Pakistan School
Kingdom of Bahrain

Pakistan School, Kingdom of Bahrain.

Welcome to new class

Grade 11

Rules of the class

1) Be on time for all your classes.

2) Respect all the participants of the class.

3) Do not create any disturbance.

4) Pay attention to your teacher.

5) Raise hand if you have a question.

6) Enter into the class with your actual name and CPR number.

Chapter 1

Biological Molecules

OBJECTIVES:

At the end of this lesson students will be able to:

- Analyze the properties of water that make it cradle of life .

IMPORTANCE OF WATER

- Following properties of water make it important for life:

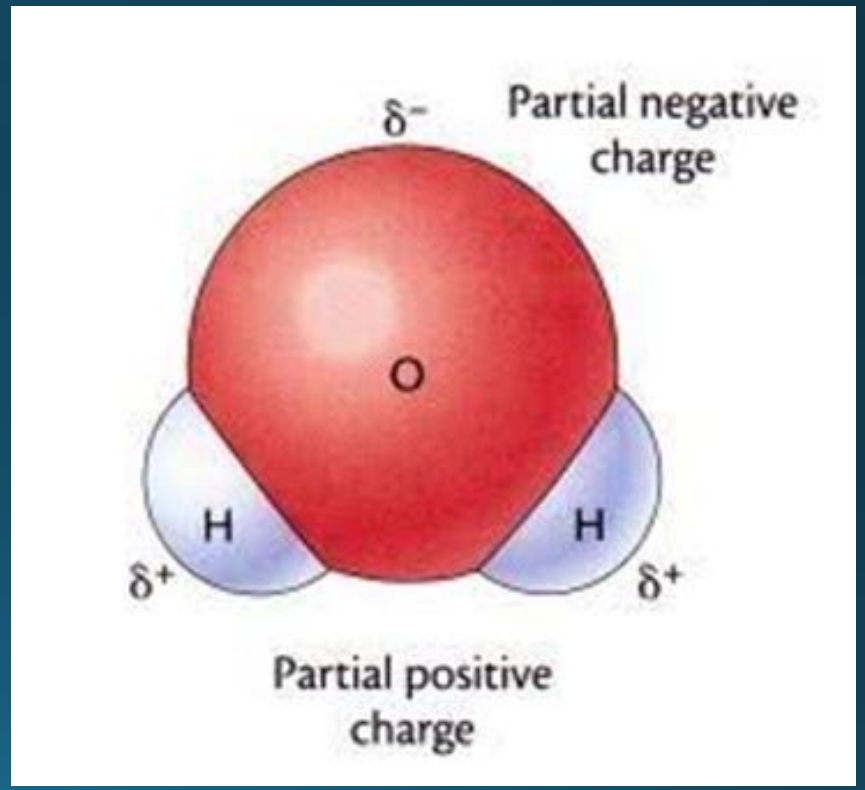
1. High polarity
2. Hydrogen Bonding
3. Cohesion and Adhesion
4. High specific heat
5. High heat of vaporization
6. Hydrophobic exclusions
7. Ionization
8. Lower Density of ice

