Name: _____

Period: _____

Ch. 23:2

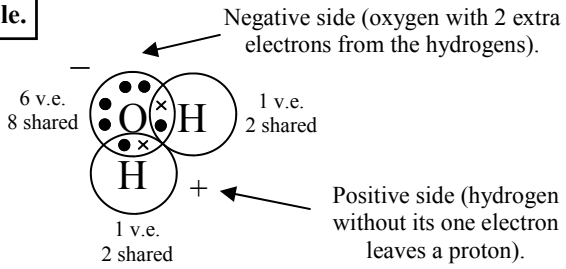
Water—the (*Nearly*) Universal Solvent

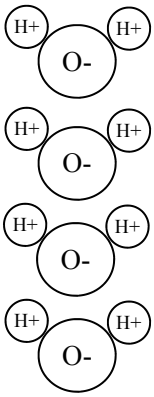
Why does water dissolve so many solutes?

Because water is a <u>polar</u> molecule.

A polar molecule has a positive and negative side. (Like a magnet has a north and south pole.)

The Covalent Water Molecule.

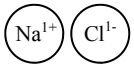




A water "chain" is held together by molecular **<u>cohesion</u>**. The attraction between the negative oxygens the positive hydrogens is called a **hydrogen bond**.

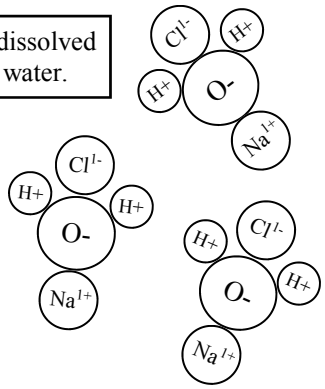
These internal electromagnetic forces (opposites attracting) are responsible for <u>water tension</u> (why bugs can walk on water) and <u>capillary action</u> (how plants can "suck up" water from their roots).

Ionic compound - sodium chloride (table salt)



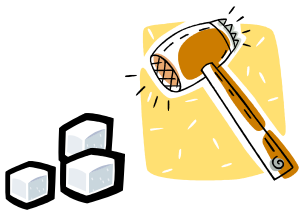
Ionic compound are made up of **positive and negative ions**. When placed in water, the **polarity** of water pulls the ions apart (called **dissociation**) and the compounds **dissolves**.

Salt dissolved in water.



Water is called the "nearly" universal solvent because it dissolves so many things. It will dissolve ionic and polar compounds, but NOT non-polar ones, like wax or oil.

Changing Dissolving Rate



Crush it (make particles smaller) — smaller particles really mean more surface area for the solvent to touch the solute. Powders dissolve faster than cubes.

Stir it —speeds up how fast the solvent touches the solute.

Change Temperature —

Hot liquids hold more solid and also speeds up dissolving. (Hot water holds more sugar than cold water.)

Cold liquids hold more gas. Artic water has more O_2 in it for fish than tropical waters. When power plants use cold streams for cooling, they can kill the fish by heating up the water and making it lose oxygen.

Change Pressure — (only for gases) WHY?

Increasing pressure forces more gas into solution. This is why colas fizz when opened. The CO_2 is forced in under pressure: release the pressure and the gas escapes.

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Polar or Non-polar in water:	*Circle the solute and underline the solvent.*	*Solution (So), suspension (Sp), or colloid (C)?*
Cooking oil _____	A solution of 55% HCl and 45% water.	Homogeneous at molecular level _____
Sugar _____	Sugar water	The particles settle _____
Soap _____	Isopropyl alcohol: 91% alcohol; 9% water.	Doesn't settle or scatter light _____
Dirt _____		Scatters light, but stays suspended _____

1. Pressurizing	A. Increases solubility by raising temperature and moving molecules farther apart.	1. Cohesion	A. The breaking up of an ionic molecule by a polar solvent.
2. Stirring	B. Increases solubility by moving the molecules faster.	2. Dissociation	B. A molecule that has a positive and negative end.
3. Crushing	C. Increases solubility by pushing compressing something into solution.	3. Polar Molecule	C. The attractive force between two molecules of the same substance.
4. Heating	D. Increases solubility by making the particles smaller.	4. Hydrogen bond	D. The attractive force caused by hydrogen protons to a more negative non-metal.

If you wanted to make sugar dissolve faster what three ways could you use?

What property of gases allows them to be pressured into solution?

Draw the covalent water molecule AND label the ends as positive and negative.

What numbers in the atom change for these:

Alpha decay:

Beta decay:

What particle decay is this?

$^{210}_{83}\text{Bi} \rightarrow {}^{210}_{84}\text{Po} + \_\_\_\_$

What particle decay is this?

$^{226}_{88}\text{Ra} \rightarrow {}^{222}_{86}\text{Rn} + \_\_\_\_$

For this nuclear process give the second set of numbers

$^{222}_{86}\text{Rn} \rightarrow \_\_\_\_ \text{Po} + \alpha$

For this nuclear process fill in the missing numbers.

$\_\_\_\_ \text{Pb} \rightarrow \_\_\_\_ \text{Bi} + \beta$