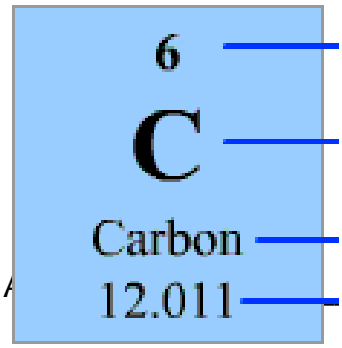
Name: _____ Period: _____

Unit 1: Basic Chemistry for Biology
Note Packet 1: Composition of Matter, Energy and Solutions

1. Matter
    a. Definition:
    _____.
    b. Everything in the universe is
    _____.
    c. Biologists study chemistry because all living things are made of the same kinds of matter.

    d. Elements
        i. Pure substances that
        _____
        _____.
        ii. Over _____ have been discovered.
        iii. _____ of mass in all living things is made from _____ elements: _____, _____, _____ and _____.
        iv. Chemical symbols on the periodic table give you information about the element.



        v. A _____.
            1. All atoms of an element have the _____ number of protons.
            2. In an atom with no charge (_____) the number of protons equals _____.

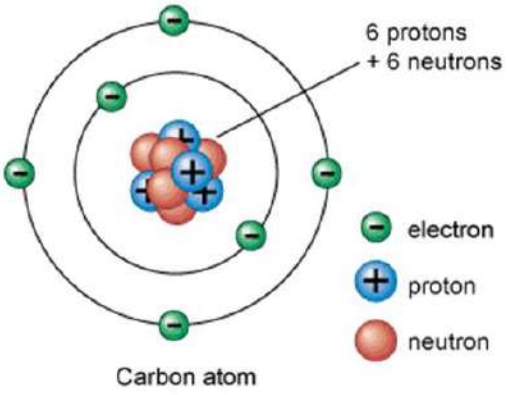
        vi. Atomic mass:
        _____
        _____.

        vii. Examples:
            1. Mg
                a. Name: _____

b. Atomic number: _____
c. Number of protons: _____
d. Number of electrons: _____
e. Atomic mass: _____
f. Number of neutrons: _____

2. Cl
   a. Name: _____
   b. Atomic number: _____
   c. Number of protons: _____
   d. Number of electrons: _____
   e. Atomic mass: _____
   f. Number of neutrons: _____
3. Cs
   a. Name: _____
   b. Atomic number: _____
   c. Number of protons: _____
   d. Number of electrons: _____
   e. Atomic mass: _____
   f. Number of neutrons: _____

e. Atoms
   i. The simplest particle of an element that _____
   _____.

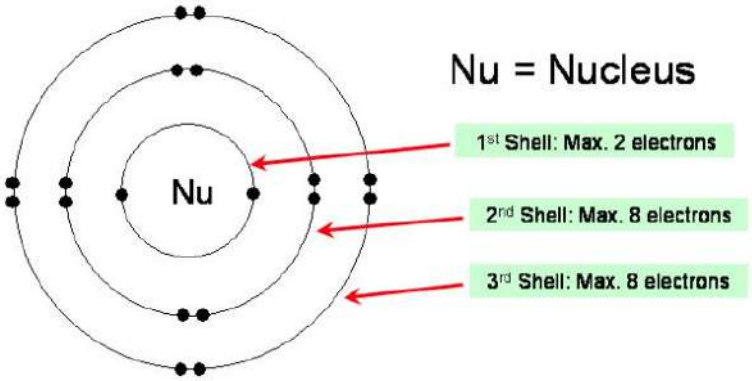


Carbon atom

   ii. The Nucleus
      1. _____
      2. _____ are found here
         a. _____
         b. Number of protons = _____
      3. _____ are found here
         a. _____
   iii. Energy Levels
      1. _____

2. _____ are found here
    a. _____
    b. In a normal atom: number of protons = _____
        i. _____ (they cancel each other out).
3. 1st Energy Level
    a. _____
    b. Holds up to _____ electrons
4. 2nd, 3rd, 4th, etc. Energy Levels
    a. Can hold up to _____ electrons

iv.