1. HIGH POLARITY

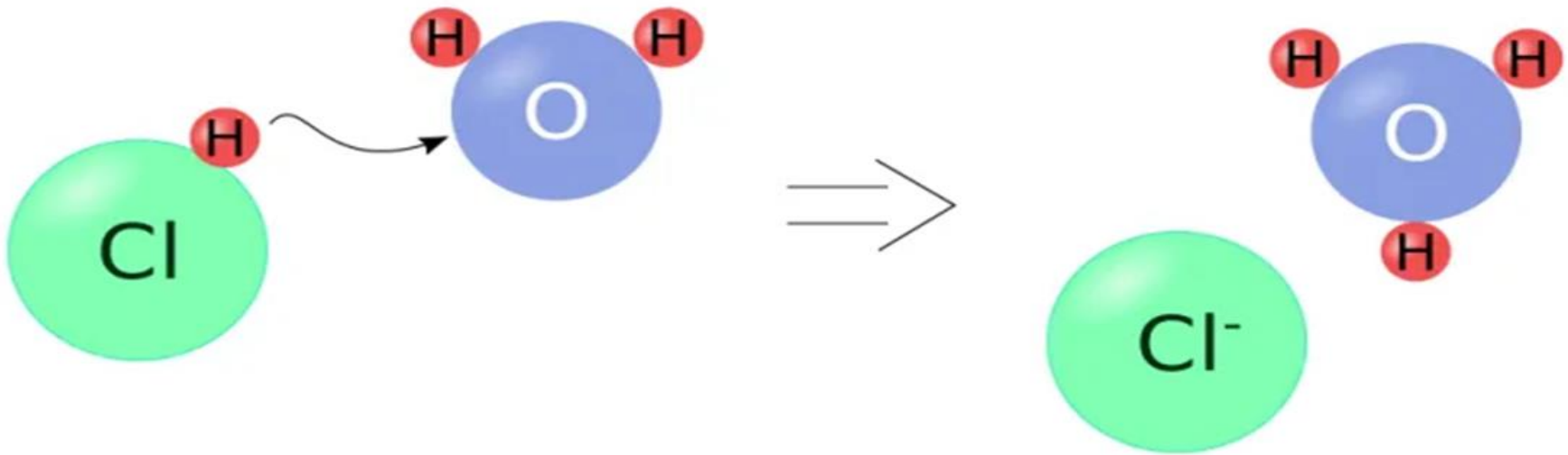
- Sharing of electrons is not equal →Polar covalent molecule (what is covalent bond?)
- Electrons pulled towards more electronegative molecule
- One partial negative and two partial positive poles
- **UNIVERSAL SOLVENT**
- Can dissolve

Polar substances, ionic compounds, covalent compounds, non polar substances

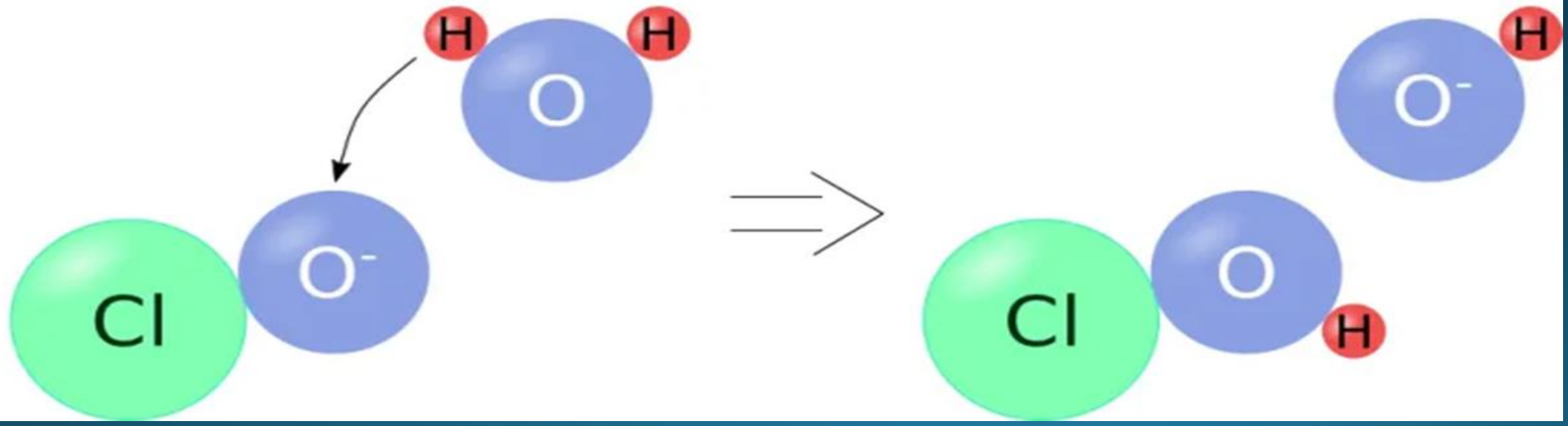
Disassociates the compounds into ions—more favourable state for chemical reactions to occur



