

General Biology Notes Guide:

You are responsible not only for the material in this guide but the diagrams and pictures on the notes. The notes can be found on Mr. Walkers website: www.walkersclass.com.

This set of notes covers Unit 1: Objective 1: Describe how chemical reactions cause change in molecules.

Wait, why are we studying chemistry? Chemistry is the foundation of Biology. Life is not only made up of chemical elements but chemical reactions.

What is an atom?

- An atom is the smallest part of an element that keeps all the _____ of the element.
- _____: elements essential for life. They include: Carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur

Life requires ~25 chemical elements

- _____ elements make up 96% of living matter:
 - carbon (C)
 - oxygen (O)
 - hydrogen (H)
 - nitrogen (N)
- _____ elements make up most of remaining 4%:
 - phosphorus (P)
 - sulfur (S)
 - calcium (Ca)
 - potassium (K)

What is an element?

- -An element is made up of only _____ kind of atom. An element can't be broken down into a simpler form by chemical reactions. Elements are arranged in a chart known as the periodic table. The table tells us it's mass, how many protons it has, and its symbol.
- _____ elements: are those required by an organism in minute quantities.

-What is a Molecule?

- -A molecule is a group of atoms held together by the energy of _____ bonds.
 - Energy is the capacity to cause _____.
 - Potential energy is the energy that matter has because of its location or structure. The electrons of an atom differ in their amounts of potential energy. An electron's state of potential energy is called its energy level, or electron shell.
- All compounds are _____ but not all molecules are compounds. Molecules can bind to the same element or a different element. Compounds are two or more different elements bonded together.

How electrons bond atoms together

- It's all about the electrons
- electrons determine chemical behavior of atom
- depends on number of electrons in atom's outermost shell
 - Known as the _____ shell
 - Electrons will try to empty or fill up the valence shell by sharing/giving/taking electrons from other atoms.
- Effect of electrons
- chemical behavior of an atom depends on number of electrons in its valence shell

Elements in the same row (period) have the same _____ of shells
Elements in the same column (group) have the same valence & _____ chemical properties

- Atoms tend to _____ a partially filled valence shell or empty a partially filled valence shell

Bonds in Biology

- Weak bonds: Examples such as hydrogen bonds which are an attraction between + and – area of two molecules (Example: water-water)
- Ionic Bonds: an atom with a + charge is attracted to an atom with a negative charge. Example: NaCl.
- Strong bonds
- _____ bonds are formed when electrons are shared between atoms

Hydrogen bonding

- Polar water creates molecular attractions between _____ H in one H₂O molecule to _____ O in another H₂O
- also can occur wherever an -OH exists in a larger molecule
- Weak bond

Covalent bonds

- Why are covalent bonds strong bonds?
- two atoms _____ a pair of electrons
- both atoms holding onto the electrons
- very stable
- Forms _____

Reactions

- Chemical reaction: process by which substances change into different substances through the breaking and _____ of chemical bonds.
- Reactant: substance that is changed by a chemical reaction.
- Product: substance formed by a chemical reaction.

Hydrogen gas + Oxygen gas forms 2 water molecules. The Hydrogen and oxygen gasses are reactants. The 2 water molecules are the products.

- Equilibrium: condition in which reactants and products of a chemical reaction are formed at the same _____.
- Exothermic: chemical reaction that yields a net release of energy in the form of heat. Think... fire, sound, or light released.
- Endothermic: chemical reaction that requires a net input of energy. Think ice cream cone melting because it is absorbing heat from the surroundings.

Subscripts and Coefficients- Atoms vs Molecules

- Subscript - shows how many atoms of an element are in a molecule.
- EX: H₂O
–2 _____ of hydrogen (H)₂
–1 atom of oxygen (O)₂
- Coefficient - shows how many molecules there are of a particular chemical.
- EX: 3 H₂O –Means there are 3 water _____.