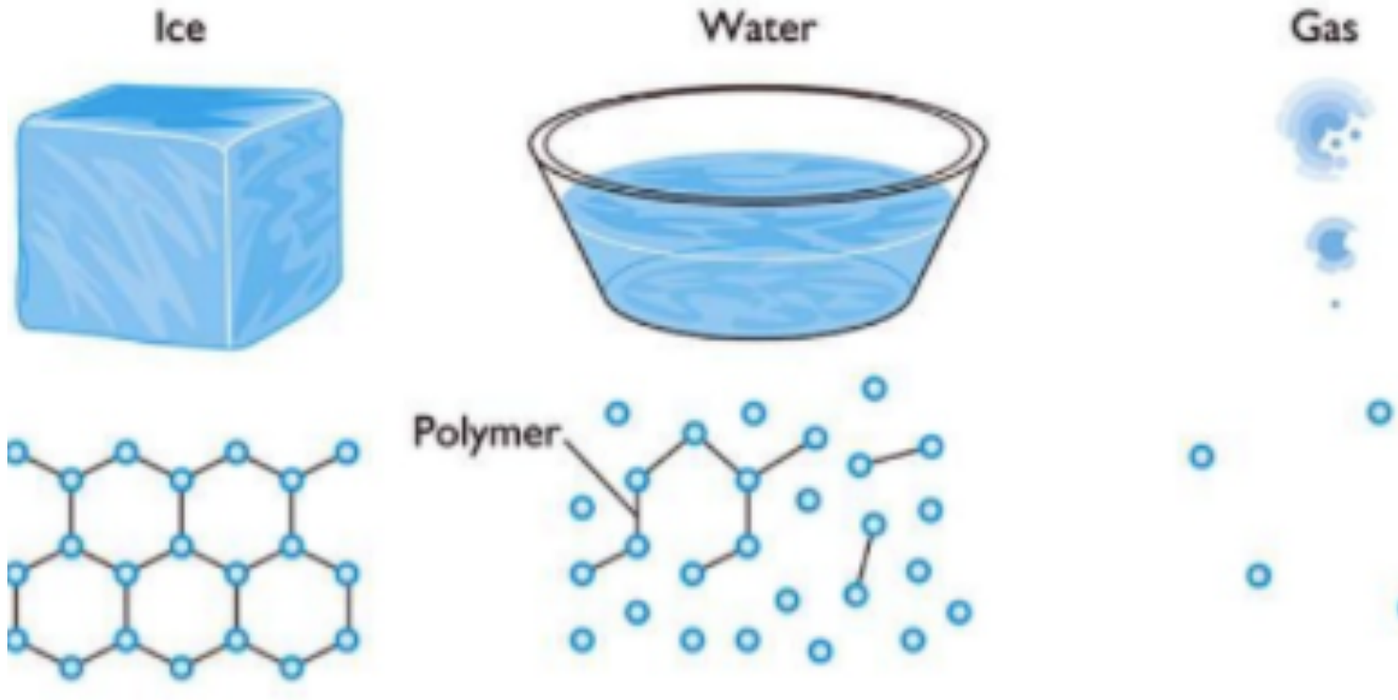
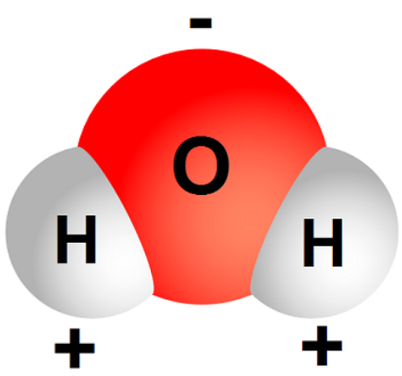
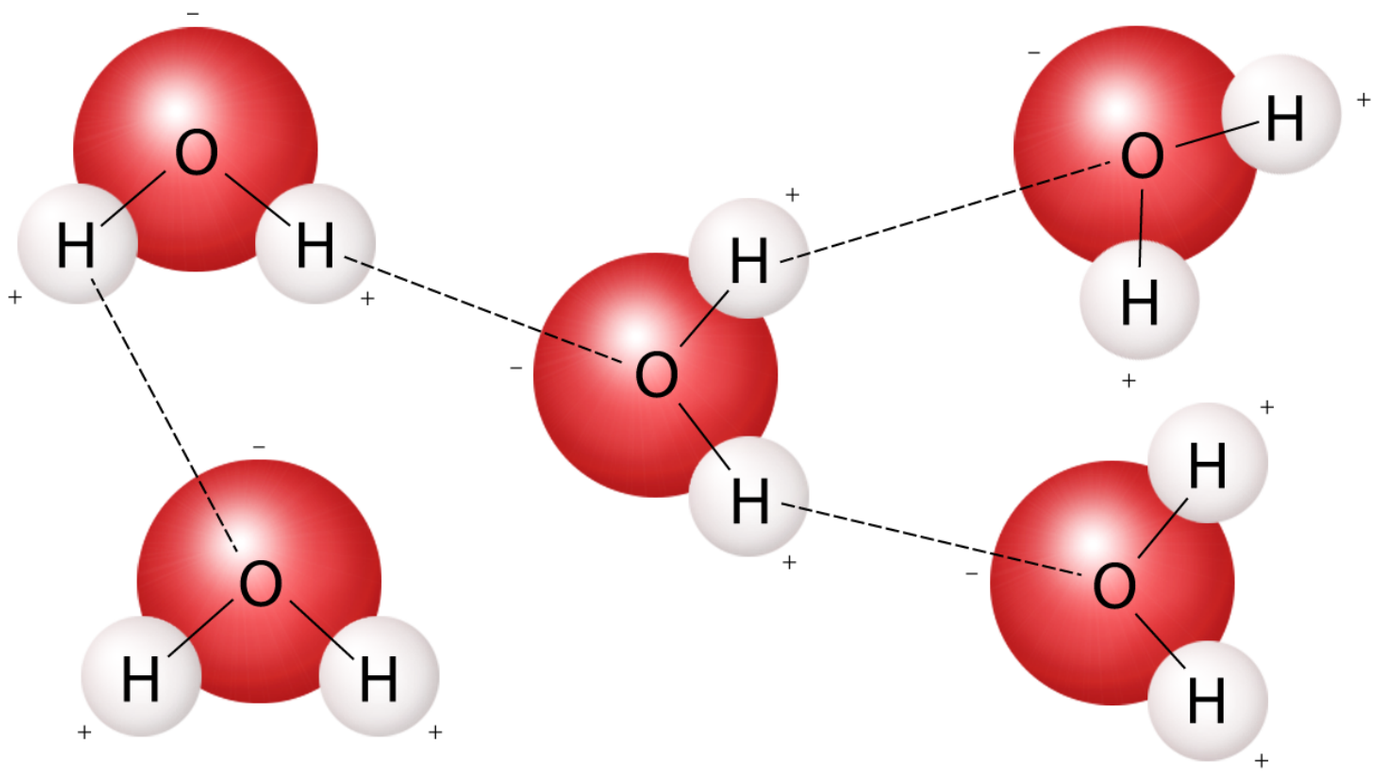
Water and It's Properties