Acid + water:



Base + water:

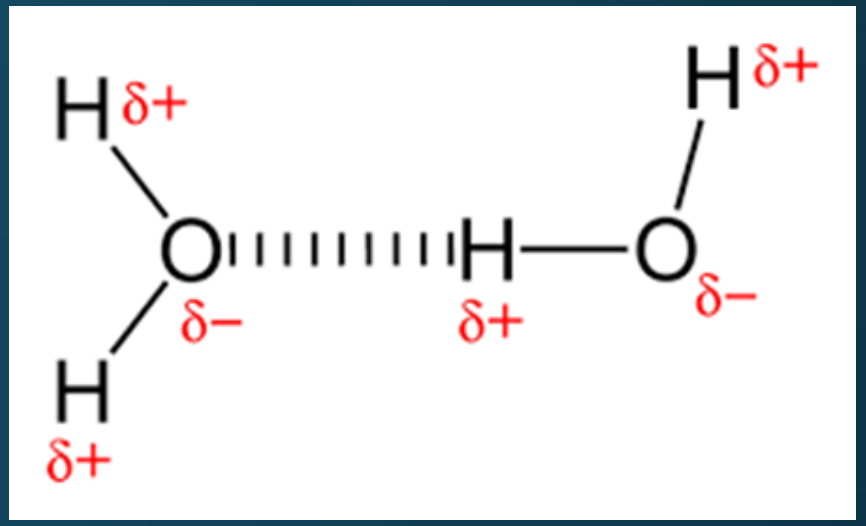


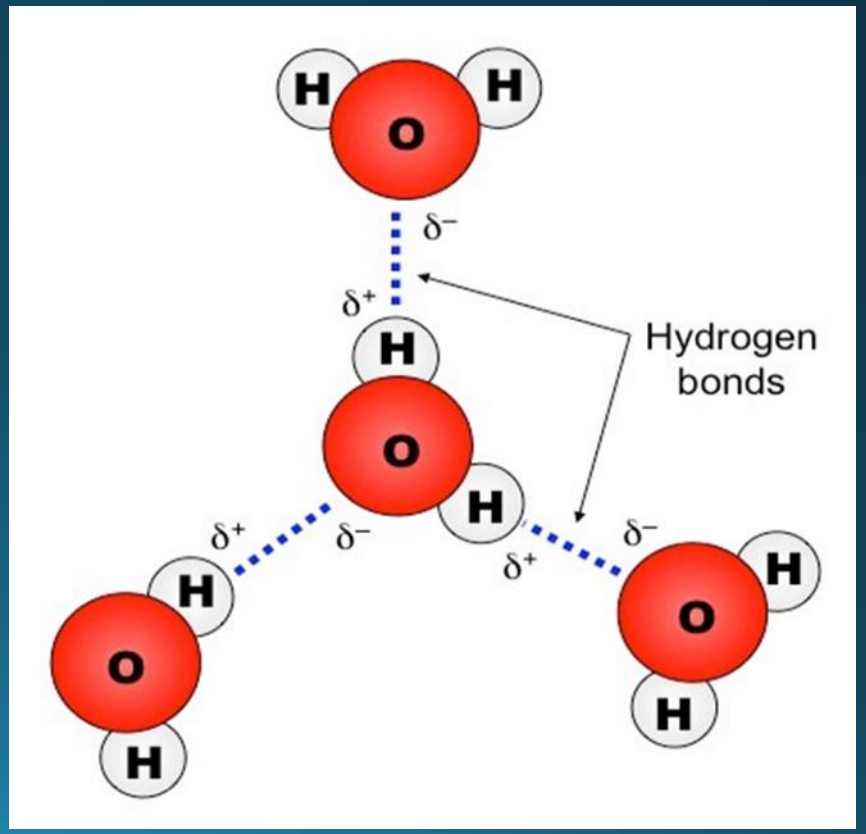
2. HYDROGEN BONDING

- Polar molecule
- Oppositely charged regions of neighboring molecules →attracted
- As positively charged partner is always H so named Hydrogen bonding
- H-bonding → weak

