Chemistry of Life

Click to see EQs

Essential Question

What does a cell need to survive?

Essential Question

How does the types of foods we eat affect our body?

What is Chemistry?

Chemistry is the study of the...

Drag beakers inwards to reveal

Chemical reactions

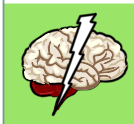
Structure of matter

Properties and composition of substances

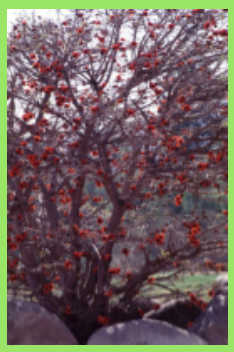
Non-living things

Why Chemistry in Biology?

Brainstorm answers (fill in w/ pen) then click on right side to reveal



Millions of chemical reactions take place in the bodies' of living things in order to survive. Its important to understand what some of the key chemicals are and how they function in order to understand life's processes.



Properties of H_2O

Click

Since living things are 70%+ made of water, to understand life, you need to understand water

Because of it's polarity, water has unique properties

High Specific Heat

Able to absorb a lot of energy = heats & cools slower than most liquids

Pull

Adhesion

Like an adhesive, water molecules are able to stick to *other* molecules

Pull

Universal Solvent

Other molecules easily dissolve in water = making an aqueous solution

Pull

Cohesion

A type of adhesion; Water molecules are attracted to each other = able to stick together

Pull

High Specific Heat

Why is it important to living things?

Water will retain its temperature after absorbing large amounts of heat, and retains its temperature after losing equally large amounts of heat.

Substances with high specific heat capacities take a lot of heat energy and therefore a long time to heat up and also a long time to cool down.

Living things are primarily made of water (at least 50%) so having high specific heat helps allow an organism to maintain it's internal temperature (ie. homeostasis) regardless of external temperature

By keeping warm or cooling off with sweat & evaporation

The specific heat capacity of sea water is greater than that of the land.

(Hence why the ocean takes longer to heat up/cool off compared to land)

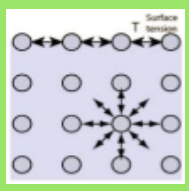
The ocean acts a heat sink/storage to regulate the Earth's temperature.

Cohesion

BACK

Why is it important to living things?

Due to the polarity (charge) of water molecules, when together, like magnets, one water molecules pulls together with another water molecule. It is a game of opposites attract.



Since each molecule pulls/attracted to it's neighboring molecule, when there is no molecule above it, it just pulls side-to-side/below it...thereby creating SURFACE TENSION

Pollen, dust, water insects, and other biological materials are able to remain on the surface of the water because of this tension

Water molecules can pull on each other so strongly they bunch into spheres.

This allows water to pulled along a pathway with relative ease (ex: circulatory system/funnel rain to roots). Also, there probably is no other liquid that can fall the height of clouds and reach the ground as drops, hence RAIN.

Universal Solvent

BACK

Why is it important to living things?

Water acts as a solvent, dissolving most molecules into it and thus providing a liquid environment

Organisms are able to obtain essential nutrients & elements that have been dissolved into water.

For example: Even though underwater, fish obtain oxygen from the O_2 that has been dissolved in **OR** Oxygen is able to circulate our body via our blood

Often for chemical reactions, a solid phase is too slow, and a gaseous phase is to quick BUT a liquid phase is just right to carry out chemical reactions

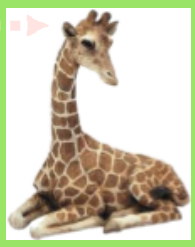
Adhesion

BACK

Why is it important to living things?

When water molecules stick to -non-water molecules, it creates capillary action (where the water molecules 'climb' up the what they stick to). Capillary action is limited by size of a tube and gravity.

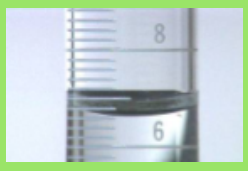
Capillary action is essential to plants to help them obtain water from the roots and transport it (via the xylem) to the top of the plant



Capillary action also helps to circulate blood and other vital fluids around the body, from the head to toes and back UP again to get re-oxygenated

Properties of H_2O

Drag and match each term with a picture
Click on picture to check answers

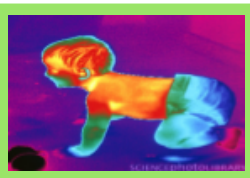


Adhesion

Universal Solvent

High Specific Heat

Cohesion



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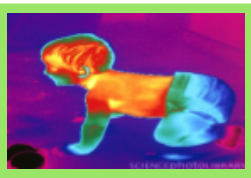
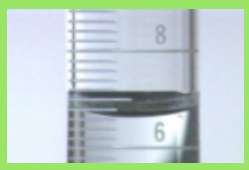


High Specific Heat

Adhesion



Universal Solvent

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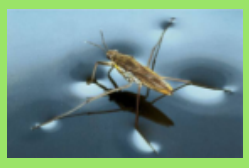

Cohesion