Properties of Water



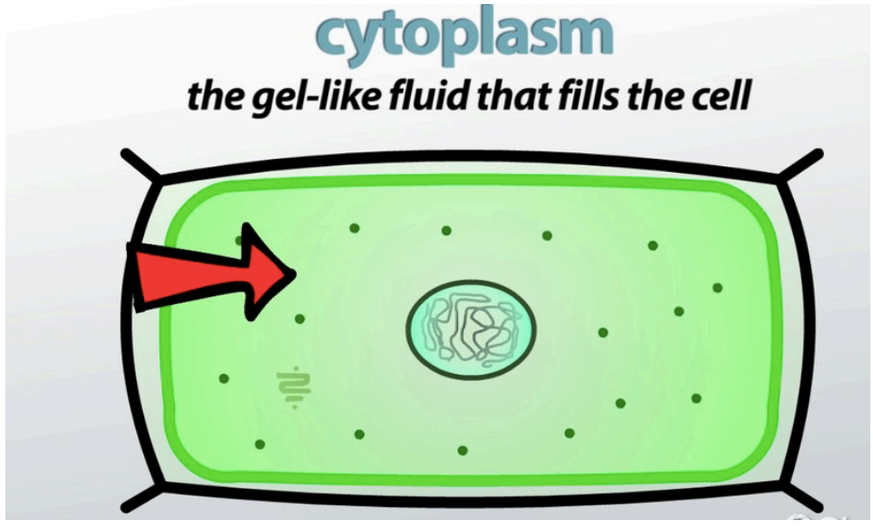
- is formed by covalent bond between O and H
- covalent sharing is unequal (oxygen is stronger) creating + pole and - pole

