Honors Chemistry Unit 1 – Intro and Atomic Theory Notes

Intro – Scientific Measurements:

1. Chemistry is the study of _____.
2. SI Base Units used in Chemistry:

Quantity	Unit Name	Abbreviation	Tool to Measure
Length			
Mass			
Time			
Temperature			
Amount of Substance			

3. What is a **derived unit**? List 5 examples.

4. Fill out the following table

1 mega (M)	**10^6 base**
Base	**Meter, liter, gram, second**

5. What is a measurement?

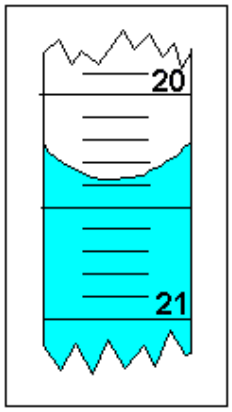
6. Why are measurements always uncertain?

7. Define:

Accuracy	
Precision	
Percent Error	

8. What is Jake's percent error, if he measured the density of a substance to be 6.8 g/mL during his experiment and the accepted value is 7.2 g/mL?

9. Measure this to the correct digits. Assume these units are mL.



Answer_____

10. Significant figures:

11. Write your approved list of rules below:

12. Use your rules to determine number of sigfigs below:
    1. 500. L
    2. 820.0 L
    3. 1.0200×10^5kg
    4. 807,000 kg
    5. 0.080s
13. Multiplying and dividing with sig figs: **The number with the fewest sig figs determines the number of sig figs in the answer.**

    Example: $13.91 g/cm^3 \times 23.3 cm^3$

14. Adding and subtracting with sig figs: **The number with the lowest decimal value determines the place of the last sig fig in the answer.**

    Example: 2.65m+5.3m

    Example: 189L+270L

15. More practice
    a. 19.82 g ÷ 9.1 g

    b. 18.9 g – 0.84g

Graphing

Interpreting Relationships from Graphs:	
Direct Proportions	**Inverse (or Indirect) Proportions**

Dimensional Analysis

1. What is it used for?

2. What are unit conversions?

Examples

3. Convert 13.4 g to mg.

4. Convert 267 kL to L

5. Convert 83.12 cm to hm

6. Convert 72.8 km/hr to m/s

Density

1. Formula:

2. An object has a volume of 825 cm^3 and a density of 13.6 g/cm^3. Find its mass.

Atomic Theory:

Matter	

Pure Substances:

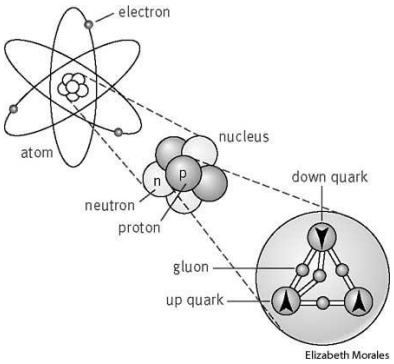
1.
2.

The smallest individual unit of an element is called an_____.

Atoms of two or more elements chemically combined make up a _____.

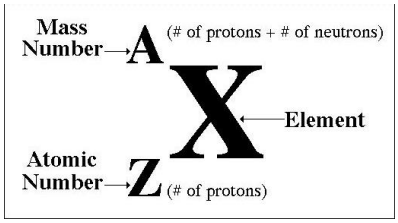
Atomic Structure:

Particle	Symbol	Relative Charge	Relative Mass	Location in the Atom
Proton				
Neutron				
Electron				



The atom consists of three subatomic particles, the _____, _____, and _____. The electron is an elemental particle, whereas the proton and neutron consist of three smaller particles called _____.

Define:

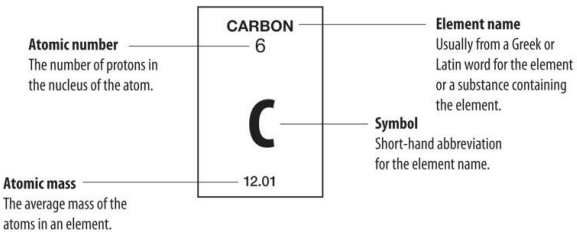


Nucleons

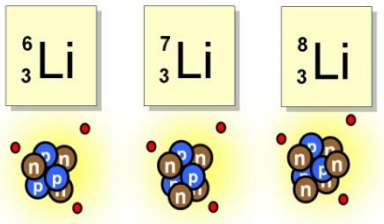
Atomic Number

Mass Number

Atomic Mass



Isotopes



Nuclides

Ion

Symbolic Notation:

$^{27}_{13}Al^{3+}$

What is the atomic number? _____ What is the mass number? _____
How many protons? _____ How many electrons? _____
How many neutrons? _____

Atomic Mass:

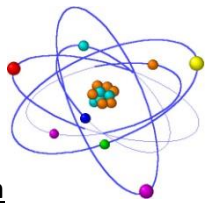
The average mass system is a relative system based on the mass of a standard nuclide. This nuclide is _____. The unit for measuring atomic masses is the _____.

