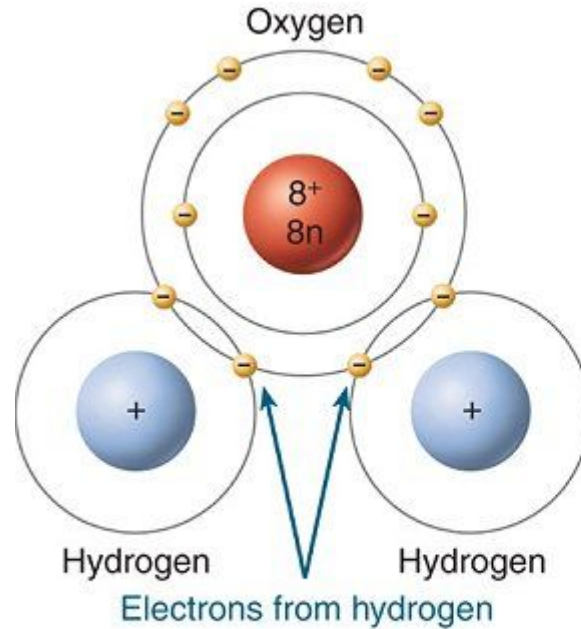


Chemical and Physical Properties of Water

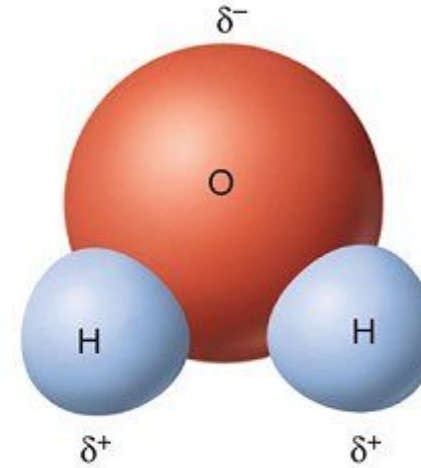
Chemistry of Water

- Water is forms molecules by 2 hydrogen atoms that are bonded to a single oxygen atom: H₂O.
- Molecules are formed when elements are combined by covalent bonds.
- The oxygen and hydrogen atoms are held together because they share electrons

The water molecule has a shape like a widened V



(a) Electron shells in a water molecule



(b) Distribution of partial charges in a water molecule

The unequal sharing of the electrons causes water to have a slight electrical charge on each end

The oxygen end is negative, and the hydrogen end is positive

Polar molecule – has an electrical charge on each end; water is a polar molecule

Because water is polar, it can dissolve many substances.

It is considered to be the universal solvent.

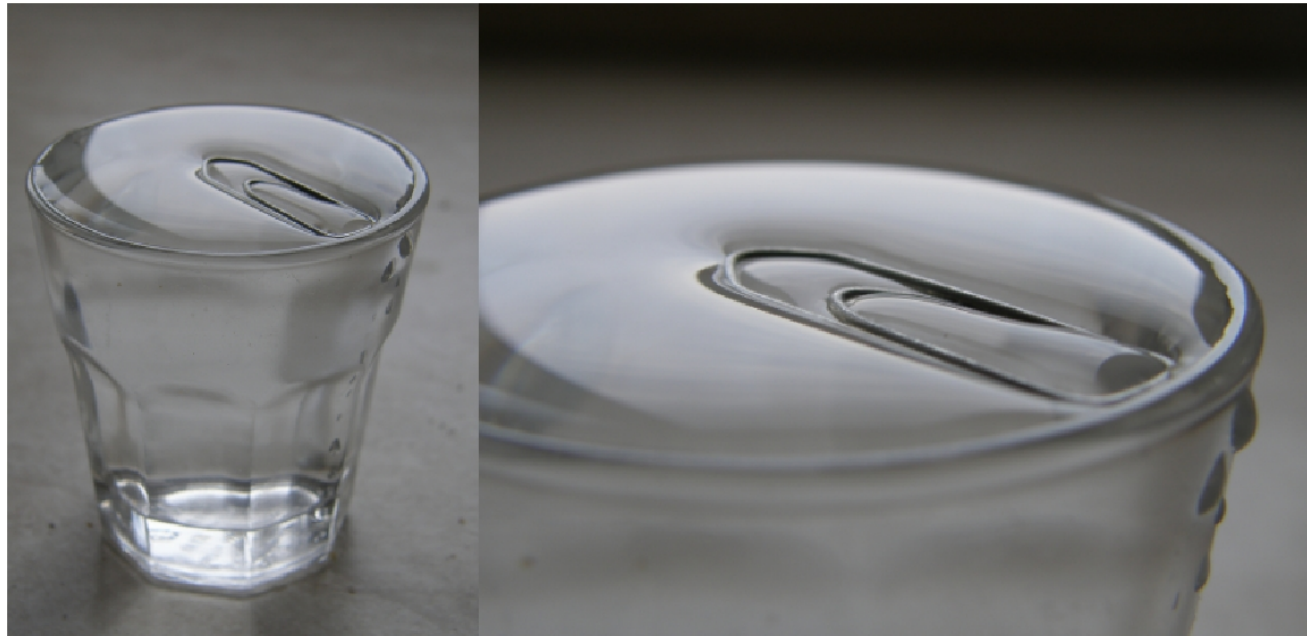
Hydrogen Bonds

The slight electrical charges on each end of a water molecule helps to attract other molecules, and gives water many of its unique properties



Cohesiveness – attraction between water molecules; causes water molecules to stick together

Viscosity – due to cohesion between water molecules; property by which water tends to resist objects entering the water (surface tension)

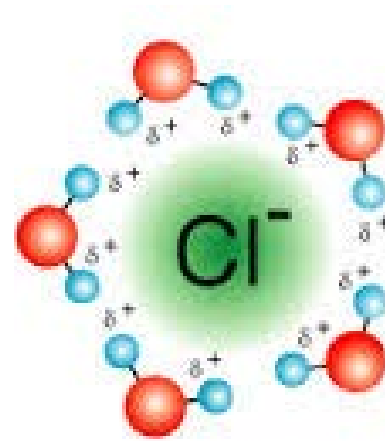


Adhesiveness

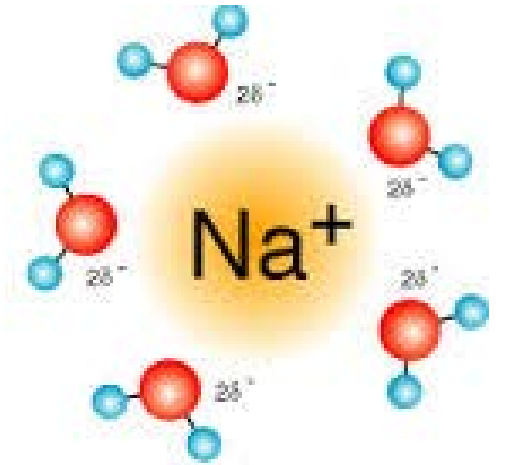
The adhesive properties of water cause capillary action-tendency. The meniscus is formed in a glass graduated cylinder.



Solvent – substance that dissolves other substances. Water is an excellent solvent because of its hydrogen bonds. Gases such as oxygen, carbon dioxide, and nitrogen are also easily dissolved into water



Slightly positive hydrogen are attracted to chlorine anions



Slightly negative oxygen are attracted to sodium cations



Temperature and Density in Solutions

Generally, the lower the temperature, the greater the density

Water is unique because its density-temperature relationship does not follow normal rules at low temperatures

Water breaks away from “normal” behavior at about 4°C

The distance between molecules increases as the temperature increases, warmer water can hold more dissolved substances than colder water



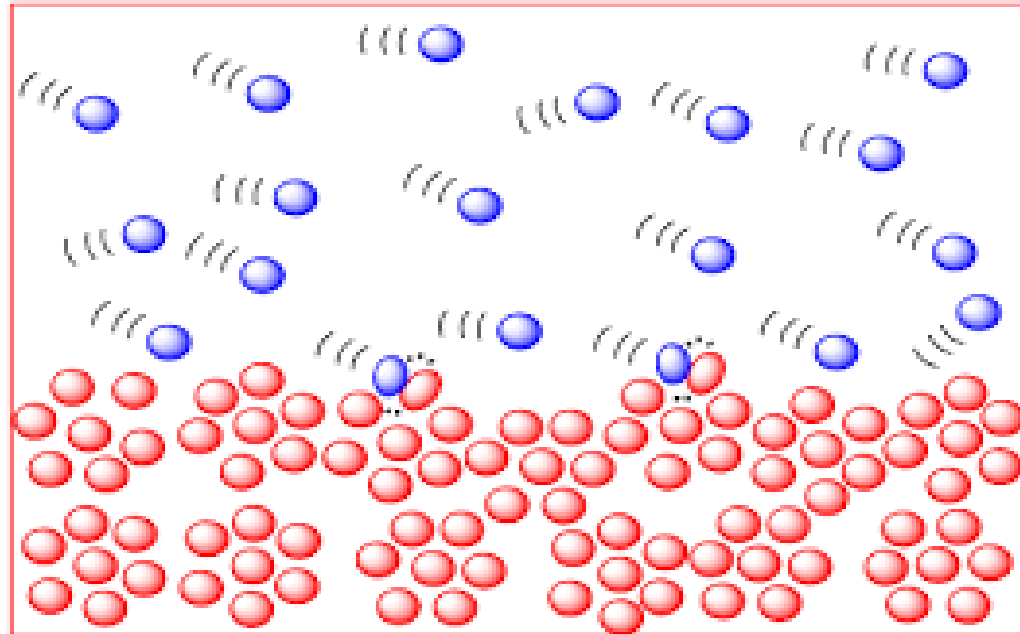
Example:

hot water can dissolve more salt than cold water



One exception to this general rule deals with dissolved gases

As the temperature of the water (along with its dissolved oxygen) increases, the kinetic energy of the oxygen molecules increases

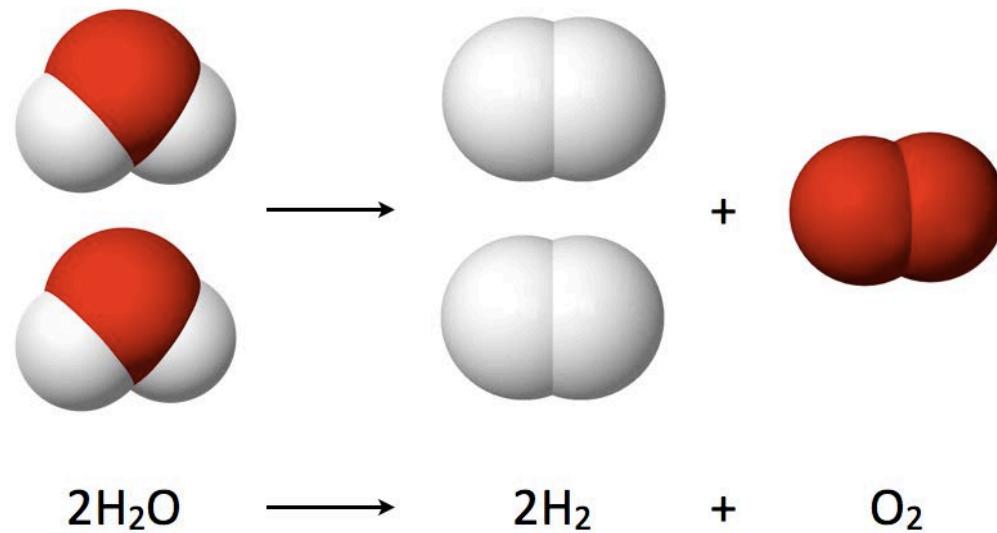


Some Use



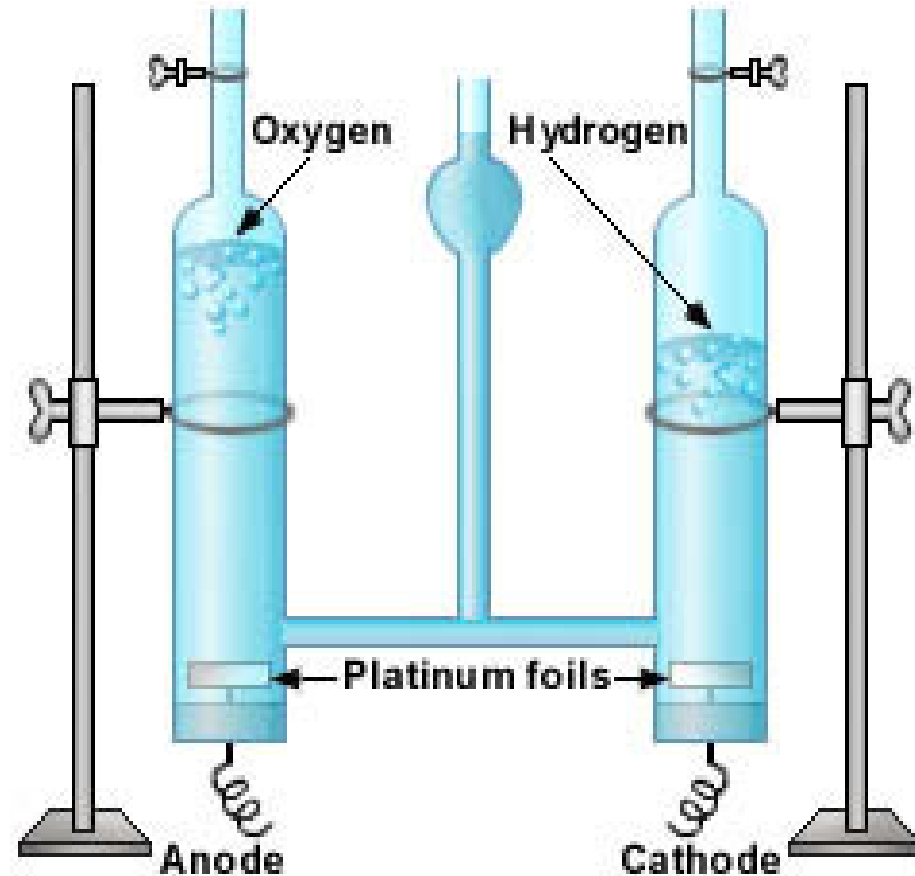
Electrolysis of Water

Using electricity to drive a non-spontaneous chemical reaction



What do we need ?

- Water
- Electrolyte
- Metal electrodes
- Electricity



Chemical what Happens

Anode (positive)



Cathode (negative)



OVERALL



How do we use the Hydrogen?



Do you have any questions?

*If water behaved like
“normal” substances, the
life as we know it would
not exist.*