

Water

Why is water called the medium for life?

Water

Why are the O-H bonds in water polar?

Water

Hydrogen bond (between water molecules)

Water

How should hydrogen bonds be drawn?

Water

Cohesion

Water

Two consequences of cohesion for organisms

Water

Adhesion

Water

Where does capillary action matter to plants?

Electrons are shared unequally: oxygen attracts them more strongly, so oxygen is δ^- and hydrogen δ^+ .

The first cells originated in water, and most processes of life still occur in water.

At least two water molecules, δ^+ on H and δ^- on O, with a dashed line from H of one to O of the other.

Attraction between the δ^+ hydrogen of one water molecule and the δ^- oxygen of another. Weak, but very numerous.

Water is pulled up xylem under tension without the column breaking; surface tension lets water surfaces be habitats, e.g. for pond skaters.

Attraction of water molecules to each other due to hydrogen bonding.

In soil, drawing water through narrow pores, and in cell walls, where water adheres to hydrophilic cellulose.

Attraction of water to materials that are polar or charged.

Water

Why do ions and polar molecules dissolve in water?

Water

Why is water the medium for metabolism?

Water

Give an example of a molecule whose function depends on being hydrophobic.

Water

Four physical properties of water to contrast with air

Water

Ringed seal: adaptation linked to thermal conductivity

Water

Black-throated loon: adaptations for water and air

Water

Why is water a thermally stable habitat?

Water **HL only**

Hypothesis for the origin of Earth's water

Many hydrophilic molecules dissolve in it and most enzymes catalyse reactions in aqueous solution.

They are hydrophilic: water molecules are attracted to them and surround them, separating them from each other.

Buoyancy, viscosity, thermal conductivity and specific heat capacity: all much higher in water.

Phospholipids: hydrophobic tails form the membrane core, a barrier to ions and polar molecules. Also stored triglycerides.

Streamlined body and rear legs for swimming against viscous water; denser bones for diving; air-trapping feathers for insulation.

Thick blubber insulates against fast heat loss to cold water, which conducts heat over 20 times faster than air.

Water was delivered by asteroids that collided with the early Earth.

Its high specific heat capacity, due to hydrogen bonding, means a lot of energy is needed to change its temperature.

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Two reasons Earth retained its water

Water **HL only**

Goldilocks zone

The range of distances from a star where a planet's surface is neither too hot nor too cold for liquid water.

Gravity strong enough to hold the atmosphere; temperatures low enough for water to condense into liquid.