Name:_____

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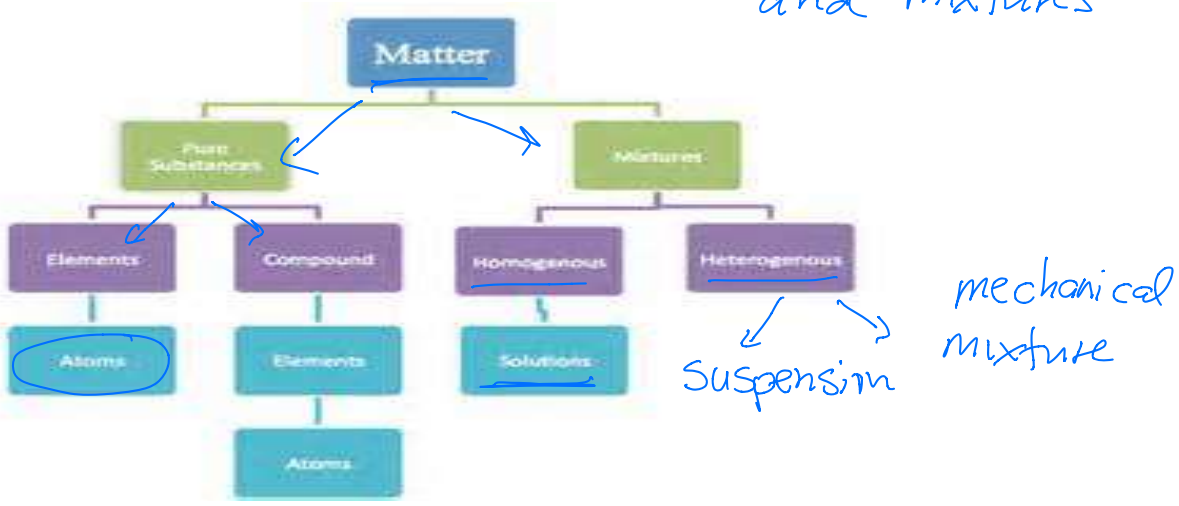
Chemistry 11

Water as a Solvent

In Junior Science you learned about matter: anything that has mass + volume.

At the start of this semester we learned that matter can be classified into: Pure Substances and Mixtures



We spend a lot of time in junior sciences focusing on Pure Substances. We investigate elements in their atomic structure. Previously you learned that compounds can be classified as either ionic, "covalent → true or polar". And we mentioned that water is so important because it is polar covalent.

Today we are going to focus on mixtures. A mixture is when two or more pure substances combine. A mixture can be classified as either Homogeneous or heterogeneous. In science often the name tells us the exact qualities of the substance. For instance ***HOMO*** in means "same" and ***HETERO*** means "different". Homogenous substance appears to be the same throughout whereas heterogeneous substances look different. An example of a homogeneous mixture is a solution (example: the result of combining salt and water) an example of a heterogeneous mixture is a suspension (example: the result of combining iodine and water)

When making mixtures there are two components to keep in mind:

The **Solute** (the stuff that is being dissolved)

The **Solvent** (the stuff that is doing the dissolving)

Yesterday we looked at different solvents (in question #17) and you may have noticed that the majority of them were classified as being "POLAR". And that is because a polar solvent (which possess either the H-bond or the dipole-dipole bond) can dissolve either polar or non-polar solutes.

In a salt water solution, water is the solvent and salt ($NaCl$) is the solute. In the iodine and water suspension, water - is the solvent and iodine (I_2) is the solute.

When water and salt are combined not only does the water dissolve the salt ($NaCl(s)$), but it also dissociates/ionizes (or IONIZES) the salt into its component ions: $Na^+ + Cl^-$. When this occurs the solution that is formed can conduct an electric current.

We can show this in an equation:

$$NaCl(s) \xrightarrow{H_2O(\ell)} Na^+(aq) + Cl^-(aq)$$

Here the separation of charges enables an electric current to flow through the solution and light the bulb.

When water and iodine combine the water only somewhat dissolves the iodine.

$$I_2(s) \rightleftharpoons^{H_2O(\ell)} I_2^0(aq)$$

Here the lack of ions (no charges) does not enable an electric current to flow and the light bulb does not glow.

1. What do you think will happen when we combine water and sugar?

$$C_6H_{12}O_6(s) \xrightarrow{H_2O(\ell)} C_6H_{12}O_6^0(aq)$$

2. Because of the result what can we conclude about sugar?

not conduct a current

Remember the process of solvation? "Like dissolves Like"?

Water is POLAR and will dissolve and dissociate a POLAR (or IONIC) solute such as salt.

Water is POLAR and will (somewhat) dissolve but not dissociate a NON-POLAR (true covalent) solute such as Iodine.

Now watch the video: "Crash Course Chemistry Water and Solutions for Dirty Laundry #7".

Ex: 28 and 29 pg 210 dissociation equations