a. Water remains liquid at temperature suitable material for life

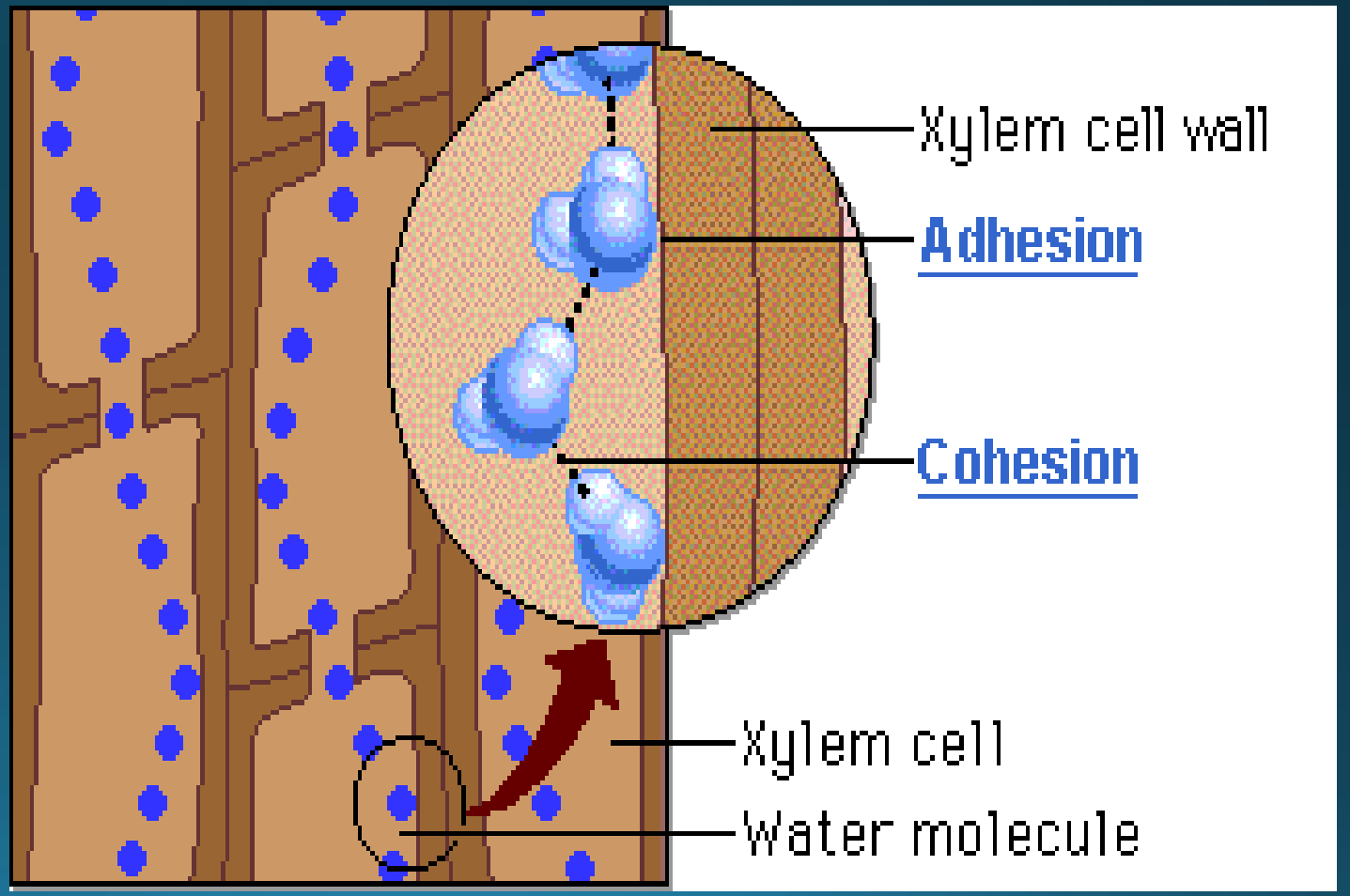
b. High cohesion makes it good transport medium





