

AP Chemistry Summer Reading Assignment

Read chapters 1 – 3.2 in Chemistry: The Central Science 12th edition by Brown, LeMay, Bursten, and Murphy.

Print out and complete the reading guides and practice problems. Show all of your work on the practice problems.

Watch the following videos and take notes. Watching the videos and taking notes as you watch is required. I will collect your video notes the first day of class. The videos should also be helpful as you complete the reading and practice problems.

- 1.5 <https://www.youtube.com/watch?v=wQpp-1nSSjc&t=1s>
- 1.6 <https://www.youtube.com/watch?v=2e1LSe9bk3M&t=3s>
- 2.3 <https://www.youtube.com/watch?v=Gd7IGl9BVQc>
- 2.4 <https://www.youtube.com/watch?v=rbSupsoBxyl>
- 3.1 <https://www.youtube.com/watch?v=p1BI3RGYygU>
- 3.2 <https://www.youtube.com/watch?v=vUOsDf9Ki-w>

The reading guides, practice problems, and video notes will be collected the first day of school. There will be a test on this material during the first week of school.

If you have any questions about the summer assignment please email me witzgallt@faculty.jhs.net

AP Chemistry Chapter 1 Reading Notes

1.1 The Study of Chemistry

Chemistry is the study of _____.

Matter is anything that has _____ and _____.

There are about _____ elements.

The building blocks of all matter are _____.

The properties of matter depend on the _____ of atoms and the _____ of atoms.

Molecules are _____.

In order to understand the macroscopic world we need to visualize how atoms and molecules behave at the submicroscopic level.

1.2 Classification of Matter

There are three states of matter.

Gases have _____

Liquids have _____

Solids have _____

Draw a particle level diagram to show the way atoms or molecules are arranged in each state of matter:

Solid	Liquid	Gas

Pure substances can be _____ or _____.

Elements cannot be _____.

Each element is made up of only _____.

There are _____ known elements.

Compounds are composed of _____.

The law of constant composition states that _____.

Mixtures are combinations of _____ in which each substance _____.

Heterogeneous mixtures are _____.

Homogeneous mixtures are _____.

Homogeneous mixtures are also known as _____.

Draw particle level diagrams

<i>Molecules of a compound</i>	<i>Molecules of an element</i>	<i>A mixture of an element and a compound</i>	<i>Atoms of an element</i>	<i>A mixture of two elements</i>

1.3 Properties of Matter

Physical properties can be observed _____.

Chemical properties describe the way _____.

Intensive properties do not depend on _____.

Extensive properties depend on _____.

Mixtures can be separated based on the physical properties of each component in the mixture.

Filtration separates a mixture based on _____.

Distillation separates a mixture based on _____.

Chromatography separates a mixture based on _____.

1.4 Units of Measurement

Quantitative properties are associated with _____.

Prefix	Abbreviation	Meaning
Picto		
Nano		
Micro		
Milli		
Centi		
Kilo		

The freezing point of water is _____ C and _____ K.

The boiling point of water is _____ C and _____ K.

Zero degrees Kelvin is known as _____

To convert a Celsius temperature into Kelvin _____

Density is _____

Do practice exercise 1.4

1.5 Uncertainty in Measurements

Numbers obtained by measurement are always _____.

Precision is a measure of how closely measurements agree with _____.

Accuracy is a measure of how closely measurements agree with _____.

Measured quantities are reported in a way that the only the _____ is uncertain.

Zeros between non zero digits are _____.

Zeros at the beginning of a number are _____.

Zeros at the end of a number are _____ if the number contains a _____.

In addition and subtraction the answer should be rounded to have the _____

In multiplication and division the answer should be rounded to have the _____

Do practice exercises 1.5, 1.6, 1.7 and 1.8

1.6 Dimensional Analysis

The key to using dimensional analysis is the correct use of _____.

When using a conversion factor the units you want should be _____ and the units you have should be _____.