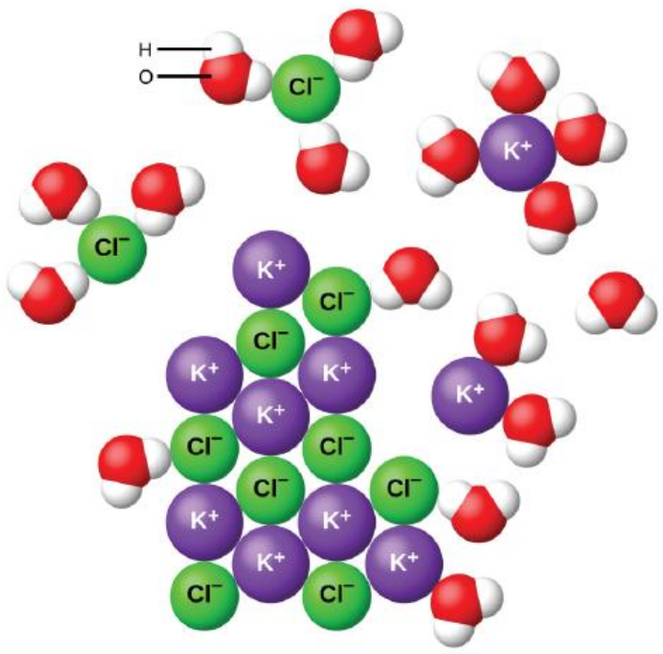


- the poles results in hydrogen bonds (attraction of O- and H+ between water molecules
- a weaker intermolecular bond then ionic bonds but still significant in larger numbers

Properties of Water

- **Solvent properties**- many polar molecules are dissolve by water
  - water clumps and shells around polar substance (weaken polar bonds)
  - cytoplasm of plant cells consists of mostly water with dissolved polar substances

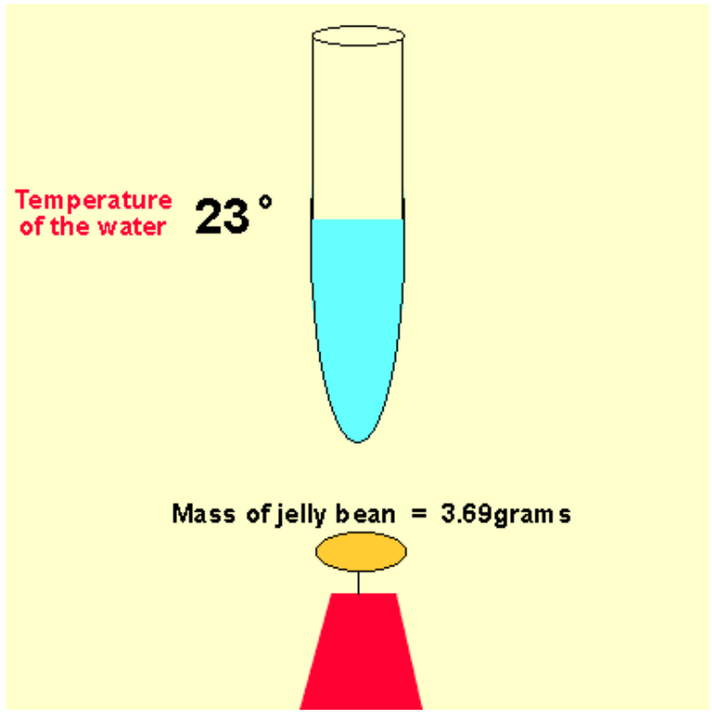




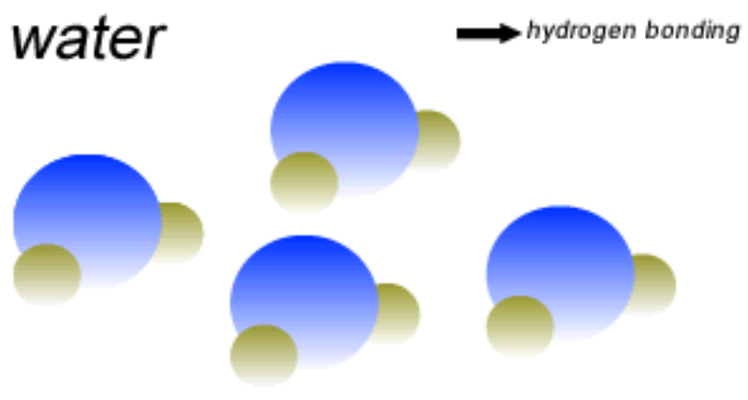
Na+ Cl+ $C_6H_{12}O_6$
K+ NO_3^+
H+ HCO_3^-
proteins
PO_4^{3-}