3. COHESION AND ADHESION

- **Cohesion**: Attraction among the water molecules, so flow of water becomes easy
- **Adhesion:** Attraction of water molecules to polar surface
- **Because of this water can move easily**
- **and acts as transport material**



4. HIGH SPECIFIC HEAT

- The amount of heat requires to increase the temperature of 1 gram of water up to 1 °C.
- Heat capacity of water = 1 calorie
- Very high because of hydrogen bonding
- Energy used in breaking of hydrogen bonding

Large amount of heat raises little temperature

Acts as heat stabilizer

Protects from the harms of sudden temperature changes

5. HIGH HEAT OF VAPORIZATION

- The amount of heat required to change unit mass of liquid to gaseous state
- No. of calories absorbed by one gram of water
- Water → Very high heat of vaporization → 574 calories per gram

Helps in stabilizing the temperature with minimum loss of water

Transpiration → cooling effect

Sweating → heat lost during vaporization

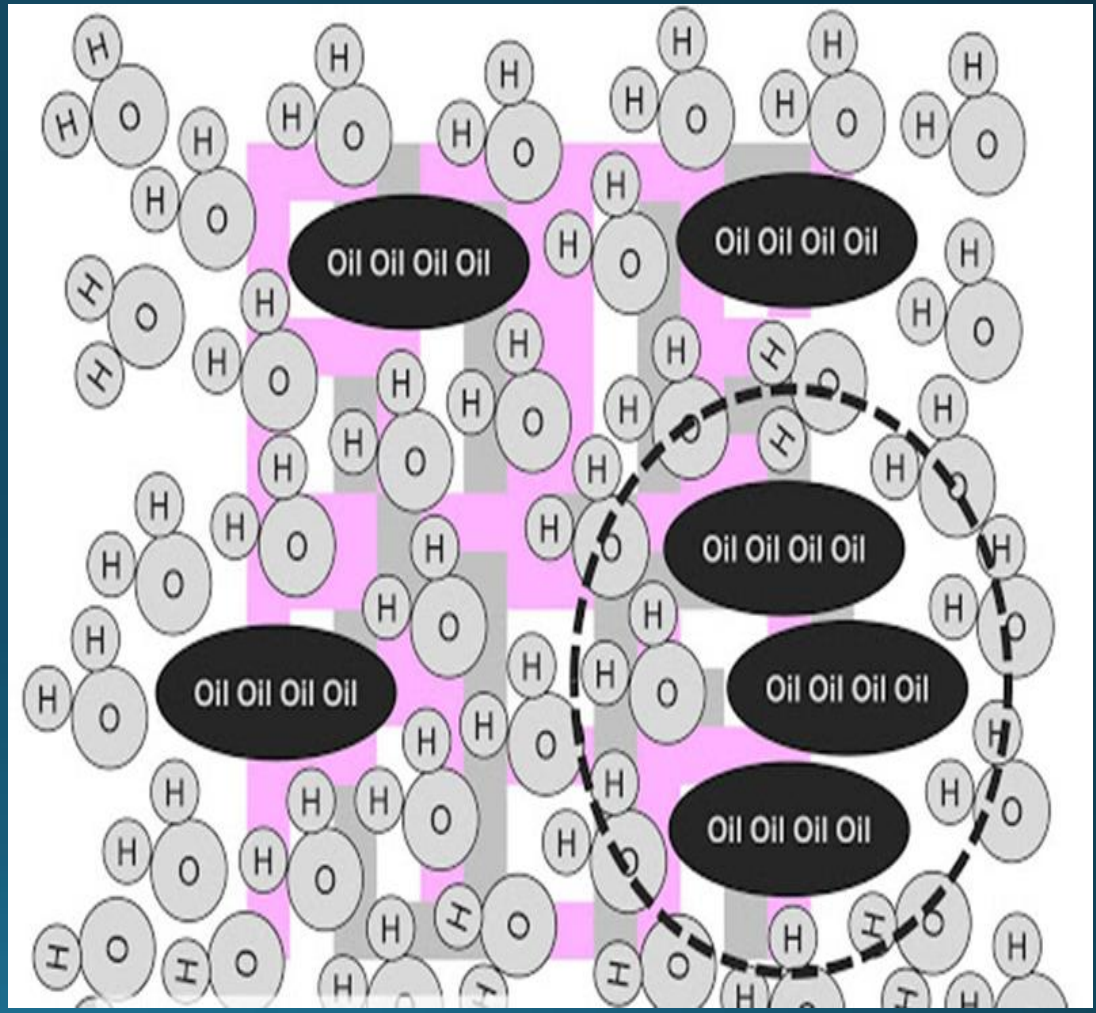
Loss of 2 ml from one litter decreases the temperature of 998 ml up to 1 ^{0}C.