1. The _____ model
    a. Shows all electrons and all energy levels
    b. Examples:
        i. Hydrogen

        ii. Neon

        iii. Potassium

2. The _____ Model
    a. Shows only the valence electrons
        i. _____.
    b. Examples:
        i. Hydrogen

ii. Neon

iii. Potassium

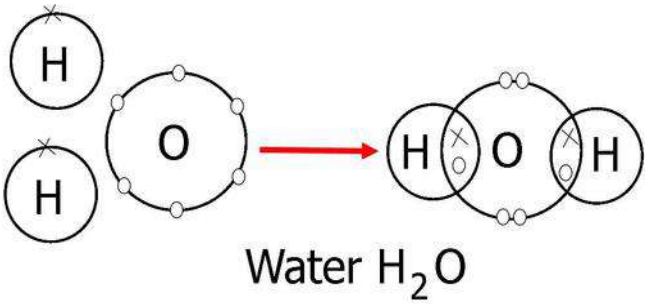
f. Compounds
   i. A pure substance made of_____.
   ii. Example: H_2O
      1. The ratio of hydrogen to oxygen is always _____.
      2. _____ hydrogens for every _____ oxygen.

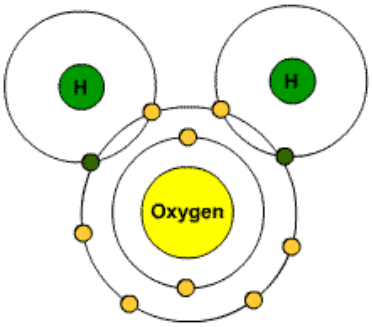
   iii. Under natural conditions, most elements _____ exist _____.
   iv. Elements want to be _____.
      1. To be stable you must have a_____.
      2. Because most elements do not naturally have a full outer energy level, they form _____ with other elements to get closer to filling the outer shell.
      3. If an element already has a full outer shell it is _____ for it to bond with other elements.

g. Chemical Bonds
   i. Two major types
      1. _____
      2. _____
   ii. Covalent Bonds
      1. These form when _____.
      2. Example:
         a. H (hydrogen) and O (oxygen)

         b. H starts with _____ valence electron (in _____ energy level, so its goal is to get _____).
         c. O starts with _____ valence electron (in _____ energy level, so its goal is to get _____).

d. 2 H _____ to give O ____ valence electrons.
e. O _____ to give H _____ valence electrons.
f. They are both now _____, and the bond forms because
_____.





iii. Ionic Bonds
1. These form when: _____
_____.
2. When an electron is transferred, two things happen:
a. The element that _____ an electron now has _____.
i. More protons then electrons = _____
b. The element that _____ an electron now has _____.
i. More electrons then protons = _____

c. An atom with a charge (+ or -) is called an _____.
i. Negative and positive charges _____ each other.
ii. Ionic bonds are the result of the attraction between the negative ion and positive ion that form when _____.

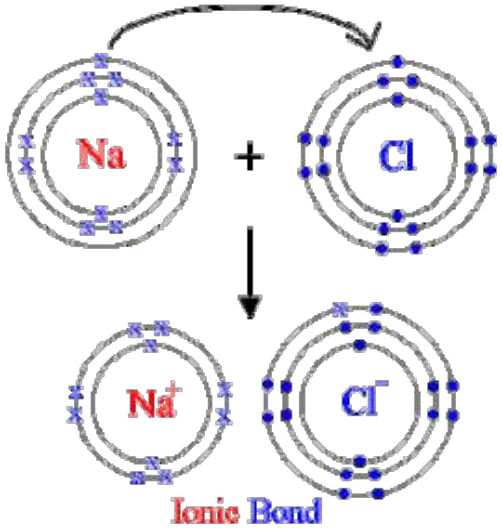
3. Example:
a. Na (sodium) and Cl (chlorine)

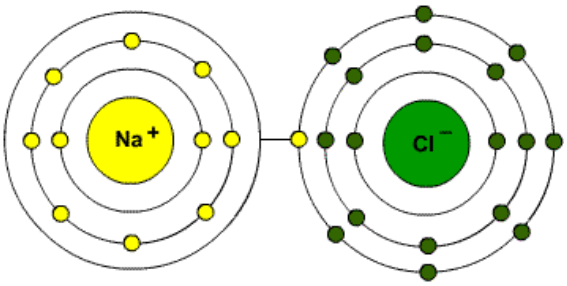
b. Na _____ electron to Cl.

c. Na goes from have _____ valence electron to ___ valence electrons.

d. Cl goes from having _____ valence electrons to ___ valence electrons.
e. They both become _____.

f. Na goes from having _____ protons and _____ electrons to having _____ protons and _____ electrons.
    i. Becomes a _____ ion.
g. Cl goes from having _____ protons and _____ electrons to having _____ protons and _____ electrons.
    i. Becomes a _____ ion.





