**Water**

* Most abundant and important molecule in living organisms,
* About **\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of our total body weight.
* Important for **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and overall cell health.
* We lose from 4-9 cups of water each daily from **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* We have adaptations for **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** water levels.
* Regulated by **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

**Water is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_bonded**

* electrons are shared **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* covalent bonds are **\_\_\_\_\_\_\_\_\_\_\_**than ionic or hydrogen bonds.

**Water is a \_\_\_\_\_\_\_\_\_\_\_\_Molecule**

* \_\_\_\_\_\_\_\_spend more time orbiting around the larger oxygen atom rather than the smaller hydrogen atom.
* hydrogen atoms have a partial **\_\_\_\_\_\_\_\_\_\_\_**charge and the oxygen a partial **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** charge.

**Water forms \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Bonds**

* partially positive H is attracted to a partially negative oxygen.
* represented by a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because it is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

Ted Ed video on polarity of water:

<http://ed.ted.com/lessons/how-polarity-makes-water-behave-strangely-christina-kleinberg>

Many of water’s unique properties are due to its polarity and hydrogen bonding:

**Unique Properties of Water:**

1. **Water is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because it can dissolve both **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** molecules.

eg When a salt like NaCl is put into water, the negative ends of the water molecules are attracted to the Na+ and the positive ends of the water molecules are attracted to the Cl-, causing the salt’s ions to **\_\_\_\_\_\_\_\_\_\_\_\_** and the salt **\_\_\_\_\_\_\_\_\_\_\_\_\_**in the water.

* Molecules that interact with water are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**
* Molecules that do not interact with water are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
1. Water has high **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.** Water molecules cling to each other yet flow freely, making it an excellent transport system inside and outside the cell.
2. The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**of water rises and falls \_\_\_\_\_\_\_\_\_\_, preventing sudden or drastic changes, allowing us to maintain a relatively **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

Water has a low freezing point and high boiling point so that it is liquid at body temperature.

1. Water has a high heat of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
	1. efficient way to release \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. When we sweat, body heat vaporizing the sweat, cooling the body as sweat evaporates.
	2. keeping the body from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Frozen water is \_\_\_\_\_\_\_\_\_\_\_\_\_ than liquid water so that ice \_\_\_\_\_\_\_\_ on water.

**Benefits of Water**

1. **Only substances dissolved in water \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of our cells (glucose, amino acids)
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** from our cells and wastes excreted in liquid (sweat, urine).
3. **\_\_\_\_\_\_are necessary for many body processes** (Ca2+ for movement, Na+, K+ for generation of nerve impulses).
4. High surface tension of water and water-based solution act as **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. (Joints are lubricated by synovial fluid)
5. **Water \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. Water doesn’t heat up or cool down as easily as most other substances. Enabling us to maintain a relatively \_\_\_\_\_\_\_\_\_\_\_\_\_\_internal temperature.
6. Our brains are partially **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** by layer of cerebral spinal fluid.
7. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** require water:
	* eyes are filled with vitreous humour, hearing depends on fluid-filled cochlea to detect and transmit vibrations.
8. **Hydrolytic enzymes** in our bodies require water to function.

**How is Water regulated?**

* When the \_\_\_\_\_\_ detects too little water in our blood, it signals \_\_\_\_\_\_\_\_\_ to remove less water from the blood. We pee less, our urine is more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_ in color.
* The brain tells us we are thirsty. We drink. Water levels return to normal.
* When our \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ either from fever, working out, or being in a warm environment, our bodies sweat. When sweat \_\_\_\_\_\_\_\_\_\_\_ from our skin, it takes some heat with it, helping to \_\_\_\_\_\_\_\_\_\_\_\_\_us off.

**Dehydration:**

* blood volume **\_\_\_\_\_\_\_\_\_**which lowers our blood pressure and heart rate, causing our hearts to \_\_\_\_\_\_\_\_\_\_\_, headaches, dizziness.

**Too Much Water:**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to keep up
* 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which can impair brain activity.
* healthy kidney can excrete \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Can that really happen?**

In 2007, a 28-year-old California woman died after competing in a radio station's on-air water-drinking contest. After downing some six liters of water in three hours in the "Hold Your Wee for a Wii" contest, she vomited, went home with a splitting headache, and died from water intoxication.

Club-goers taking MDMA (ecstasy) have died after consuming copious amounts of water trying to rehydrate following long nights of dancing and sweating.

A 2005 study in the New England Journal of Medicine found that close to one sixth of marathon runners develop some degree of hyponatremia, or dilution of the blood caused by drinking too much water.

**Drink when you are thirsty.**

Water Questions

1. How is water important to living organisms?
2. How is water regulated in our bodies?
3. What is a covalent bond?
4. Why is water called a polar molecule?
5. Describe how a hydrogen bond is formed.
6. List 5 unique properties of water.
7. List 5 ways our bodies benefit from water.
8. List 3 things that can happen when we are dehydrated.
9. How much water would you have to drink to get water toxicity?