6. HYDROPHOBIC EXCLUSIONS

- The reduction of the contact area between water and hydrophobic substances when placed in water

OR

- Hydrophobic exclusion describes the tendency, for example, of multiple oil droplets in water to coalesce into fewer, larger droplets.
- Helps to maintain integrity (unity, state of being together)of the membrane

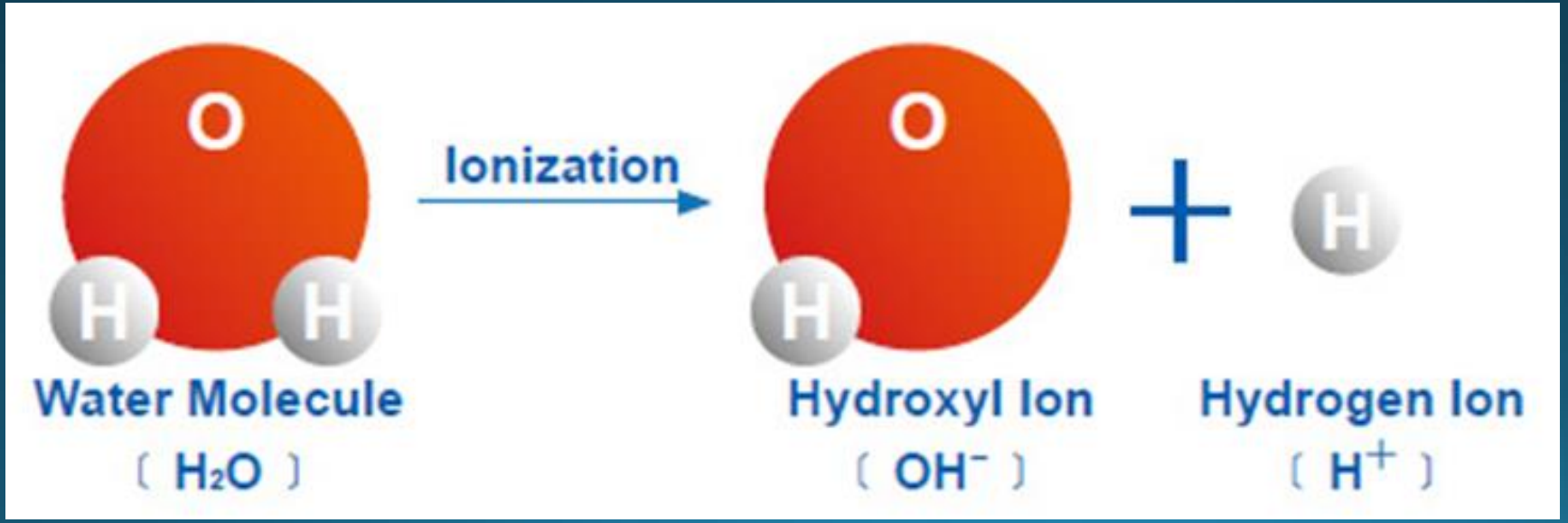


7. IONIZATION:

- The dissociation of molecules into ions.
- Equal number of + H and -OH Ions
- Reversible
- Equilibrium maintained at 25 ^{0}C.