2. Energy
    a. Definition:

    _____.
    b. Life processes involve chemical reactions which

    _____.
    c. Chemical Reactions
        i. Shown by an equation
        ii. Ex:

        iii. Reactants
            1. On the _____ side of the equation
                a. _____
        iv. Products
            1. On the _____ side of the equation
                a. _____

v. Balancing Chemical Equations
   1. The number of each kind of atom must be _____ on either side of the arrow.
   2. Ex:

C:	C:
O:	O:
H:	H:

Balanced? YES or NO

   3. Ex:

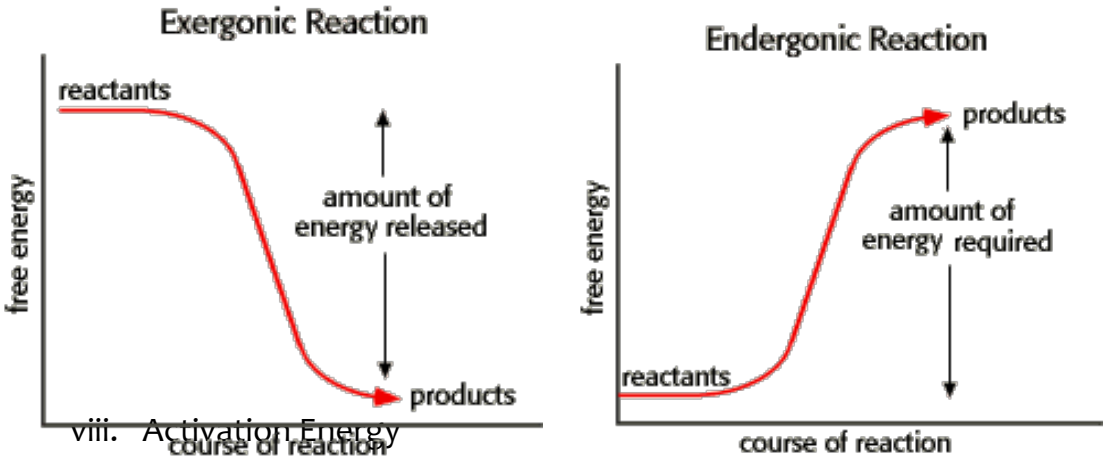
H:	H:
O:	O:

Balanced? YES or NO

To balance: add coefficients to either side and re-tally numbers of atoms until they become balanced. Guess and check!

vi. Exergonic Reactions
   1. Reactions that _____.

vii. Endergonic Reactions
   1. Reactions that _____.

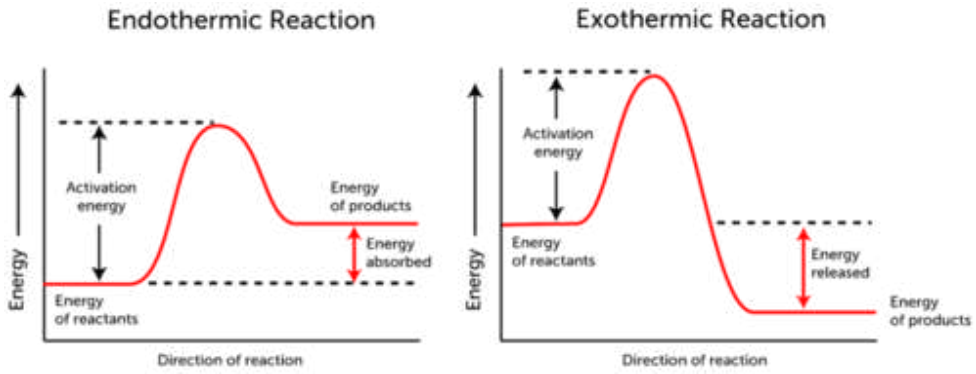


viii. Activation Energy
   1. T he amount of energy that is needed for _____.
   2. _____
      a. Reduce the amount of activation energy that is needed.
   3. _____

a. A type of catalyst that is found in _____.
b. A single organism may have _____ of different enzymes each used for specific chemical reactions.

3. Solutions

a. Definition: _____



_____.

b. Parts of a solution:
   i. _____
      1. The substance _____.
   ii. _____
      1. The substance _____.
   iii. Example:
      1. When sugar (_____) and water (_____) are mixed the _____ forming a sugar water _____.

c. Concentration of a solution
   i. The measurement of the _____.
   ii. Example:
      1. 2 percent saltwater solution contains _____ grams of salt dissolved in _____ of water.
      2. To increase the concentration of salt, keep the 100 ml of water the same, but _____.

d. pH of a solution
   i. The pH measures _____ (hydroxide) ions compared to _____ (hydrogen) ions in a solution.
   ii. More OH- = _____
   iii. More H+ = _____
   iv. pH scale
      1. _____= acidic (more H+ then OH-)
      2. _____= neutroal (H+ = OH-)

3. _____= basic (more OH- then H+)