



Water  
It changes things

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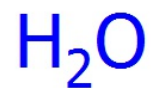
# Water...



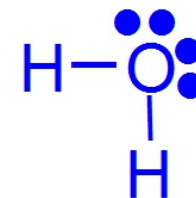
...the universal solvent!

# Let's look at the structure of water

chemical formula



structural formula (Lewis dot diagram)



# Water

## Freshwater

- Most important liquid on Earth
- 1% freshwater, 97% ocean, 2% frozen polar caps





# Common Solvent

- **Water** is the most common substance on earth.
- It makes up 70% of the earth's surface.
- 65% of your body mass is composed of water.



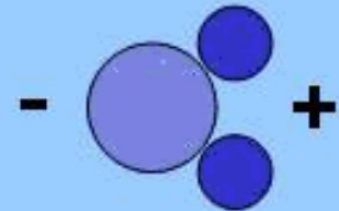
# Polar Molecule



**Water is a polar molecule.**

- one side of a water molecule is slightly positive and the other is slightly negative.
- forms a "V" shape of oxygen atom with 2 hydrogen atoms
- covalently bonded
- hydrogen bonds are weak and water constantly reforms
- when water freezes it forms a lattice, with air spaces. Remember it floats.

# Polar Molecule



- The charged ends of a polar solvent can separate the charged ends of a polar solute.
- As a general rule: **Like Dissolves Like**

Think about it...

Water and vinegar mix, however oil and water do not mix.

Is vinegar polar or non-polar?

Is oil polar or non-polar?



# What is in your tap water?

- acids-dissolved  $\text{CO}_2$  from soils, corrodes pipes, leaches out Pb and Cu
- bases-Ca and Mg-hard water
- chlorine-changes taste, smells, kills bacteria
- fluorine-prevents tooth decay
- iron-causes orange stains
- copper-changes taste, causes blue stains, needed for health
- lead-toxic even in low concentrations



## Other chemicals in surface water

- phosphorus-from detergents and fertilizers
- nitrogen-from decayed organic matter





# Bottled Water

## Mineral water

- must contain 250 mg/L of dissolved minerals, such as Ca, K, Mg
- minerals must be natural, not added
- must be collected from underground source

## Potable water

- bottled from city or town source
- may contain minerals and additives

## Distilled water

- most minerals removed
- deionization or reverse osmosis

## Carbonated water

- contains CO<sub>2</sub>, make it bubbly



# The Water Cycle

Also named **Hydrologic Cycle**

- driven by the **SUN**



Starts with **groundwater**

- water seeps through soil and rocks, filtering out microorganisms
- becomes slightly acidic from  $\text{CO}_2$
- arrives in an **aquifer** (underground storage area)
- flows to ocean





# The Water Cycle continued

- evaporates from the oceans, rivers, lakes and streams
- transpiration-plants lose water to atmosphere



- falls back to Earth, through precipitation



- surface runoff collects water in lakes, rivers and streams
- once again becomes ground water.