Take part in many reactions

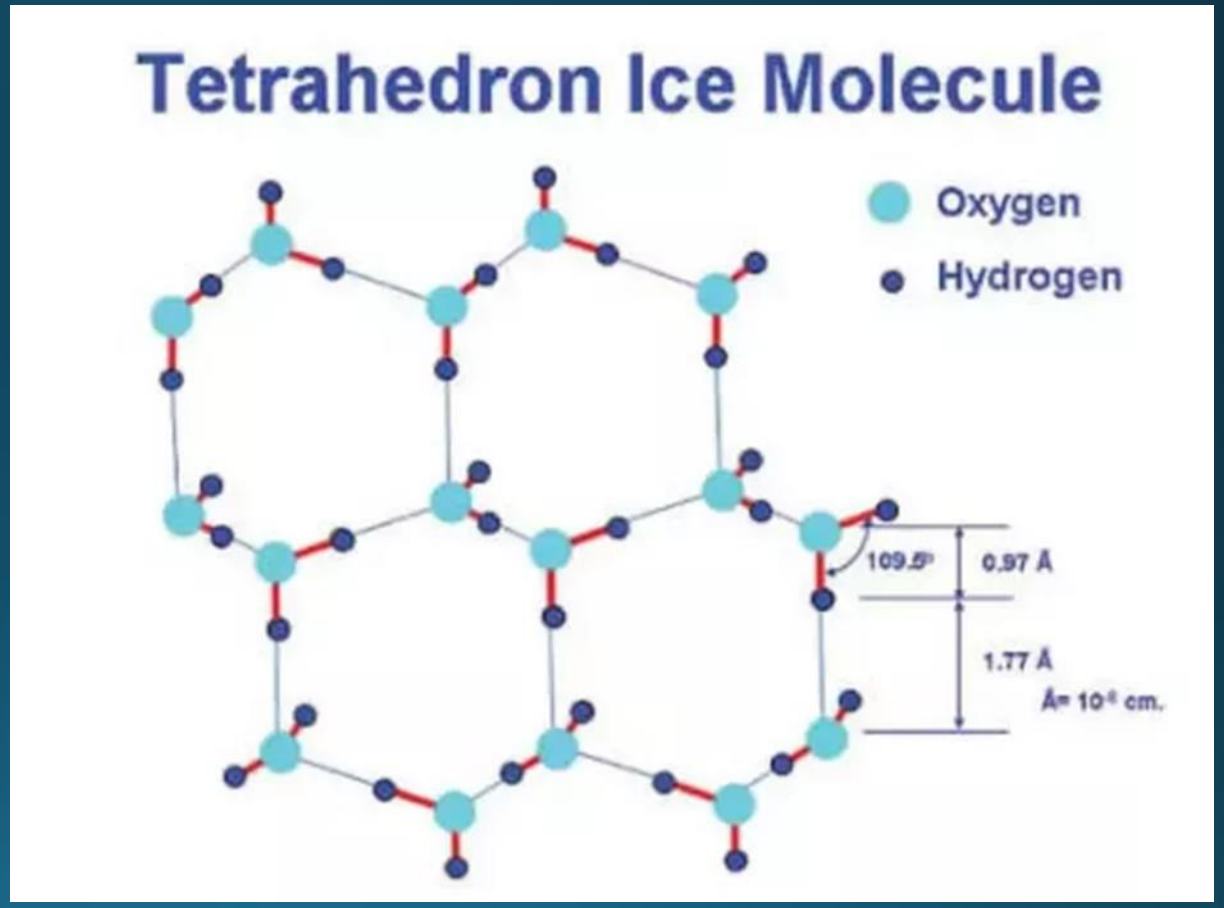
Help to maintain or change the pH of the medium



8. LOWER DENSITY OF ICE

- Ice floats on water → low density
- Giant structure with maximum number of hydrogen bonding
- Molecules arrange in lattice with large empty spaces
- Insulating layer above the water in ponds and lakes

Thus, water below remains at the temperature that supports life.



PLENARY:

1. Why is the covalent bond in water polar?
2. How does water protect living organisms against certain temperatures?
3. What is the importance of ionization to living organisms?
4. Large amount f heat can increase very little temperature in water. Why?


STAY
HOME
STAY SAFE

Allah Hafiz