4)

Chapter Sections:

- | | | | |
|-----|---------------------------------|------|--|
| 4.1 | Water, the Common Solvent | 4.6 | Describing Reactions in Solution |
| 4.2 | The Nature of Aqueous Solutions | 4.7 | Stoichiometry of Precipitation Reactions |
| 4.3 | The Composition of Solutions | 4.8 | Acid-Base Reactions |
| 4.4 | Types of Chemical Reactions | 4.9 | Oxidation-Reduction Reactions |
| 4.5 | Precipitation Reactions | 4.10 | Balancing Oxidation-Reduction Reactions |

Key Terms:

- | | | |
|---------------------------|---------------------------|---------------------------------------|
| • Aqueous Solution | • Weak Acid | • Stoichiometric (Equivalence) Point |
| • Polar Molecule | • Weak Base | • Indicator |
| • Hydration | • Molarity | • Endpoint |
| • Solubility | • Standard Solution | • Oxidation-Reduction Reaction |
| • Solute | • Dilution | • Oxidation State |
| • Solvent | • Precipitation Reaction | • Oxidation |
| • Electrical Conductivity | • Precipitate | • Reduction |
| • Strong Electrolyte | • Formula Equation | • Oxidizing Agent (Electron Acceptor) |
| • Weak Electrolyte | • Complete Ionic Equation | • Reducing Agent (Electron Donor) |
| • Nonelectrolyte | • Spectator Ions | |
| • Acid | • Net Ionic Equation | |
| • Base | • Neutralization Reaction | |
| • Strong Acid | • Volumetric Analysis | |
| • Strong Base | • Titration | |

End of Chapter Problems:

Required: All AP Multiple Choice (1 – 15)

Recommended: 15, 16, 21, 23, 27, 31, 35, 43, 45, 49, 61, 65, 73, 75, 81, 87, 90, 91, 109, 19, 24, 29, 39, 51, 67, 82, 119, 133, 139