

Some Important Things to Know about **CHEMISTRY**

Definitions:

- **Chemistry** – the study of matter
- **Matter** – anything that takes up space or has weight (mass)
- **Atom** – smallest unit of an element. Made up of a **nucleus** (where positively charged **protons** and neutral **neutrons** are located). The nucleus is surrounded by negatively charged **electrons** that move around in a particular path called a **shell** or **orbital**.

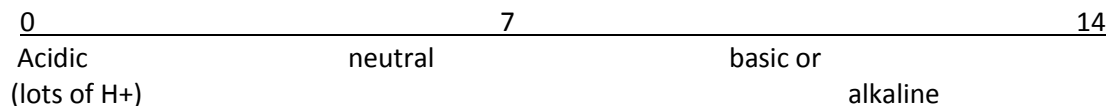
2-8-8 Rule: for most atoms there will be up to 3 electron shells (or orbitals). The first one can hold up to 2 electrons; the second and third can hold up to 8 electrons. The atom “likes” to have its outermost shell full. If the outer shell is full, it’s called a **stable** atom.

Electrical Charge: an atom can be **positive** (if it has more protons than electrons), **negative** (if it has more electrons than protons), or **neutral** (if it has the same number of + protons and – electrons). Atoms without an electrical charge are called neutral; atoms with a + or – charge are called **ions**. A **cation** is positive, and an **anion** is negative.

Chemical Bonds: how atoms are combined with other atoms. There are 3 types:

- **Ionic:** “opposites attract” – cations and anions are held together
- **Covalent:** “sharing” – electrons are shared by 2 atoms, instead of being taken
- **Hydrogen:** molecules of water are held together

pH Scale: measures how acidic or basic (alkaline) a substance is. It measures the amount of hydrogen ions (H⁺) given off in a solution. The scale goes from 0 to 14; the lower the number the more hydrogen ions are in the substance.



Organic Compounds (or macromolecules): have the element **carbon** in them. 3 types are:

- **Proteins:** made up of amino acids, held together by peptide bonds. Proteins are used for building body structures (like muscles), as **enzymes** which help chemical reactions run better, and some hormones are made of proteins.
- **Carbohydrates:** are made from monosaccharides (the simplest type of sugar). **Glucose** is the body’s favorite monosaccharide for making energy. **Glycogen** is stored glucose. Abbreviation: CHO stands for Carbon₆ Hydrogen₁₂ Oxygen₆
- **Lipids (fats):** are made from glycerol and fatty acid tails. Lipids are important for energy, hormones, and cell membranes.

Atomic Number and Mass Practice

1. Complete the following chart.

	Where located in atom	electrical charge	mass in AMU
Proton	_____	_____	_____
Electron	_____	_____	_____
Neutron	_____	_____	_____

2. Calculate the number of protons, electrons and neutrons there are in the following elements. Use a periodic table to help.

<u>substance</u>	<u>protons</u>	<u>electrons</u>	<u>neutrons</u>	<u>mass #</u>
Calcium (Ca)	_____	_____	_____	<u>40</u>
Iron (Fe)	_____	_____	_____	<u>55</u>

Look below at the number of subatomic particles in atom #1 and atom #2:

atom #1 has: 15 protons 15 electrons 16 neutrons

atom #2 has: 17 protons 17 electrons 18 neutrons

3. Use your periodic table to identify the element each atom represents.

_____atom #1 _____atom #2

4. Explain how you decided which element you chose for question #3.

5. What is the mass number of each element?

_____atom #1 _____atom #2

6. Draw each atom in #3-5 showing the neutrons and protons in a nucleus and how the electrons would look in their orbits.