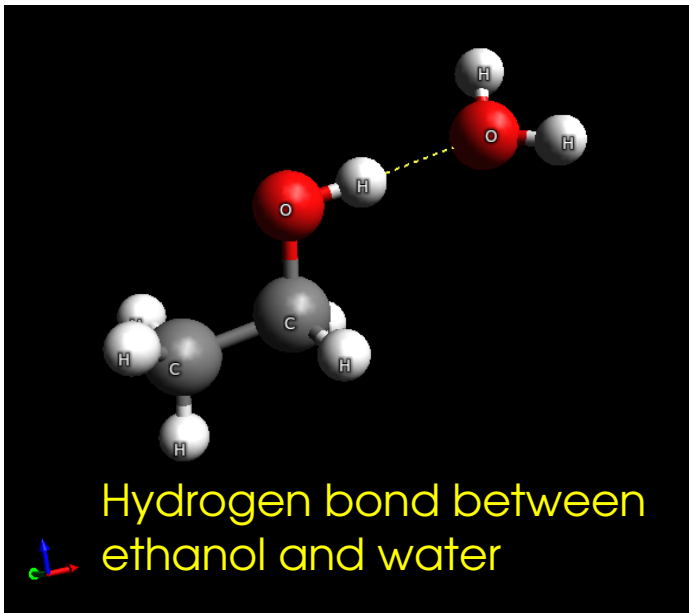
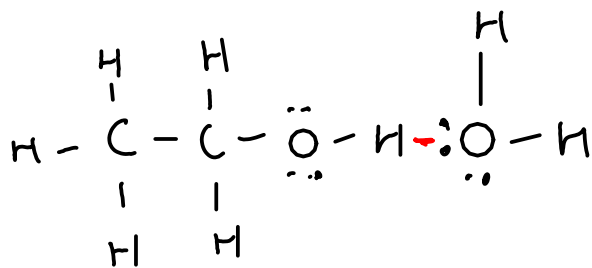


Consider WATER:

HYDROGEN BONDS



Water mixes well with other substances that can hydrogen bond, like ETHANOL!



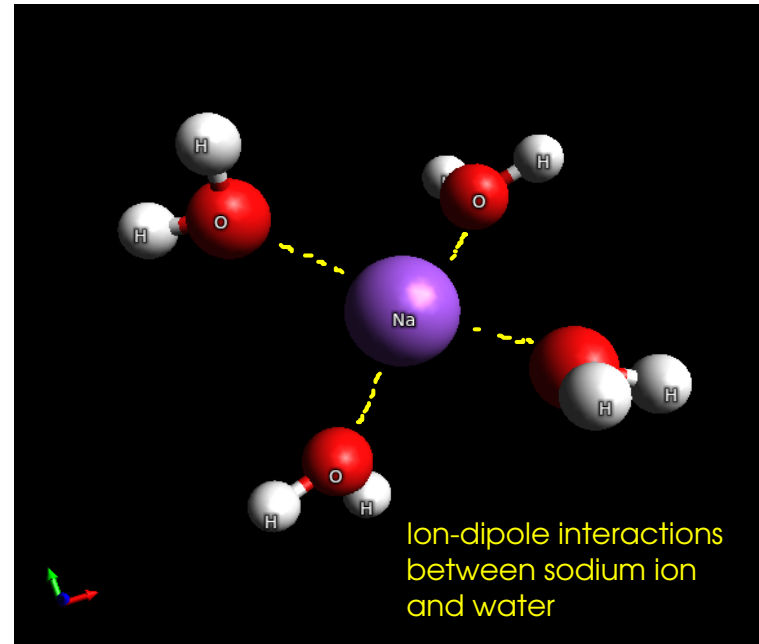
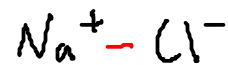
POLAR



Water can dissolve polar substances!
(SUCROSE is polar!)



Since IONIC BONDS are also interactions between opposite charges (You can think of an ionic bond here as an extreme case of dipole-dipole interaction), many IONIC SUBSTANCES will also dissolve in water!



SMALL (little London force)



large and/or nonpolar solutes do not dissolve well in water!

(example: OILS and WAXES)

ELECTROLYTES

... are substances that form free ions when dissolved into an aqueous solution!

STRONG ELECTROLYTES

- Substances where all the dissolved substance forms ions

WEAK ELECTROLYTES

- Substances where only a small fraction of the dissolved substance forms ions

NONELECTROLYTES

- Substances that do not form ions when dissolved

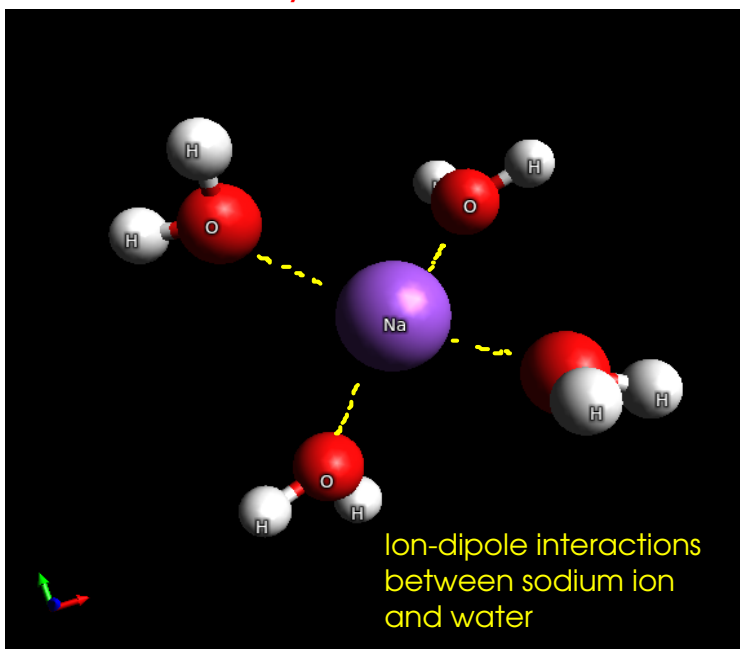
Whether a substance is an electrolyte can be easily tested with a simple conductivity meter. The stronger the electrolyte, the more electric current an aqueous solution of that electrolyte will conduct! (What about water itself? Water does self-ionize, but to such a small extent - about 0.0000002% - that it conducts very little electric current!)

What kinds of substances can be electrolytes?

IONIC COMPOUNDS

- WATER-SOLUBLE ionic compounds tend to be STRONG ELECTROLYTES, since water pulls apart ionic compounds as they dissolve (DISSOCIATION)

Whether an ionic compound dissolves depends on how strongly the ions in the compound attract each other relative to the strength of the ion-dipole interactions and entropy



MOLECULAR COMPOUNDS

- Most molecular compounds are NONELECTROLYTES
- Some molecules REACT WITH WATER to produce ions in solution, These molecules are electrolytes. Most of these are WEAK ELECTROLYTES, but some are STRONG. The most common examples of molecules that are electrolytes are ACIDS and BASES.

EXTERNAL FACTORS AFFECTING SOLUBILITY

- There are a few external factors that affect the solubility. (By external, we mean other than the chemical identity of the solute and solvent).

① TEMPERATURE

-For gases dissolved in liquids, the solubility DECREASES as the temperature INCREASES

- This is why THERMAL POLLUTION is bad! Hot water holds less oxygen than cooler water.

- For solids dissolved in liquids, solubility USUALLY increases with temperature. This is not true for ALL solid/liquid solutions.

② PRESSURE

- For gases dissolved in liquids, solubility INCREASES when the partial pressure of the solute gas over the solution INCREASES.

- Consider soft drinks. They go flat after opening because the pressure of carbon dioxide over the liquid goes down.

- No significant pressure effects for solid/liquid solutions.