

Calvert High School

AP Chemistry Summer Assignment

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Textbook: Chemistry 9th Edition, Author: Zumdahl and Zumdahl

Supplemental Text: The Cartoon Guide to Chemistry, Authors: Larry Gonick and Craig Criddle

**Books can be picked up in Guidance during the summer*

Option 1

Part 1: (40 process points, Time estimate 3-4 hours for reading and summary)

Read the first 7 Chapters of The Cartoon Guide to Chemistry and complete the questions on the summary sheet provided. The book will summarize chemical concepts and theories developed in your first year chemistry course. You may find it helpful to reference your first year chemistry notes as you read.

Part 2: (40 process points, Time estimate 2-3 hours))

Complete the chemistry problems on the problem sheet provided. Show all work. Each problem references a sample problem from the text that might help you to solve the problem. You might also find it helpful to reference your first year chemistry notes for additional resources.

The purpose of the Summer Assignment is to reinforce concepts learned in the first year course and to provide me with information about your background in chemistry content and skills. Feel free to email me with questions. I will respond as soon as I am able. The Summer Assignment will be collected on the first day of school. I will be correcting your work to provide you with feedback, but the bulk of your grade will be based on completion not accuracy. However, you and I will gain the most benefit if you try your best to complete the assignment as accurately as possible.

Option 2

Complete 7 Units of the Flinn Prep AP Chemistry Course: (80 Process Points, Time Estimate 7 hours)

Go to the Flinn Prep website and choose the AP Chemistry Prep Course. Purchase a single student code (\$22.95). Once you have purchased the code you will need to enter our classroom code, vz5qt. Entering the code enters you into the 2017 CHS Summer AP Class.

The Calvert High School Summer Assignment is the completion of Units 1, 2, 3, 4, 6, 7, and 8. Each unit has some reading, videos, sample problems and some practice problems to check your understanding. At the end of each unit there is a 20 question quiz. You will need to take the quiz and achieve a score of 80% before moving to the next unit. You may take the quiz as often as you like. Flinn estimates that each unit will take about an hour to complete. This option will also give you AP Chem materials to use for new topics during the school year as well as test prep materials to use as you prepare to take the AP Chem Exam next May.

Cartoon Guide to Chemistry

Use the graphic novel, The Cartoon Guide to Chemistry to answer each of the following. Please use your own paper. Use excerpts from the text to answer the questions. Feel free to use pictures to enhance your answers.

Chapter 1: Hidden Ingredients

1. Summarize the role of the three ancient Greek philosophers in the development of atomic theory. Which one had ideas closest to what we theorize today?
2. What is alchemy? What did it not accomplish? What did it contribute to the study of chemistry?
3. Why was the discovery of gases so instrumental in the evolution of atomic theory?
4. Explain the contributions to atomic theory made by Priestly, Lavoisier and Dalton.
5. Mendeleev was instrumental in organizing the elements. Explain his system.

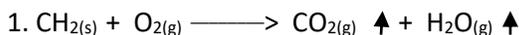
Chapter 2: Matter Becomes Electric

1. Explain the concept of “Elektra” and how it pertains to atomic theory.
2. How do atoms become negatively charged? Positively charged?
3. What is the definition of Atomic Number? What is the range for the atomic number of naturally occurring elements?
4. Use quantum Mechanics to explain the space occupied by electrons in the atom. How do atoms move between energy levels?
5. How does nuclear charge effect atomic size across a row on the periodic table?
6. What is ionization energy? Explain the trend in ionization energy both across a row in the table and down a column.
7. Why does the author state that the noble gases are “the envy of the common elements?”

Chapter 3: Togetherness

1. How do atoms combine with each other? Why are nonmetals considered to be electronegative?
2. Ionic bonds form from the transfer of electrons. Explain the formation of an ionic crystal.
3. What is a polyatomic ion? Give an example.
4. Explain the typical properties of an ionic compound.
5. Explain how metallic bonds are similar to ionic compounds. How are they different? Why do metals conduct electricity?
6. Ionic and covalent bonds form differently and have very different properties. Discuss these differences.
7. Use the water molecule to explain the concept of polarity. How does polarity explain why water is a good solvent?

Chapter 4: Chemical Reactions



Above is an example of a reaction equation. This represents a shorthand method to explain a chemical reaction. Identify the meaning of each of the following from the reaction above:

- a. The subscript of 2 in CH_2
 - b. The (g) symbol after O_2
 - c. The arrow following CO_2
2. Explain what happens in combustion, decomposition and combination (synthesis) reactions.
 3. What does it mean to balance a reaction? What is the art of balancing equations called?
 4. What is a mole? How many particles are included in one mole?
 5. What happens in a redox reaction?
 6. Oxidation numbers are useful in discussing redox reactions. Give a definition for oxidation numbers.

Chapter 5: Heat of Reaction

1. What is the Law of Conservation of Energy? Use a discussion of calorimetry to explain the law of conservation of energy.
2. Explain why heat and energy are not the same.
3. What is heat capacity? Use heat capacity to explain why water is used as a coolant in industry.
4. What is enthalpy? Use enthalpy to explain the terms endothermic and exothermic.