Do practice exercises 1.9, 1.10, 1.11, and 1.12

Chapter 1 Practice Problems

1) Identify the following changes as chemical or physical

Melting ice
Digesting a candy bar
Burning gasoline
Crushing ice

2) Suggest a method for separating each of the following mixtures. What property of the substances does your method rely on?

Styrofoam and rocks
Iron and sulfur
Salt and sand
Water and ethanol
Sand and rocks

3) Classify the following as elements, compounds, homogeneous mixtures, or heterogeneous mixtures:

Sea water
Magnesium
Gasoline
Rice pudding
Air
Sand
Copper
Ethanol

4) Give the symbols for the following elements:

Sodium
Potassium
Silver
Calcium
Lead

5) Name the following elements:

Mn
Mg
Li
Cr
Ti
Au
Br

6) How many significant figures are in each of the following numbers?

5600

5600.
0.056
5.00006
5.60000
0.00056
0.005600

7) Do the following calculations and round your answer to the correct number of significant figures.

$$12.0550 + 9.05 =$$

$$34.00 \times 0.013 =$$

$$0.0577 / 0.753 =$$

$$10.34 - 8.34210 =$$

8) Complete the following conversions Show your work! Use dimensional analysis!

2.54 cm = 1 inch
12 inches = 1 foot
3 feet = 1 yard
2.205 lbs = 1 kg

Convert 15 inches into cm

Convert 150 lbs into kg.

Convert 1350 cm into feet

Convert 37 yards into cm

Convert 17.03 m into km

Convert 8.25 g into mg

Convert 250 cl into ml

Convert 3.14 kg into mg

Convert 1.0 g/ml into $\mu\text{g/L}$

Convert 3.25 mg/dl into g/L

Convert 3.5 hours into seconds

Convert 8.25 meters² into cm²

Convert 60 meters/second into kilometers/hour

Convert 40 L/second into ml/second

19) A piece of wood measures 1.35 cm by 3.56 cm by 18.5 cm and has a mass of 75.36 grams. What is its density? Will it float or sink in water?

20) The density of brass is 8.41 g/cm³. What is the mass of a 13.18 cm³ piece of brass?

21) The density of steel is 7.36 g/cm³. What is the volume of a 39.91 gram piece of steel?

22) A piece of metal measures 4.59 cm by 3.41 cm by 12.69 cm and has a mass of 1762.00 grams. What is its density?

AP Chemistry Chapter 2 Reading Notes

2.1 The Atomic Theory of Matter

All matter is composed of _____.

Dalton's Atomic theory (~1800)

1) _____

2) _____

3) _____

4) _____

Law of constant composition: _____

Law of conservation of mass: _____

2.2 The Discovery of Atomic Structure

Cathode rays: Stream of particles affected by magnetic field.

J.J. Thompson discovers the _____ which has a _____ charge.

Millikan's oil drop experiment

See how small drops of oil are affected by an electrical charge.

Discovers the mass of an electron is _____

Rutherford's Gold foil experiment

Shoot particles at a very thin (only one or two atoms thick) sheet of gold foil.

He expected the particles to _____

What actually happened _____

What he learned from the experiment _____

2.3 The Modern View of Atomic Theory

Modern atomic theory

Subatomic particle	charge	Mass (grams)	Mass (amu)	location

The atomic number = _____

The mass number = _____ + _____

In a neutral atom the electrons = _____

Do Practice Exercise 2.2 and 2.3

2.4 Atomic Weights

Isotopes are _____

To calculate the average atomic mass of an element you need to know the mass of each isotope and the abundance of each isotope.

Average atomic mass = (% abundance) (mass of isotope) + (%abundance)(mass of isotope) + ...

Do practice exercise 2.4

A Closer Look: Mass Spectrometer

A mass spectrometer is used to measure _____

The sample is bombarded with high energy electrons to produce _____

The sample is then accelerated towards a negative charge.

On its way it passes by a _____ which deflects the particles more or less based on their _____.

A graph is produced that shows where the particles end up. The light particles are deflected more and the heavy particles are deflected less.

