

Name: _____

Date: _____

I. Molecular Components

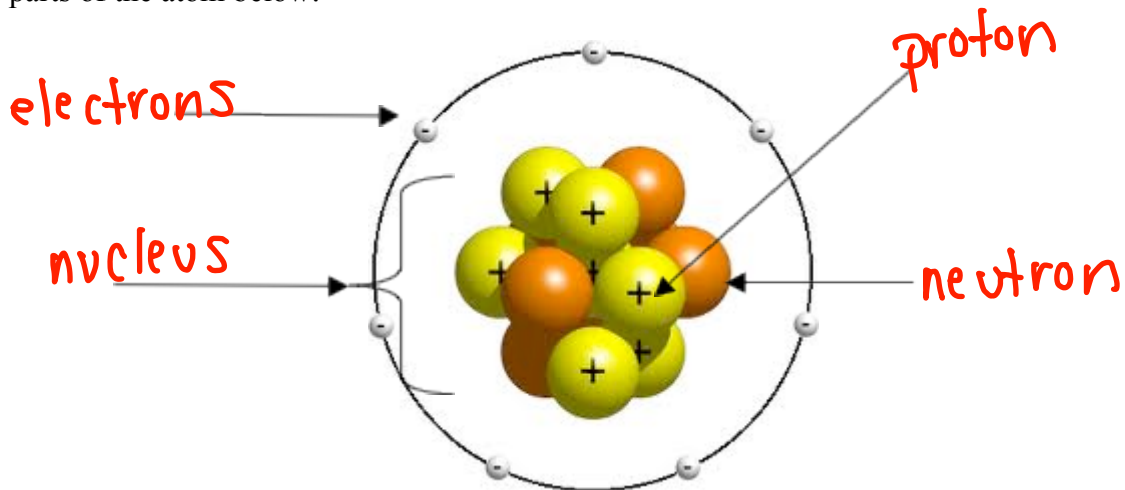
A. Directions: Using the words in the word bank below, please complete the paragraph. Please note that the words can be used more than once or may not be used at all.

Word Bank

Atom	Compound	Molecule
Nucleus	Element	Covalent
Neutrons	Matter	Bonds
Electrons	Atoms	Protons

A(n) atom is the smallest unit of matter that cannot be broken down by chemical means. A(n) atom has a nucleus that consists of both protons and neutrons with electrons orbiting around the nucleus. Different kinds of atoms make up a(n) molecule. A group of atoms held together by a covalent bond is called a molecule. A(n) element is a substance that is made up of only one type of atom. A compound is a substance made up of the joined bonds of one or more different kind of element. In a nutshell, everything is made up of matter, which is made up of atoms.

B. Label the parts of the atom below:



1. What is the charge on a proton (+) ? positive
2. What is the charge on a neutron (0) neutral ?
3. What is the charge on an electron (-) negative ?

II. Bond Types

A. There are three types of chemical bonds:

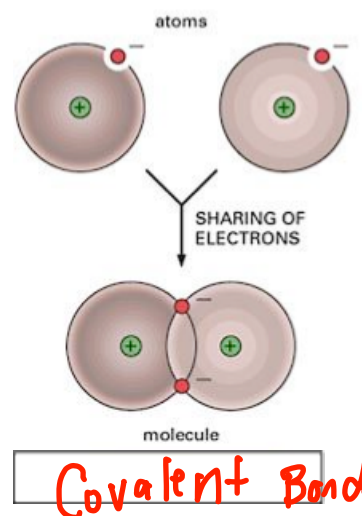
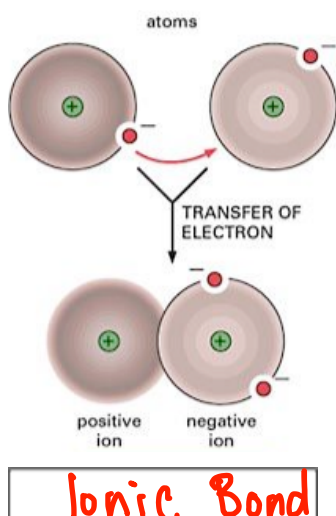
1. Covalent bonds = chemical bonds formed by sharing electrons

2. Ionic bonds = force of attraction between oppositely charged ions

2a. What is an ion? an atom that has gained or lost 1 or more electrons

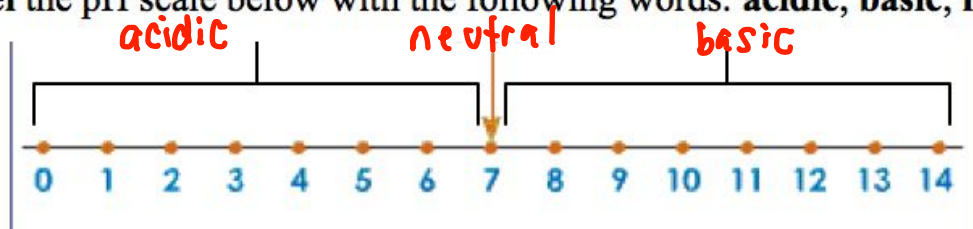
3. Hydrogen bonds = A weak chemical attraction between polar molecules.

