**Ch 2: Atoms and Elements Name:**

*2.1 Brownian Motion: Atoms Confirmed* Read through each section.

*2.2 Early Ideas about the Building Blocks of Matter*

What was the effect of Aristotle’s influence on intellectual thought?

*2.3 Modern Atomic Theory and the Laws That Led to It*

*Conceptual Connection 2.1*

*Practice 2.1, 2.2*

Why is #1 in Dalton’s atomic theory not true in the modern age?

*2.4 The Discovery of the Electron*

What properties did the particles that Thomson discovered have?

What did he discover and how small was its mass compared to hydrogen?

Millikan was able to determine the charge of an electron to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_C and by using Thomson’s charge to

mass ratio he calculated the mass of an electron to be\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_g.

*2.5 The Structure of the Atom*

Describe Thomson’s Plum Pudding model in terms of a blueberry muffin.

What is radioactivity and what types were known at this time? (What’s important to know about alpha particles?)

Why did Rutherford design the gold foil experiment and what did he expect?

What really happened?

How did the results change the model of the atom? (He eventually discovered protons.)

It took until 1932 for \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to discover the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

charge and about the same mass as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Read the last paragraph of this section about “empty space”.

*2.6 Subatomic Particles: Protons, Neutrons, and Electrons in an Atom*

How/why was the amu developed?

Why is matter “neutral”?

What is the atomic number (symbol \_\_\_) and what does it define?

Why are the symbols of many elements not from their English name?

What does it mean to say neon has 3 different isotopes and how does this connect to relative abundance?

Write the symbols for the 3 isotopes:\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ What does “A” represent?

How do you find the number of neutrons in each isotope?

*Practice 2.3 a) \_\_\_\_\_\_\_\_ b) p = \_\_\_\_ n = \_\_\_\_ CC 2.7 \_\_\_\_ CC 2.8 \_\_\_\_*

How do atoms form ions?

Write equations to represent the formation of a Ca2+ ion and of a P3- ion. (label each ion as a cation or an anion)

*2.7 Finding Patterns: The Periodic Law and the Periodic Table*

What was Mendeleev’s periodic law?

Why did he leave gaps?

Now the table is listed in order of increasing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

(Can you find examples where the elements are not in order by mass?)

Summarize the 3 classes of elements by description and location.

Where are the transition metals? How are the column designated in this section?

Be familiar with noble gases, alkali metals, alkaline earth metals, and halogens. CC 2.10 \_\_\_\_

What is the pattern for charges among the main group metals and non-metals of the periodic table?

*Practice 2.4 a) \_\_\_\_\_ b) \_\_\_\_\_*

*2.8 Atomic Mass: The Average Mass of an Element’s Atoms*

Explain what it means to say that the atomic mass of an element is a “weighted average”.

Review the example for chlorine on pg 66 and Example 2.5 on pg 67.

*Practice and MORE practice 2.5*

*Conceptual Connection 2.11 \_\_\_\_\_ Briefly explain your choice.*

Review *Figure 2.15* and read about how a mass spectrometer works. Now examine the *Figures* for chlorine.

Explain what is indicated by each axis in the diagrams.

How is the % abundance determined from the mass spectrum?

Mass spectroscopy can also be used for \_\_\_\_\_\_\_\_\_\_\_\_\_s. \_\_\_\_\_\_\_\_\_\_\_\_\_\_s form upon ionization that correspond to

the \_\_\_\_\_\_\_s and the spectrum is like a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The *Chemistry in Your Day* article on pg 72 shows how the masses on the periodic table are constantly updated.

*2.9 Molar Mass: Counting Atoms by Weighing Them*

Why do we not “count” atoms?

What is Avogadro’s number (a mole)? Write the 2 conversion factors used for a mole.

*Note: The new definition of a mole is based directly on the number of particles and no longer is defined by mass.*

*Practice 2.6*

What is the molar mass of iron? (Look at periodic table – label your answer as g/mol.) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Practice and More Practice 2.7*

*Practice and More Practice 2.8*

*Read the paragraph at the on pg 77!*

*Practice 2.9*

The *Self-Assessment Quiz* on pgs 78-79 is good review.

*Exercises (pgs 82-86)* ***#****31, 43, 45, 52a,b, 67, 69, 75, 77, 100, 105, 106, 118*

**Chapter 3: Molecules, Compounds, and Chemical Equations *(sections 1-7, 11)***

*3.1 Hydrogen, Oxygen, and Water*

Hydrogen(\_\_\_) is an \_\_\_\_\_\_\_\_\_\_\_ gas. Oxygen(\_\_\_) gas is NOT \_\_\_\_\_\_\_\_\_\_\_\_\_ but must be \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to occur. What is the dramatic difference between these elements and the water they form?

*(NaCl is another example.)*

*3.2 Chemical Bonds*

Chemical bonds result from \_\_\_\_\_\_\_\_\_\_\_\_\_\_s between the \_\_\_\_\_\_\_\_\_\_\_\_\_s and \_\_\_\_\_\_\_\_\_\_\_s that compose atoms.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forces are responsible for \_\_\_\_\_\_\_\_\_\_\_\_\_. *CC 3.1 \_\_\_\_*

Summarize the difference between ionic and covalent bonds. *Pay attention to Figures 3.2 & 3.3*

**3.3 Representing Compounds: Chemical Formulas and Molecular Models**

Chemical formulas indicate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a compound and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ number of atoms or ions.

Does the order of elements in the compound matter?

Use water and hydrogen peroxide to show the difference between empirical and molecular formulas for each cmpd.

What is the advantage of a structural formula? CC 3.1

*Practice 3.1 a) \_\_\_\_\_\_\_\_\_ b)\_\_\_\_\_\_\_\_\_ c) \_\_\_\_\_\_\_\_\_\_\_\_*

What advantage can you see for the ball-and-stick vs the space-filling model? And vice versa?

*(use the structures in Table 3.1 as examples)*

**3.4 An Atomic-Level of Elements and Compounds**

Give some examples of atomic elements and molecular elements. *(You should memorize the 7 diatomics shown in yellow in Figure 3.5 the mnemonic BrINClHOF may help.)*

*CC 3.4 \_\_\_*

Why is dry ice a molecular compound while table salt is an ionic compound?

While the basic unit of a molecular cmpd is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the basic unit of an ionic cmpd is a \_\_\_\_\_\_\_\_\_\_\_ unit.

Explain how ionic cmpds exist.

What is a polyatomic ion? Use the active ingredient in bleach and baking soda as examples.

*Practice 3.2 a) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ b) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ c)­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*d) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* *e) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ CC 3.5 \_\_\_\_\_*

*3.5 Ionic Compounds: Formulas and Names*

What consumer product contains limestone? Formula? Soda ash(washing soda) is \_\_\_\_\_\_\_\_\_.

ALL ionic compounds are referred to as salts. What other “salt” is in Lo Salt? Why do you think this is used?

What makes ionic compounds so stable?

*Read over the rules for writing ionic formulas and naming ionic compounds.*

Binary ionic cmpds are composed of a \_\_\_\_\_\_\_\_\_\_\_ and a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. For those that contain metals with only a single charge, you name the cation(metal name) and then nonmetal base name + - \_\_\_\_\_.

*Practice 3.3 \_\_\_\_\_\_\_\_ Practice 3.4 \_\_\_\_\_\_\_\_\_*

*Practice 3.5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ More Practice 3.5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Binary ionic cmpds that contain a metal that can form more than one \_\_\_\_ion (different charges) must use a \_\_\_\_\_\_\_\_

numeral to represent the charge of the cation(metal). Fe2+  is iron(\_\_\_\_) and Fe3+ is iron(\_\_\_\_). *Note: there is no*

*space between the metal name and the parenthesis. (Typically \_\_\_\_\_\_\_ition metals have more than one charge.)*

*Practice 3.6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ More Practice 3.6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Ionic cmpds that contain \_\_\_\_\_\_atomic ions just incorporate the name of the ion in the cmpd name. *Be familiar with*

*Table 3.5 (most are \_\_\_\_\_anions); ions ending in -\_\_\_\_\_ have one less \_\_ atom than those ending in - \_\_\_\_\_)*

*Note the use of prefixes in the Chlorate/ite series. 2 other halogens: Br and I form similar ions.*

*Practice 3.7 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ More Practice 3.7 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

What common household product contains a hydrate? Formula?

How does the “hydrated” form of colbalt(II) chloride differ from the “anhydrous” form?

*3.6 Molecular Compounds: Formulas and Names*

Why don’t we just use common names like \_\_\_\_\_\_\_\_\_(H2O) and \_\_\_\_\_\_\_\_\_\_\_\_\_(NH3) for all molecular cmpds?

Read over the rules for naming. When can the prefix “mono” be left out of a name?

*(Know the prefixes for 1-10)*

*Practice 3.8 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ More Practice 3.8 \_\_\_\_\_\_\_\_\_\_\_\_*

*CC 3.8*

How are acids defined at this point? What does *“aq”* stand for?

When is HCl an acid and when is it not?

What are common characteristics of acids?

Binary acid formulas start with \_\_\_\_\_\_\_\_\_\_\_\_\_ which is combined with a \_\_\_\_\_metal. To name them we use

\_\_\_\_\_\_\_\_ base name of \_\_\_\_metal+ic acid For example: HCl is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ acid

*Practice 3.9 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

To name \_\_\_\_acids you can remember the saying *“I –ate something that tasted –ic and seniors get senior-ite ous”*

*Read Chemistry in the Environment: Acid Rain*

*Practice 3.10 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ More practice 3.10 \_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*3.7 Summary of Inorganic Nomenclature*

*Note: The flow chart at the bottom of 109 is very important. I will give out a similar handout.*

*Practice 3.11 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*3.11 Organic Compounds*

It is good to read over this section at this point so you are familiar with the structure and names of some common organic compounds which are often used in AP Chemistry. Organic naming/structure is not directly tested on the AP exam. Inorganic nomenclature (naming/writing) is also NOT tested on the AP exam but being familiar with the names and formulas helps you to better understand chemistry.

*Exercises (pgs 130-134) Look over #s 23-58 and 101-102 IF you need more review on naming/writing cmpds.*