

The following suggested readings and problems are from Chemistry by Zumdahl and Zumdahl. The first few weeks of AP Chemistry will serve as a review. Each section listed below is a review of information you should have learned in your first-year chemistry course. You will have a test around the end of the second week of school over these review topics.

All suggested problems below have the correct answer provided in the back of the book. In addition, our textbook contains many practice problems with worked out solutions so feel free to do more or less practice as you see fit to master the material. Nothing will be collected, this is for you to review in order to be prepared for the class.

We will also be utilizing [Perusall](#) for asynchronous class discussions of content. We can start utilizing this application over the summer if you need help with any of the summer work content. An introductory video can be found here: [Perusall Intro Video](#) Course Join Code: **COOK-EH6J8**

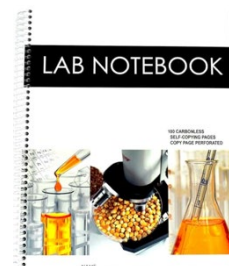
#### Using the **PDF 9<sup>th</sup> edition available on Perusall**

Chapter	Suggested reading	Suggested problems
1	All ** especially sig figs!**	21, 23, 27, 29, 31, 33, 37, 41, 55, 95
2	All	17, 19, 21, 35, 37, 43, 47, 57, 79, 85, 89
3	All except 3.2 and 3.7	31, 35, 71, 105, 115, 119, 131
7	7.10-7.13	97, 105, 107, 113
8	All except 8.12	15, 23, 33, 39, 41, 53, 55, 83, 127

#### Using the **Hardcopy** textbook 10<sup>th</sup> edition.

Chapter	Suggested reading	Suggested problems
1	All ** especially sig figs!**	23, 31, 33, 35, 37, 41, 59, 101
2	All	19, 21, 25, 30, 39, 41, 47, 51, 61, 83, 85
3	All except 3.2 and 3.7	33, 37, 73, 109, 121, 125, 139
7	7.10-7.13	103, 111, 113, 119
8	All except 8.12	19, 27, 37, 43, 45, 57, 59, 87, 93, 133

**In the fall you will also need a 100 pg Student Lab Notebook with Duplicate Copy Paper.** These have gotten back ordered in the past so you might want to order it sooner rather than later (found on amazon as well as other places).



If you have any questions, please do not hesitate to email me at any point during the summer!

## **Expectations of Understanding from First year Chemistry by Chapter in Zumdahl**

### **Chapter 1: Chemical Foundations**

1. Recognize the name and function of common pieces of laboratory equipment.
2. Recognize and use the rules for significant figures and identify that they reflect the precision of a measurement.
3. Measure using the proper tool with the correct degree of precision.
4. Define accuracy and precision in terms of data.
5. Analyze data based on accuracy and precision.
6. Calculate percent error to determine the accuracy of an experiment
7. Complete procedural error analysis for a lab, which includes identification of the source of error, impact quantitatively (data and answer) and a way to improve the procedure.
8. Memorize common metric prefixes (centi-, milli- and kilo-) to use in calculations.
9. Relate the volume of a container (in  $\text{cm}^3$ ) to the volume of liquid it contains (in mL)
10. Calculate using dimensional analysis (ratios).
11. Define a system and represent it in a particle diagram.
12. Define volume.
13. Define mass and represent in a particle diagram.
14. Define and apply the Law of Conservation of mass at the particle level.
15. Define and explain solids, liquids and gases.
16. Determine and explain whether an object will sink or float based on density
17. Use density to identify unknown substances.
18. Create particle diagrams to represent different densities.
19. Explain and represent density differences of mixtures.
20. Classify matter, based on evidence and/or particle level descriptions, as an element, compound, homogeneous mixture, or heterogeneous mixture.
21. Define atom, element, compound, homogeneous mixture, or heterogeneous mixture.
22. Create particle level representations of the different classifications of matter.

### **Chapter 2: Atoms, Molecules, Ions**

1. Explain that atoms are so small that they are difficult to study through direct observation
2. Explain Democritus' contribution to Atomic Theory
3. Explain Dalton's contribution to Atomic Theory.
4. Explain Thomson's cathode ray tube experiment, why it was done, and the model that was developed based on his evidence.
5. Explain Rutherford's gold foil experiment, why it was done, and the model that was developed based on his evidence.
6. Compare and contrast the properties of neutrons, electrons, and protons.
7. Identify an atom based on the number of positive protons in the nucleus.
8. Define and identify using the periodic table: mass number, atomic mass, valence electron, valence energy level and atomic number.

9. Calculate the number of protons, neutrons and electrons in a neutral atom.
10. Memorize common element symbols and names.
11. Distinguish between groups and periods in the periodic table.
12. Classify elements as metals or non-metals using the periodic table.
13. Identify groups based on common names (alkali metals, alkaline Earth metals, halogens and noble gas).
14. Explain why and how metals and non-metals react.
15. Define ion, cation, and anion.
16. Determine the quantity of subatomic particles when given either hyphen notation or nuclear symbol notation.
17. Identify the common charge of ions in easily predictable groups.
18. Memorize common polyatomic ions and their naming rules.
19. Name ionic compounds.
20. Translate the names of ionic compounds into written chemical formulas.
21. Identify three types of bonds.
22. Interpret a chemical formula to determine the charge of a transition metal
23. Count the number of atoms and ions in a compound.
24. Write a formula from a name for a covalent molecule.
25. Name a covalent molecule.

### **Chapter 3: Stoichiometry**

1. Define and explain the purpose of a mole.
2. Solve problems, using dimensional analysis, with conversions between moles, particle number, molar mass and molar volume.
3. Support and explain mole relationships at the particle level using balanced chemical equations, calculations, particle diagrams and graphs.
4. Balance a chemical equation.
5. Explain two reasons why balancing a chemical equation is necessary.
6. Identify the reactants and products of a reaction.
7. Translate a chemical reaction from words into formulas.
8. Write a chemical equation based on evidence
9. Memorize diatomic elements.
10. Predict the products of reactions given the reactants.
11. Solve stoichiometry problems.
12. Define theoretical yield and actual/experimental yield.
13. Calculate percent yield.

## Chapter 7: Atomic Structure and Periodicity

1. Explain the properties (electronegativity, reactivity, ionization energy, radius) based on atomic structure.
2. Analyze atomic structure in terms of nuclear charge, distance and shielding.
3. Predict the properties of atoms based on their position on the periodic table.
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4. Identify that electrons have exact energy levels, with no values in between, represented by the Bohr model.

## Chapter 8: Bonding General Concepts

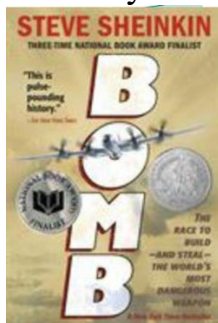
1. Define valence electron and identify the number of valence electrons in any atom.
2. Explain why atoms bond in terms of energy and attraction.
3. Explain charge based on the quantity of subatomic particles and how charge forms.
4. Draw a Lewis structure for neutral compounds and polyatomic ions.
5. Explain the difference between ionic, covalent and metallic bonds and why that difference exists.

## Other important ideas not covered directly in the reading

1. Define and identify endothermic and exothermic changes.
2. Define and identify all phase changes
3. Explain energy changes at the particle level.
4. Calculate the change of heat.
5. Identify and apply that energy is conserved (LOCE).

Recommended Books if you are looking for summer reading related to our chemistry course next year:

Bomb by Steve Sheinkin



Into the Clear Blue Sky by Rob Jackson

