

Why Does Water Work?

By Simon Pelletier

Water is involved in just about every process on planet Earth. It's fundamental to biological life forms and their function. It's required for all plant growth. Giant swaths of the planet (approx. 70%) is covered in the stuff. The air is filled with water vapour. Humans society uses it extensively.

Why exactly is this?

Wikipedia says that, "Water (chemical formula H_2O) is an inorganic, transparent, tasteless, odorless, and nearly colourless chemical substance, which is the main constituent of Earth's hydrosphere and the fluids of all known living organisms (in which it acts as a solvent)."

One of the main reasons water is involved in so many other processes has to do with its ability to be a solvent. It is the "universal solvent." A solvent takes up another compound and suspends it. The resulting solution is a homogenous mixture of the solvent, water in this case, and the solute; where each solute molecule is surrounded and held by the solvent. The un-reactive nature of water is what makes it universal. It can pick up a compound move it somewhere and then evaporate away leaving the same compound intact. Much of the geographical processes on Earth features washing away of compounds and depositing of them elsewhere. It is a crucial process for life as minerals from the mountains wash their way down and fertilize the plains.

Water is used by life forms to break bonds between larger molecules. The breaking of bonds produces energy for the cell and smaller molecules as building materials. The inverse, building larger molecules from smaller ones, also require water.

Water is used to transport molecules throughout the body. Humans have copied this using ships.

Water is used in photosynthesis. Photosynthetic cells use the sun's energy to split the hydrogen from the oxygen molecule contained in water. The cell makes glucose from the split hydrogen and carbon dioxide and emits oxygen.

The more recent future has seen humankind use water for its own intentions.

The advent of plumbing has co-opted water's solvent nature and used it to ferry away pathogens. This same solvent property is used in a variety of industrial steps to wash and move compounds.

The thermal capacity of water means that it is a good way in which to absorb excess heat. An important function in manufacturing where vast amounts of heat are dealt with.

Why does water fill all these niches?

The real answer is I don't know. But if I'm thinking about it, I might postulate the following.

Perhaps because water is so ubiquitous, covering 70% of the Earth, and because it has traits that lead to it being a good solvent all of the biological forces have fit themselves into water's key. A selection mechanism.

I'm not sure how this would apply to geographical forces. Or to the engineering advantages possessed by water...

Anyways, a little dive into how water works.