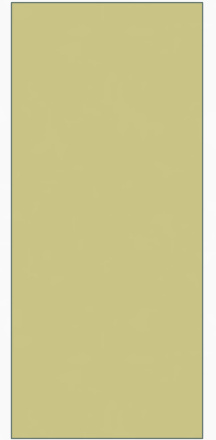
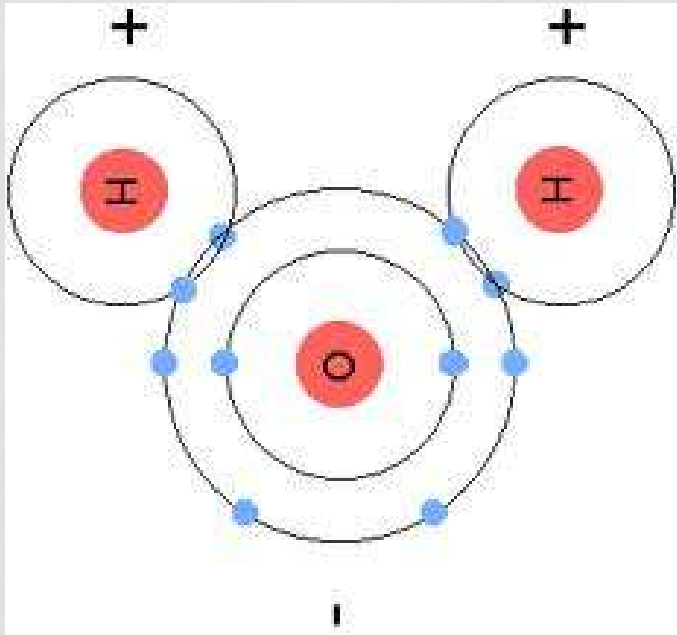


PROPERTIES OF WATER



CHEMISTRY OF WATER

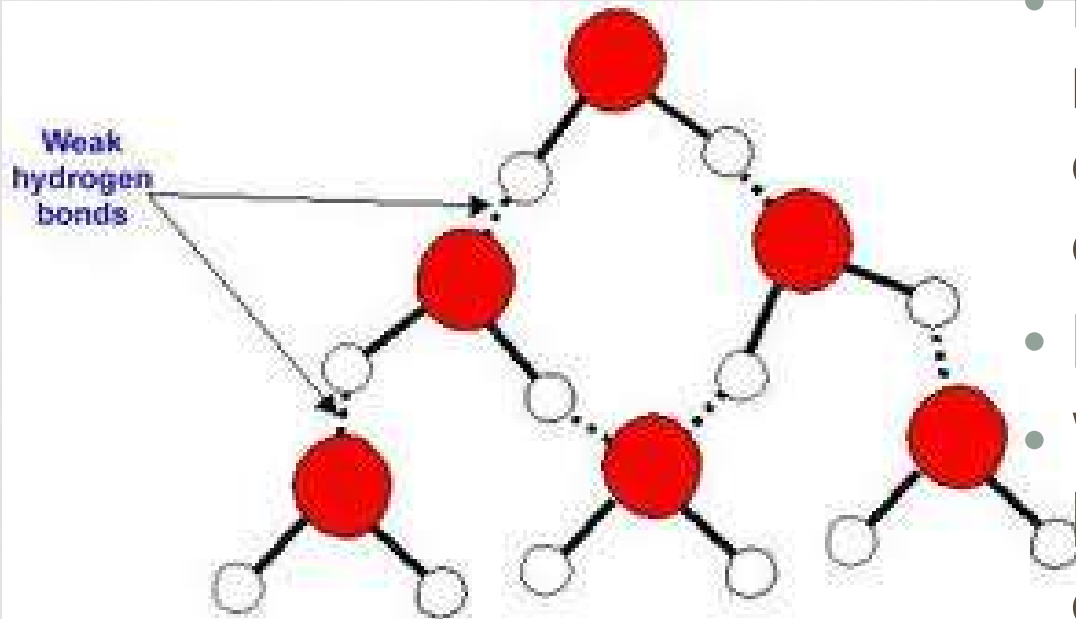
POLAR COMPOUND



- Electrons move around the oxygen more often than around the hydrogen
- Oxygen gets a slight negative charge
- Hydrogen get a slight positive charge

CHEMISTRY OF WATER

POLAR COMPOUND, MAKES H BONDS



- Positives and negatives attract and weak bonds are formed
- HYDROGEN BONDS
- Weak interactions between hydrogen of one molecule and either O, F or N of another