Chapter 6: Matter in a State

1. Explain similarities and differences in the three states of matter (ie. Solid, liquid and gas).
2. What are the forces that hold solids and liquids together? Give the three types of these forces and explain their relative strengths.
3. We consider gases to be ideal. What complications do we ignore when we call gases ideal?
4. Give the ideal gas law, define each variable and suggest units for each term in the equation.
5. What are the roles of IMF in evaporation?
6. Define vapor pressure.
7. Is the melting process endothermic or exothermic? What do we call the enthalpy associated with melting?
8. Sketch a heating curve and label each of the 5 areas.

Chapter 7: Solutions

1. Define the following terms:

a. Solute	e. Suspension
b. Solvent	f. Molarity
c. Solution	h. Solubility
d. Concentration	i. Emulsion
2. Explain the phrase “likes dissolve likes”. Make sure to use polarity on your answer.
3. Explain how temperature effects the solubility of a solid in a liquid. Why does this happen?

AP Chemistry Summer Work

Problem Set

Answer each of the following. Show all work. Use text reference in parenthesis if you need help answering the question.

- Classify each of the following as units of mass, volume, length, density, energy or pressure. (Chapter 1, Section 3)
 - nm
 - kg
 - J
 - m^3
 - g/cm^3
 - atm
- How many significant figures are there in each of the following? (Chapter 1, Section 4 and 5)
 - 259.6 cm
 - 0.0142 g
 - 3.41×10^7 nm
 - 52.3 L
 - 1.9140 atm
 - 220 J
- Calculate each of the following to correct number of significant figures: (Chapter 1, Section 4-5)
 - $13 \text{ g}/52.9 \text{ cm}^3 =$
 - $6.314 \text{ g}/2.3 \text{ L} =$
 - $1.16 \text{ g} + 52 \text{ g} =$
 - $(3.27 \text{ g} + 1.914 \text{ g})/6.149 \text{ cm}^3$

10. The sodium isotope ^{24}Na is used to trace blood clots. How many: (Chapter 2, Section 5)

- Protons are in the nucleus?
- Neutrons are in the nucleus
- Electrons are in the sodium atom?
- Electrons and protons are in the $^{24}\text{Na}^+$ ion?

11. Give the number of protons and electrons in each of the following: (Chapter 2, Section 5)

- Cr^{+3}
- Cr^{+2}
- HCl
- H_2O

12. Complete the following table (all compounds are ionic) (Chapter 2, Section 8)

<u>Name</u>	<u>Formula</u>
a.	LiOH
b. Ammonium chloride	
c.	CaF_2
d.	$\text{Ba}(\text{OH})_2$
e. Calcium nitrate	
f.	FeCO_3

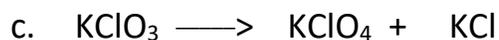
13. Complete the table for the following molecular compounds. (Chapter 2, Section 8)

<u>Name</u>	<u>Formula</u>
a.	BCl_3
b. Xenon hexafluoride	
c. Nitrogen trichloride	
d.	S_4N_4
e. Silicon tetraiodide	

14. Copper consists of two isotopes with masses 62.96 and 64.96 amu. If the abundance of the 62.96 isotope is 70.5%, Calculate the average atomic mass of Cu. (Chapter 3, Section 1 and 2)
15. Bromine consists of two isotopes with masses of 78.92 and 80.92 amu. Estimate the abundances of these two isotopes. Explain or support your answer with calculations. (Chapter 3, Sections 1 and 2)
16. Determine the (Chapter 3, Section 4)
- Mass of 2.0×10^{15} Ag atoms
 - Number of atoms in 1 pound of silver
17. The density of ethyl alcohol, C_2H_6O , is 0.785 g/mL at 25°C. Calculate (Chapter 3, Section 4)
- The molar mass of ethyl alcohol
 - The number of moles in 252 mL of ethyl alcohol
 - The mass of 1.62 mol of ethyl alcohol
18. Calculate the mass percent of each element in $C_{15}H_{11}NO_4$. (Chapter 3, Section 6)
19. Iron reacts with sulfur to form a sulfide. If 2.561 g of iron reacts with 2.206 g sulfur, what is the simplest formula of the sulfide? (Chapter 3, Section 7)

20. A certain compound has the simplest formula C_2H_4O . Its molar mass is about 90 g/mol. What is the molecular formula? (Chapter 3, Section 7)

21. Balance the following chemical reactions. (Chapter 3, Sections 8 and 9)



22. Write a balanced equation for the: (Chapter 3, Sections 8 & 9)

a) reaction of magnesium with nitrogen.

b) reaction of copper(I) oxide with oxygen to form copper(II) oxide

c) combustion of methyl alcohol, CH_3OH , to give carbon dioxide and water.

d) Decomposition of solid sodium azide, NaN_3 , to its elements.

e) Reaction of fluorine with aluminum.

23. When acetylene gas, C_2H_2 , burns in air, the products are $CO_{2(g)}$ and $H_2O_{(l)}$. (Chapter 3, Section 10)

a) Write a balanced equation for this reaction.

b) How many moles of CO_2 are produced from 0.524 mol C_2H_2 ?

24. You are given a bottle labeled "6.0 M HCl." (Chapter 4, Section 3)

a. How many moles of HCl are there in 10.2 mL of this solution?

b. What volume of this solution contains 0.100 mol HCl?