2.5 The Periodic Table

In the periodic table elements are arranged in order of increasing _____

Elements with similar properties are found in the same _____

Horizontal rows are called _____

Vertical columns are called _____

Metals are found _____ of the periodic table. The properties of metals are _____.

Nonmetals are found _____ of the periodic table. The properties of nonmetals are _____.

Metalloids are found _____. The properties of metalloids are _____.

2.6 Molecules and Molecular Compounds

A molecule is _____

A diatomic molecule is _____.

The seven elements that form diatomic molecules are _____.

A molecular compound is _____.

In a chemical formula the subscript number tells you _____

A molecular formula tells you _____

An empirical formula tells you _____

A structural formula tells you _____

2.7 Ions and Ionic Compounds

An ion is _____

A cation has _____ electrons and has a _____ charge.

An anion has _____ electrons and has a _____ charge.

Metals usually form _____

Nonmetals usually form _____

Number of electrons = number of protons – charge

Do practice exercise 2.7

Polyatomic ions are _____

Ionic compounds are usually made up of one _____ and one _____

Molecular compounds are usually made of two _____.

Do practice exercise 2.9

If you know the charge of the cation and anion in an ionic compound, you can predict the formula of the ionic compound the form by _____.

Do practice exercise 2.10

2.8 Naming Inorganic Compounds

Ionic Compounds

If you know the charges of the ions you can write the formula of an ionic compound

Cations have the same name as _____

Transition metals that can form more ions with various charges are identified by _____

Monatomic anions are named by changing the ending of the element's name to _____

Polyatomic anions containing oxygen

The most common ions oxyanion of the element ends in _____

The oxyanion with the same charge but one fewer oxygen ends in _____

To name an ionic compound just name the _____ and then the _____.

Acids

You can tell a substance is an acid if its formula starts with _____.

An acid is a substance that _____ when dissolved in water.

An acid consists of an _____ and enough _____ to balance out the charges.

Molecular compounds

Prefix	meaning
	1
	2
	3
	4
	5
	6
	7
	8
	9
	10

Use prefixes to indicate the number of atoms of each element. (the prefix mono is not used if there is only one of the first element)

Change the ending of the second element to –ide

Practice:

CO₂ _____

N₃O₅ _____

_____ carbon tetrachloride

_____ diboron trifluoride

2.9 Some Simple Organic Compounds

Organic compounds always contain _____ and _____ and often also contain _____, _____, or _____.

<i>Molecular formula</i>	<i>Name</i>	<i>Structural formula</i>
CH ₄		
C ₂ H ₆		
C ₃ H ₈		

If a hydrogen atom is replaced with –OH then the compound is an _____ and the name should end in _____.

<i>Molecular formula</i>	<i>Name</i>	<i>Structural formula</i>
CH ₃ OH		
C ₂ H ₅ OH		
C ₃ H ₇ OH		

Chapter 2 Practice Problems

- 1) How many protons neutrons and electrons are in an argon-39 atom?
- 2) How many protons, neutrons, and electrons are in an argon-40 atom?
- 3) How many protons neutrons and electrons are in a potassium-39 atom?
- 4) What is the symbol for an element with 25 protons and 32 neutrons?

- 5) How many protons neutrons and electrons are in $^{58}\text{Ni}^{2+}$?
- 6) How many protons, neutrons and electrons are in $^{77}\text{Se}^{2-}$?
- 7) Write the symbol for the neutral atom with the atomic number 56 and a mass number of 139.
- 8) Write the symbol for the ion with 15 protons, 18 electrons, and 16 neutrons.
- 9) What is the symbol of the ion with 20 protons and 18 electrons and 21 neutrons?
- 10) What is the symbol of the ion with 35 protons and 36 electrons and 37 neutrons?

