

**I. Start With Atoms**

- A. \_\_\_\_\_ is anything that occupies space and has mass.
  
- B. Structure of Atoms
  1. Subatomic Particles
    - a. *Protons*
  
    - b. *Neutrons*
  
    - c. *Electrons* (e-) have a negative charge
      - They move around the nucleus.
      - Their quantity is equal to that of the protons.
  
  2. \_\_\_\_\_ equals the number of protons in the nucleus
  
  3. \_\_\_\_\_ equals the number of protons plus the number of neutrons.
  
- C. \_\_\_\_\_ is an arrangement of elements based on their chemical properties.
  1. Those in the same column of the table have the same number of electrons available for interactions with atoms.
  2. Not all elements in the periodic table can be found in nature. Those after atomic number 92 are highly unstable.

**II. What Happens When Atom Bonds with Atom?**

- A. Electrons and Energy Levels
1. Electrons are attracted to protons and are repelled by other electrons.
    - a. Orbitals permit electrons to stay as close to the nucleus and as far from each other as possible.
  
    - b. \_\_\_\_\_ can be thought of as occupying shells around the nucleus.  
  
The shell closest to the nucleus has \_\_\_ orbital holding a maximum of 2 electrons.

c. The next shell can have \_\_\_\_ orbitals with two electrons for a total of eight electrons.

d. A \_\_\_\_\_ is a union between atoms formed when they give up, gain, or share electrons.

- 2. Atoms with “unfilled” orbitals in their outermost shell tend to be reactive with other atoms.

*The number or distribution of its electrons changes when an atom gives up, gains or shares electrons.*

## **B. From Atoms to Molecules**

- 1. A \_\_\_\_\_ is a bonded unit of two or more (same or different) atoms.
- 2. \_\_\_\_\_ are substances in which two or more different elements are combined in fixed proportion
- 3. \_\_\_\_\_, two or more elements simply intermingle in proportions that can vary.

## ● **III. Major Bonds in Biological Molecules**

### **A. Ion Formation and Ionic Bonding**

1. When an atom loses or gains one or more electrons, it becomes positively or negatively charged – an \_\_\_\_\_.
2. In an *ionic bond* (+) and (-) ions are linked by mutual attraction of opposite charges - example

### **B. Covalent Bonding**

- 1. A *covalent* bond holds together two atoms that share one or more pairs of electrons.
- 2. In a \_\_\_\_\_ covalent bond, atoms share electrons equally.

### **C. Hydrogen Bonding**

#### **IV. Properties of Water**

- A. Polarity of the Water Molecule

1. Because of the electron arrangements in the water molecule, a polarity results that allows water to form hydrogen bonds with one another and other polar substances.

- B. Water's Temperature-Stabilizing Effects

1. Water tends to stabilize temperature because it can \_\_\_\_\_ considerable heat before its temperature changes.

- C. Water's Cohesion

1. Hydrogen bonding of water molecules provides cohesion (capacity to rupturing) which imparts surface tension.

- D. Water's Solvent Properties

1. Water is a great solvent because ions and polar molecules (solutes) dissolve in it.

- End of Chapter 2 Material