Properties of Water

- **Thermal properties**
  - **High specific heat capacity**
  - hydrogen bonds restrict water motion… higher energy is need to raise water temperature
  - this allow it to regulate temperature changes



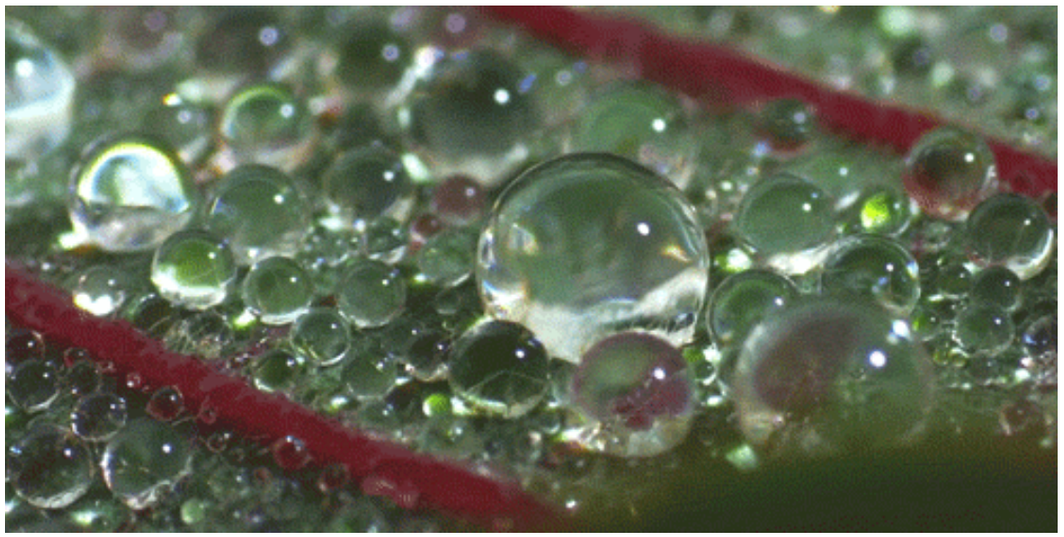
  - **High latent heat of vaporization**
  - to evaporate, heat must added to vaporize
  - causes a cooling effect on the surface
  - eg. transpiration in plants , sweating in animals



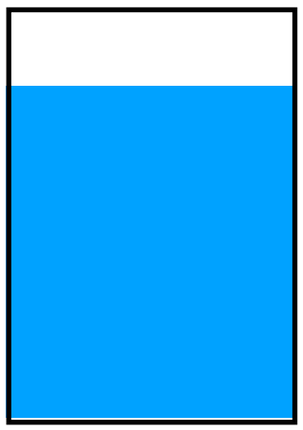
Properties of Water

- **cohesive property** - ability to stick together

- useful for water transport in plants,
    - water sucked through vessels at low pressure
    - molecules stick together with suction forces
    - water can be pulled up through the tallest trees



Comparing
Water with other substance



What is the mass and initial temperature of the water?

What is the mass and initial temperature of the weight?

What is the final temperature of the water?

What is the final temperature of the weight?