PROPERTIES OF WATER

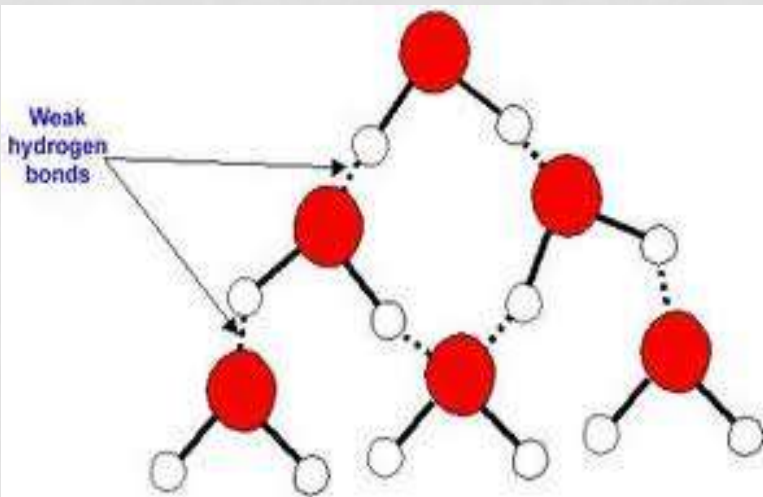
Because of its chemical properties, water plays an important role in life.

4 main properties:

- Expand upon freezing
- Universal Solvent
- Cohesiveness of water molecules
- Ability to moderate temperature

WATER EXPANDS WHEN IT FREEZES

- The molecules in solid water are spaced out due to the H bonds
- Ice floats



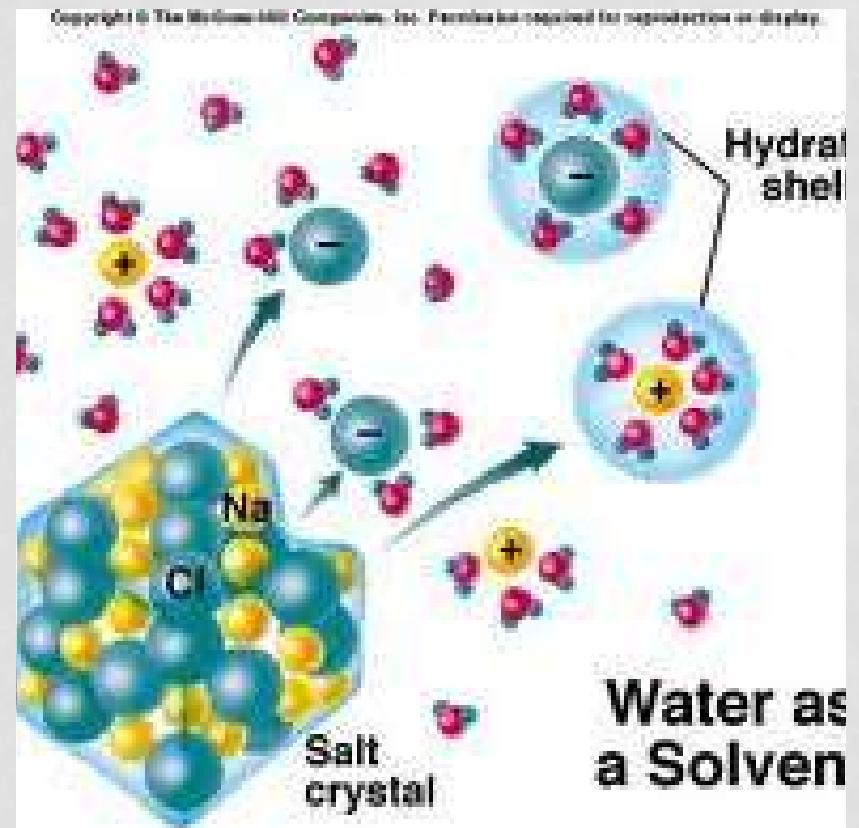
Ice formation is top down

Ice insulates



UNIVERSAL SOLVENT

- Dissolves polar and ionic molecules
- Ex: Blood and cells dissolve salts, sugars, hormones, proteins and ionic and polar molecules important for life
- Plants take up minerals dissolved in water