Average Atomic Mass:

To calculate average atomic mass ⇨

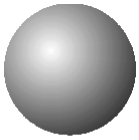
Use the following formula:

Example: Calculate the average atomic mass of boron if a sample contains
19.78% boron-10 (atomic mass = 10.013 u)
80.22% boron-11 (atomic mass = 11.009 u)



History of the Atom

1. **Early Theories of the Atom:**
   a. _____ proposed the first idea of the atom around 430 B.C.
   b. _____ proposed the first Atomic Theory in _____
      Describe this theory:
   c. Dalton based his theory on the work of two scientists:
      _____ **Law of Conservation of Mass**

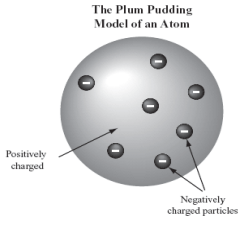


Dalton
1803-1805

      _____ **Law of Definite Proportions**

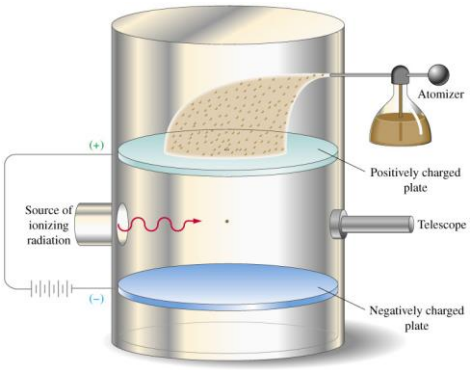
   d. Dalton used his theory to develop the **Law of Multiple Proportions**

2. **Discovery of Subatomic Particles** – Cathode ray tubes were used to discover two subatomic particles
   a. _____ used cathode rays to discover the **electron**. He measured the bending of the rays to determine the _____.
   b. Modified cathode ray tubes were used to discover a beam of positive charge. These rays were determined to be positive particles and were named **protons**.
   c. Thomson developed a new model of the atom called the _____



d. _____ performed the "oil drop experiment" to determine the charge on the electron. He also used Thomson's charge to mass ratio to calculate the mass of an electron.

Describe his experiment:

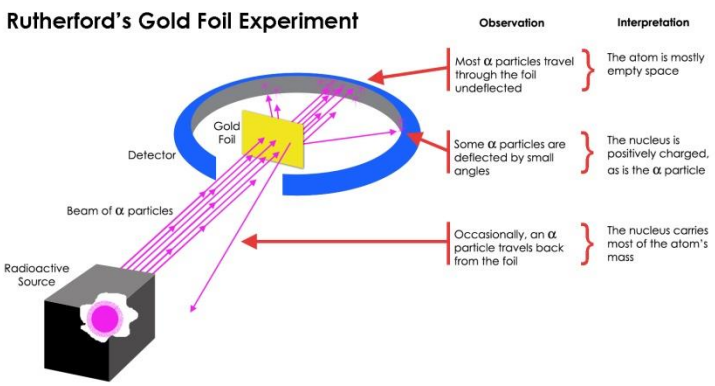


e. The third subatomic particle was discovered much later by _____.

****Discovery of subatomic particles led to the first revision of Dalton's Atomic Theory: Atoms are not indivisible and indestructible; they are made up of smaller particles.****

****Discovery of isotopes and neutrons led to the second revision of Dalton's Atomic Theory: Atoms of the same element are NOT exactly alike; they can have the same number of protons, but may have different numbers of neutrons****

3. **<u>The Nuclear Model of the Atom</u>** – The nucleus was the next major focus in the development of the atomic model.
   a. _____ ( ) studied the radiation emitted by these substances, especially the alpha particles. He directed another famous experiment, the "**<u>gold foil experiment</u>**".



Describe his experiment:

   b. Rutherford's model of the atom is called the **<u>nuclear model</u>** of the atom.