C. Label the pictures below as **covalent** or **ionic**:



III. Acids and Bases

- Label the pH scale below with the following words: **acidic**, **basic**, **neutral**



- Give an example of an **acid**: Lemon juice, vinegar, OJ, HCl
- Give an example of a **base**: Ammonia, bleach, KOH
- Give an example of a **neutral substance**: pure / distilled H₂O

Atoms, Water & pH

Water and its Chemical Properties:

Water is composed of 2 hydrogen and 1 oxygen atom. Its chemical formula is H_2O . Water is unique because it is capable of absorbing a great deal of energy (heat) from its environment, before it increases its own temperature. This means that water can help to regulate (stabilize) the temperature of air and land around it. A great example of this is the beach. Temperatures at the beach do not fluctuate (change) very much because of the huge body of water (the ocean) that is located near it. This also explains why we use water to regulate our body temperature. We don't want our body temperature to fluctuate very much because it would alter chemical reactions (metabolism). When metabolism is thrown off, homeostasis is also thrown off. As you know, this can lead to death!!!!

Here are some more interesting water factoids:

- Water can stick to itself! This is called *cohesion*.
- Water can stick to other things! This is called *adhesion*. Adhesion explains why water can stick to a spider's web.

pH & Solutions:

In class, we discussed three types of solutions: Acids, Bases, and solutions that are Neutral. How do we determine whether a solution is an acid, base, or neutral? That's easy, we use the pH scale! The pH scale is a linear scale that runs from 0-14. Look at the scale below.

Substances with a pH below 7 are called *Acids*. Substances with a pH above 7 are called *Bases*. Substances with a pH of 7 are called *Neutral*.

We need to add one more detail to this scenario: The pH scale actually measures the amount of *HYDROGEN IONS (H^+)* that are present in a solution. The lower the pH value, the greater the amount of hydrogen ions (H^+) present in the solution.

Example: Solution A has a pH of 8. Solution B has a pH of 3. Because Solution B has a lower pH, it has a greater concentration of hydrogen ions present. The more acidic a solution is, the greater the concentration of hydrogen ions.

IV. Characteristics of Water

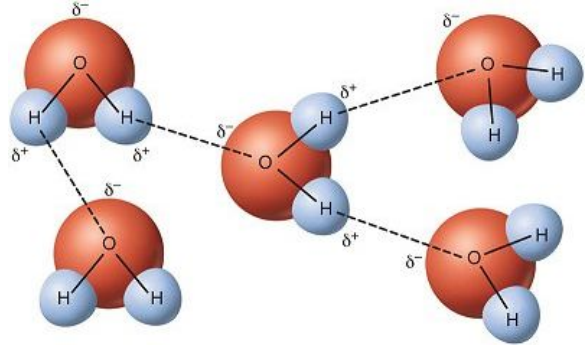
1. Refer to the picture below. What type of bond is represented by the solid lines?

Covalent bond

2. Refer to the picture below. What type of bond is represented by the dashed lines?

hydrogen bonds

3. What term can be used to describe water's ability to "stick" to itself? Cohesion



4. In class, we discussed how water droplets when placed on a penny begin to form a dome shape. What term can be used to describe water's ability to "stick" to other things, such as a penny? adhesion

5. In class we discussed water's ability to climb the walls of a narrow glass tube, against gravity! What term can be used to explain this feat? capillary action

"percent of hydrogen"

6. The pH scale measures the concentration of hydrogens in solution.

7. Lemon juice has a pH of 2. Is lemon juice an acid or a base? acid (1-6)

8. Ammonia has a pH of 11.5. Is ammonia an acid or a base? base (8-14)

9. What property of water allows ice to float on the surface of ponds in winter?

A. Adhesion

B. Universal Solvent

C. Cohesion

D. Less dense as a solid than a liquid

10. What property of allows sugar to dissolve in water?

A. Adhesion

B. Universal Solvent

C. Cohesion

D. Less dense as a solid than a liquid

If I asked you to make Crystal Light for the class, and I gave you the packet of Crystal Light and a pitcher. In the completed pitcher of Crystal Light,

16. What constitutes the solution? H₂O + Crystal Light

17. What makes up the solute? Crystal Light

18. What makes up the solvent? H₂O

19. Write a simple equation to explain the relationship between the terms solution, solute, and solvent.

Solvent + solute = Solution
 (what solute is dissolved in) (dissolved in solvent)

V. Extra Credit

Part One: Matching

1. _____ Water molecules stick to each other on the surface of a pond, making a surface that bugs can walk on.
2. _____ Water in our blood can dissolve and carry nutrients throughout our body.
3. _____ Icebergs floating in the Arctic Ocean provide a habitat for polar bears.
4. _____ Water sticks to plant stems, helping.
5. _____ Water molecules possesses electrons that are unequally shared, thus the molecule has both negative and positive charges.

- A. Universal Solvent
- B. Adhesion
- C. Less dense as a solid than a liquid
- D. Cohesion
- E. Polar

Part Two: Acids and Bases

Directions: Fill in the last column by determining if the items are acidic, basic, or neutral

Item	pH value	Acidic, Basic, or Neutral?
Lemon juice	2	
Baking soda	8	
Coffee	5	
Ammonia	11	
Orange juice	3	
Vinegar	4	
Water	7	
Bleach	10	
Tomato juice	3	
Oven cleaner	11	
Saliva (spit)	7	
Drain cleaner	13	
Sweat	7	

1. Give 3 examples of acids:
2. Give 3 examples of bases:
3. Give 3 examples of neutral substances:
4. What types of items seem to be acidic?
5. What types of items seem to be basic?
6. What types of items are neutral?