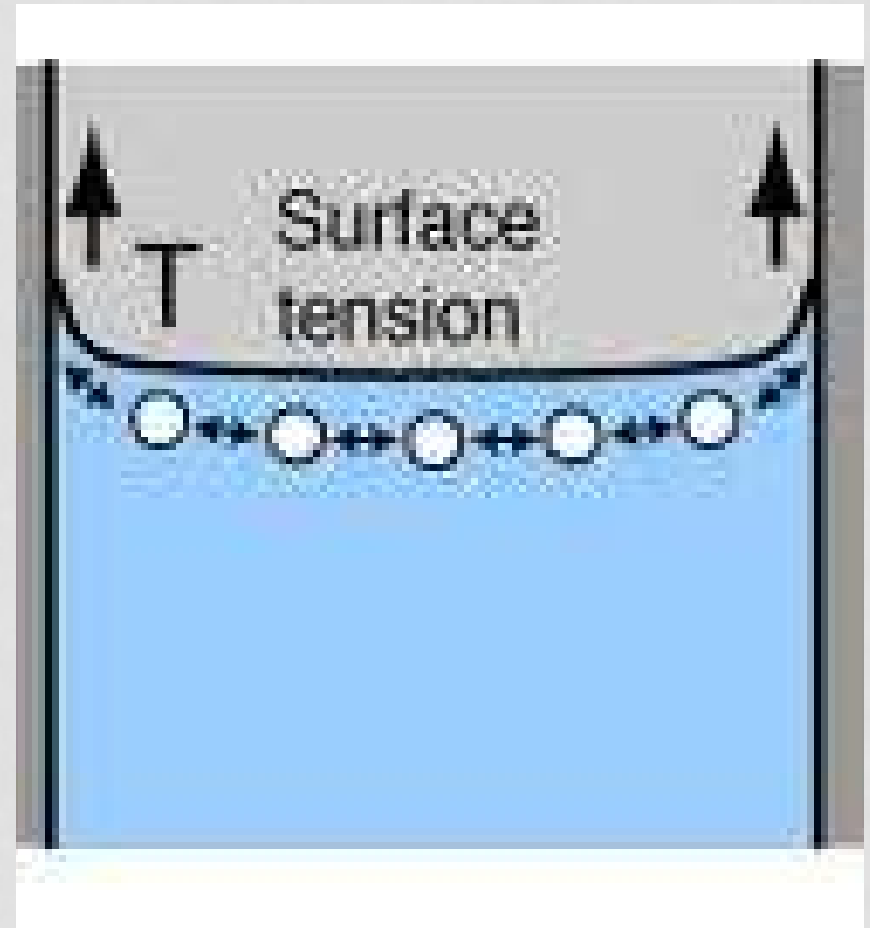
ADHESION AND COHESION

Adhesion

- When water molecules stick to other polar or ionic substances - H bonds

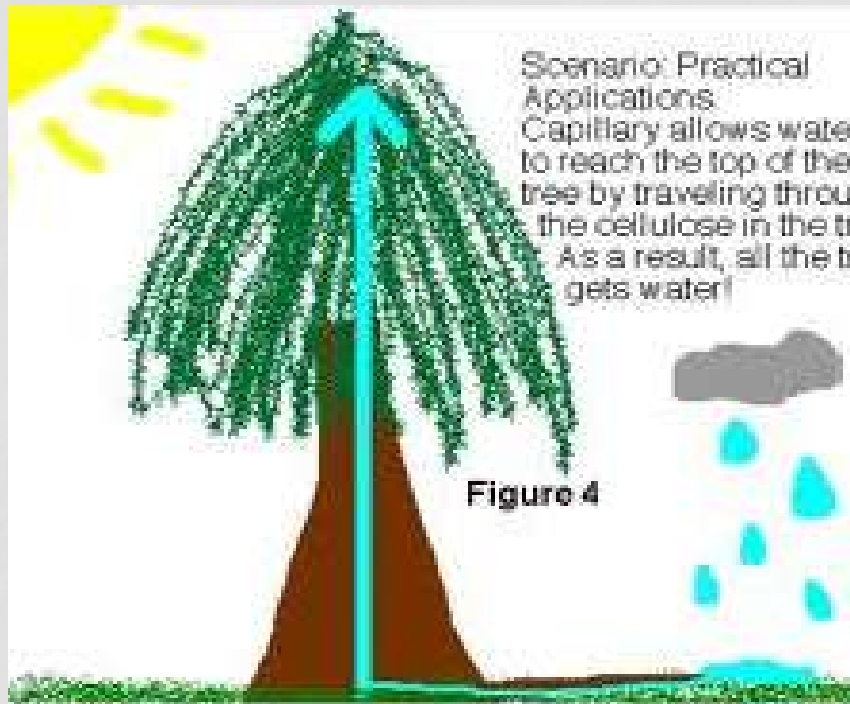
Cohesion

- Water sticks to each other by H bonding



ADHESION AND COHESION

Capillary action- movement against gravity to supply water to the leaves from the soil – adhesion and cohesion



Surface Tension Walk on water Ex. Jesus lizard/water striders



TEMPERATURE STABILIZING EFFECT

Hydrogen bonds have to break/make before temperature changes are felt

High specific heat

Needs a lot of heat to change the temp of water

So:

- Oceans and large bodies of water maintain temps over different climates
- Reduces temp fluctuation in cells

High heat of vaporization

- Takes a lot of heat to evaporate a little water
- Evaporation of Sweat uses heat energy from body surface – cools body

High heat of fusion

- Needs a lot of energy to form ice
- Takes lakes and ponds longer to freeze over in winter