11) Complete the following chart:

Chemical Symbol	Number of Protons	Number of Electrons	Number of Neutrons	Atom or Ion	Charge
^9Be					0
$^{131}\text{I}^-$				Ion	-1
	35	36	45		
	11		12	Atom	
		55	78	Atom	
		18	16		-2
	13		14		+3
	29		35		+1

- 12) There are two isotopes of chlorine, chlorine-35 and chlorine-37. Chlorine-35 has a mass of 34.969 amu and an abundance of 75.53%. Chlorine-37 has a mass of 36.97 amu and an abundance of 24.47%. Calculate the average atomic mass of chlorine. (show your work)

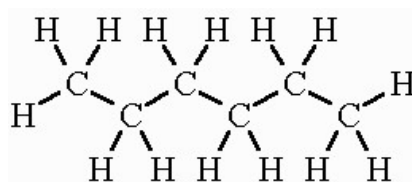
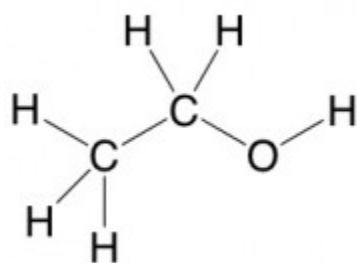
13) There are three isotopes of Silicon. Silicon-28 has a mass of 27.977 amu and an abundance of 92.21%. Silicon-29 has a mass of 28.976 amu and an abundance of 4.70%. Silicon-30 has a mass of 29.974 amu and an abundance of 3.09%. Calculate the average atomic mass of silicon. (show your work)

14) Magnesium has two isotopes, Magnesium-24 and Magnesium-25. The average atomic mass of magnesium is 24.305. Which isotope of magnesium is more abundant? Explain your answer.

15) On the blank periodic table label the following:

- Metals, non-metals, metalloids (semimetals)
- Alkali metals, Alkaline earth metals, transition metals, inner transition metals, halogens, noble gases
- The most common charge of ions for each of the representative groups

16) Write the empirical and molecular formulas of the following compounds.



17) Explain the differences between an ionic compound and a molecular compound.

18) What are the charges of the most common ions formed by the following elements?

Strontium

Fluorine

Oxygen

Potassium

Sulfur

Bromine

Aluminum

Beryllium

Boron

Nitrogen

Lithium

Iodine

Phosphorus

19) Predict the formula of the ionic compound formed by the following pairs of ions.

Ca^{2+} and Br^-

Na^+ and S^{2-}

K^+ and CO_3^{2-}

Mg^{+2} and PO_4^{3-}

Fe^{3+} and O^{2-}

Ba^{2+} and NO_3^-

20) Determine if the following substances are ionic, molecular, or acids

NaCl _____

HClO_2 _____

NCl_3 _____

CuCl_2 _____

HBr _____

Na_2O _____

Na_2CO_3 _____

P_4O_{10} _____

NH_4NO_3 _____

FeSO_4 _____

SiO₂ _____

Fe(OH)₃ _____

HC₂H₃O₂ _____

PCl₃ _____

CO _____

Cr(CO₃)₃ _____

Chapter 3 Reading Notes

Stoichiometry is an area of chemistry that studies _____.

The law of conservation of mass is explained by the fact that in a chemical reaction, atoms are neither _____ nor _____.

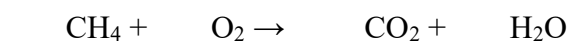
3.1

The substances on the left of a chemical equation are the _____ and the substances on the right are the _____.

The numbers in front of the formulas are called _____ and tell us _____.

Chemical equations need to be balanced because of the law of _____.

To balance an equation you should add _____ in front of formulas, but never change the _____.



When an equation is balanced the number of each type of _____ on each side of the equation should be _____.

Symbols can be used to identify the states of the reactants and products

(s) _____

(l) _____

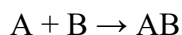
(g) _____

(aq) _____

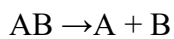
Do practice exercises 3.1 and 3.2

3.2

In a combination (or synthesis) reaction _____ reactants form _____ product.



In a decomposition reaction _____ reactant forms _____ products.



In a combustion reaction a hydrocarbon reacts with _____ to form _____ and _____.
 $C_xH_y + O_2 \rightarrow CO_2 + H_2O$

Chapter 3.1 – 3.2 Practice Problems

Use coefficients to balance each chemical equation:

