Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ch. 1 Chemical Foundation

* 1. **Chemistry: An Overview**

How has the scanning tunneling microscope help with building concepts in chemistry?

What is the difference between the microscopic and macroscopic world?

After reading Science: A process for understanding nature and its changes, What are the three processes fundamental elements to science?

* 1. **The Scientific Method**

What are the steps to the scientific method?

What is the difference between a theory and a law?

* 1. **Units of Measurement**

After reading this section, What if you were not allowed to use units for one day? How would this affect your life for that day?

* 1. **Uncertainty in Measurement**

In reference to Fig. 1.7 and the table provided that shows 5 different measurements.

Which part of their measurements are “certain” and why?

Which part of their measurement are “uncertain” and why?

How are significant figures used?

EXAMPLE 1.1- Uncertainty in Measurement, what is the difference between the measurements 25.00 mL and 25 mL?

What is the difference between precision and accuracy?

Draw the figures in Fi. 1.8 below and describe each figure with precision and accuracy AND how each shows random/systematic errors.

EXAMPLE 1.2 Precision and Accuracy- Which graduated cylinder is accurate? EXPLAIN!

* 1. **Significant Figures and Calculations**

For each of the rules for counting Significant Figures, provide an example of that rule and underline the certain digits and circle the uncertainty digit.



2a

2b

2c.

3

EXAMPLE 1.3 Significant Figures 1.3

Provide the number of Sig Figs for each of the following.

a

b

c

What is the rule for multiplication and division for significant figures?

Multiply: 4.567 cm with 2.4 cm =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the rule for adding and subtracting for significant figures?

Add: 4.567 cm with 2.4 cm =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1.7 Learning to Solve Problems Systematically**

What is dimensional analysis?

Provide the problem solving strategy:

Read through all of the Interactive Examples. Notice that the labels that need to be crossed off are diagonal from each other.

**1.8 Temperature**

After reading this section- Look at Fig. 1.9

How are the Fahrenheit, Celsius and Kelvin thermometers, what if anything do they have in common?

**1.9 Density**

Define density. What does it measure?

**1.10 Classification of Matter**

Define Matter.

Provide two differences between gases, liquids and solids.

What is the difference between heterogeneous and homogeneous mixtures?

What are pure substances? Provide several categories of pure substances.

Describe distillation separate liquids?

What is filtration?

Describe chromatography.

**KNOW!**

Scientific Method

Significant Figures

Calculation & Rounding Sig FIgs

Types of Matter

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ch. 2 Atoms, Molecules, and Ions

**2.1 Chemistry: An Overview**

What is Alchemy?

Who was considered the first “chemist”?

What is “phlogiston”?

**2.2 Fundamental Chemical Law**

What was so important about the law of conservation?

What was the significance of “Proust Law”?

What is the law of multiple proportions?

**2.3 Dalton’s Atomic Theory**

For each of Daltons atomic theory, paraphrase them into your own words- we will be using these Theories in Chapter 7.

What is Avogadro’s hypothesis?

**2.4 Early Experiments to Characterize the Atom**

Read this section and answer the question below.

You have learned about three different models of the atom: Daltons, Thompson’s and Rutherford’s’ model.

What if Dalton was correct? What would Rutherford have expected from his experiments with gold foil?

What if Thomson was correct? What would Rutherford have expected from his experiments with gold foil?

**2.5 Atoms**

What are the three elementary particles that make up an atom? Provide their characteristics.

Define an isotope and provide an example.

What is the difference between atomic number and mass number?

**2.6 Molecules and Ions**

What are chemical bonds?

Define covalent bonds and what is the resulting structure when 2 atoms do this?

Provide the chemical formula and structural formula for water.

How are ions formed? What are the two types and what distinguishes them from one another?

**2.7 An Introduction to the Periodic Table**

How is the Periodic table of elements organized?

Provide 5 physical properties of a metal and 1 chemical property.

What about nonmetal properties physically and chemically?

In reference to the periodic table, where would the metals and nonmetal reside?

What is the difference between groups and periods on the periodic table?

**2.8 Naming Simple Compounds**

Define binary compounds.

THIS SECTION IS SOOOOO IMPORTANT- IT’S THE LANGUAGE OF CHEMISTRY!!

PLEASE GO THROUGH THE INTERACTIVE EXAMPLES.

**KNOW!**

Atomic Scientist and Model contribution

Atomic # verse mass

Ionic Bonding-

Name and Formulas

Charge and Symbols of polyatomic ions without notes

Covalent Bonding

Name and Formula

Prefixes

Name Acids

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ch. 3 Stoichiometry

**3.1 Counting by Weighing**

Explain what “Counting by weighing” means?

**3.2 Atomic Masses**

Read how a mass spectrometer works and paraphrase how it works below. We will examine mass specs in Ch. 7.

What is meant by average atomic mass?

**3.3 Mole**

What is the relationship between a mole and Avogadro’ number?

What if you discovered that Avogadro’s number was not 6.02 x 1023 but 3.01 x 1023? Would this affect the relative masses given on the periodic table? If so, how? If not, why not?

Use the Example 3.2-3.5 as a reference to the following.

How much would 300 atoms of gold weigh? Show work below.

If I had 30.0 grams of gold, how many moles would this be? Show work below.

How many atoms would be in 30.0 grams of gold?

If I had 3.56 x 1056 atoms of gold, how much would it weigh? Show work below.

**3.4 Molar Mass**

Define molar mass.

What would be the molar mass of Gold III sulfide? Show work below.

**3.5 Learning to Problem solve.**

Read through this section- It’s pretty good.

**3.6 Percent composition**

Define percent composition.

Provide the percent composition of oxygen in water. Show work below.

**3.7 Determining the Formula of a Compound**

Read through the content to get your brain warmed up.

What is the difference between an empirical and molecular formula?

Look at Interactive EXAMPLE problem 3.10.

Show how you can determine the empirical formula of a substance that is 71.65% Chlorine, 24.27% Carbon and 4.07% Hydrogen.

Look at Interactive EXAMPLE problem 3.12.

Show how you can determine the molecular formula of a caffeine that is 49.48% Carbon, 5.15% Hydrogen, 28.87% Nitrogen and 16.49% Oxygen. Its molar mass is 194.2 grams.

**3.8 Chemical Equations**

Define a chemical equation and locate where the reactants and products are found in an equation.

**3.9 Balancing Chemical Equations**

Why is it important to have a balance an equation?

GO THROUGH THE INTERACTIVE EXAMPLES PROBLEMS!!

Balance the following: \*\*change to formulas\*\*

Calcium hydroxide reacts with Silver phosphate to produce calcium phosphate and silver hydroxide.

**3.10 Stoichiometric Calculation: Amounts of Reactants and Products.**

Read through how to do Stoichiometry problems

Below- Provide the Problem-Solving Steps to solving a Stoichiometry problem.

**I would go through the mental gymnastics of the INTERACTIVE EXAMPLE PROBLEMS**

Using your balanced equation from 3.9, how many grams of calcium hydroxide is need to react with 2.5 grams of silver phosphate for this reaction?

**3.11 The Concept of Limiting Reactants**

READ through the passage to understand what it is meant by Limited reactants.

Define limiting reactant.

GO THROUGH THE INTERACTIVE EXAMPLES PROBLEMS!!

Using your balanced equation from 3.9,

If I use 1.3 grams calcium hydroxide and 2.5 grams of silver phosphate for this reaction, what is the maximum amount (theoretical yield) of calcium phosphate that can be produced? Identify the limited reactant and calculate the amount of excess reactant.

SHOW WORK BELOW.

What is the difference between theoretical yield and percent yield?

Calculate the % yield using problem in 3.11’s theoretical yield and an actual yield of 0.873 grams of calcium phosphate.

**KNOW!**

Particles to Moles to Mass

Molar mass-Percent composition

Balancing an equation

Convert grams of A to grams of B (stoichiometry)

Limited reactant & Theo yield

Concept and calculation

Percent yield