IONIZATION OF WATER

- One in a million molecules dissociate to form H^+ and OH^-
- Water has equal number of the two ions so the charges are cancelled = pH 7 (actually 10^{-7} H^+ ions)

Acid – pH of $1 < 7$

- When there are more H^+ ions than OH^-

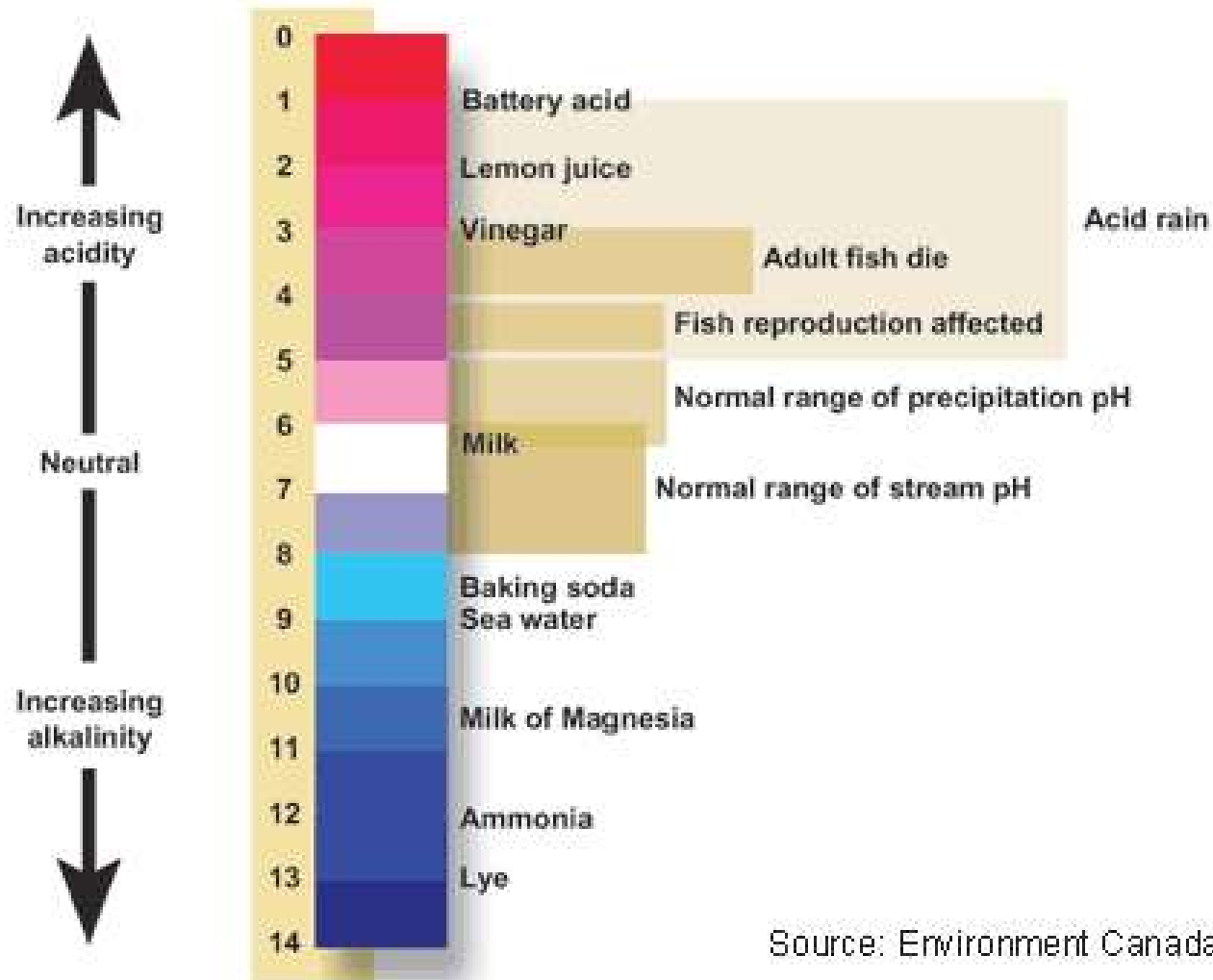
Base – pH 7^+ to 14

- When more OH^- than H^+

IONIZATION OF WATER

- $\text{pH} = -\text{Log of the } \text{H}^+ \text{ concentration}$
- $\text{pH of } 7 \text{ implies that the substance has } 10^{-7} \text{ H}^+ \text{ ions in 1 Liter of solution}$
- $\text{pH of } 6 = ?$
- $\text{Why is that an acidic solution?}$
- $\text{How many } \text{H}^+ \text{ ions are there in a pH } 10 \text{ solution?}$
- $\text{Why is that important for life?}$
- $\text{Metabolic reactions need specific pH to occur. Stomach acidic, blood basic etc.}$

IONIZATION OF WATER



Source: Environment Canada

Water Cycle