Hydrophobic vs Hydrophilic

- SEE DEMO

- Hydrophobic substance that tend to avoid mixing with water (often non-polar substance) - two hydrophobic substance will come together when water is around

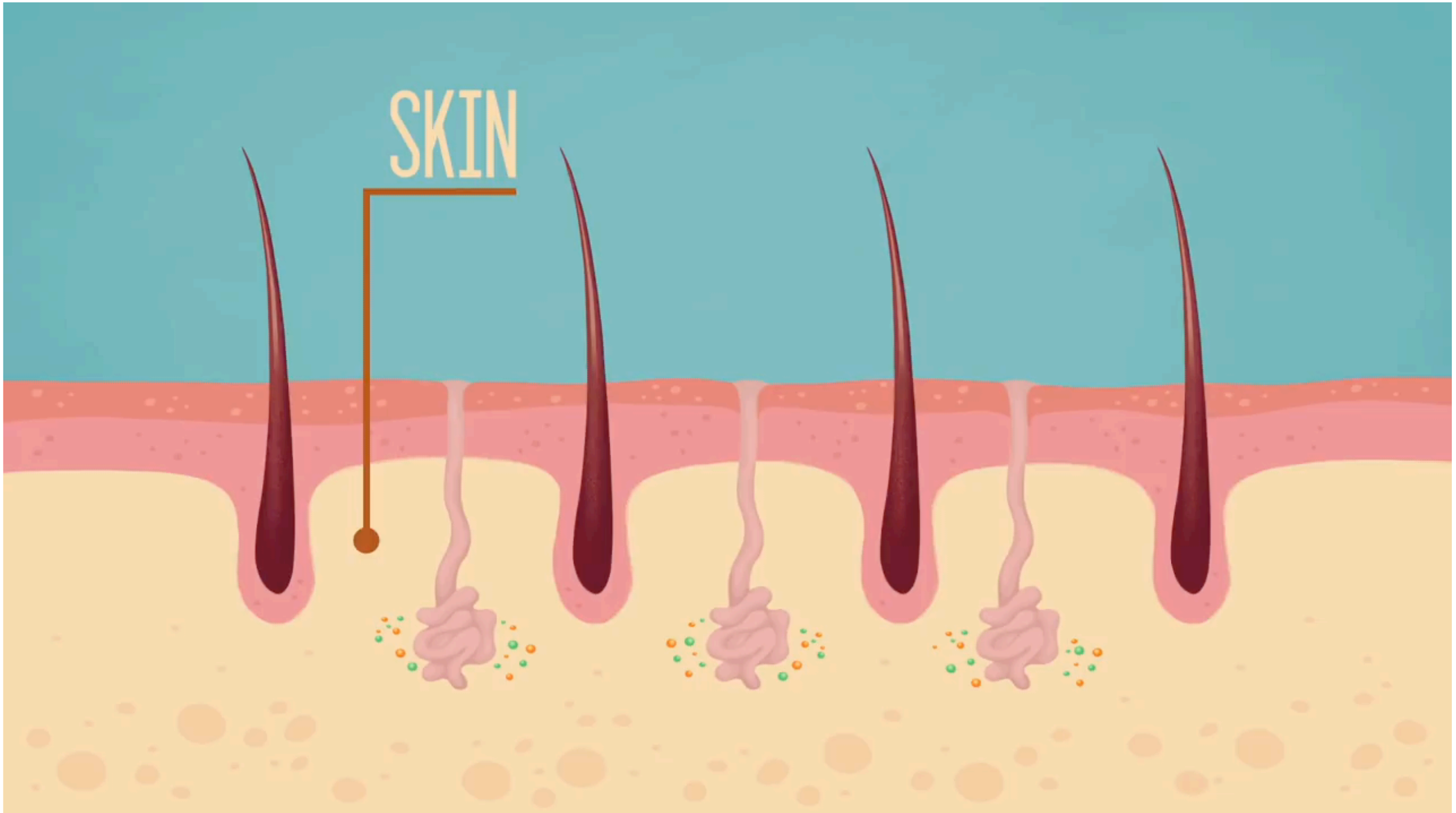
- Hydrophilic substance that tend to attract and dissolve in water (often polar substance) - salts or other ionic compounds will dissolve readily

- Which of the following would be the best substitute for water as a life substance?

Property	Substance A	Substance B	Substance C
Molecular Mass	16	22	20
Density	0.46g/cm^3	1.1g/cm^3	0.96g/cm^3
Specific Heat Capacity	2.2 J•g/°C	3.9 J•g/°C	4.0 J•g/°C
Latent Heat of Vaporization	760J/g	2180J/g	1933J/g
Melting Pt	-180°C	3°C	2°C
Boiling Pt	-160°C	92°C	91°C
Toxicity	high	low	low
Polarity	non polar	non polar	polar

a. What causes the triggering of sweat during exercise?

b. List the brief summary steps that trigger a sweating response



How is water vital to Plasma?