

Importance of Water!

Learning Targets:

1. Describe how the structure of water leads to its unique properties.
2. Explain the properties of water and its importance of life.



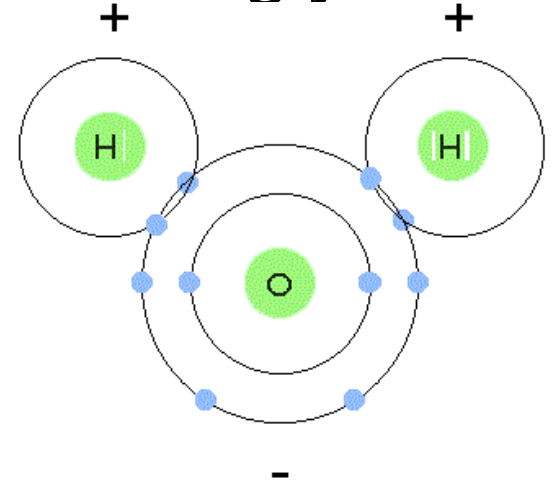
Why is water so important?

- All living things rely on water!
- Water covers $\frac{3}{4}$ of Earth's surface.
- Humans are about 70% water.
- *Water plays an important role in dehydration synthesis and hydrolysis reactions*



How is a water molecule arranged?

- With 8 (positive) protons, the oxygen nucleus attracts electrons more strongly than the single proton of hydrogen.

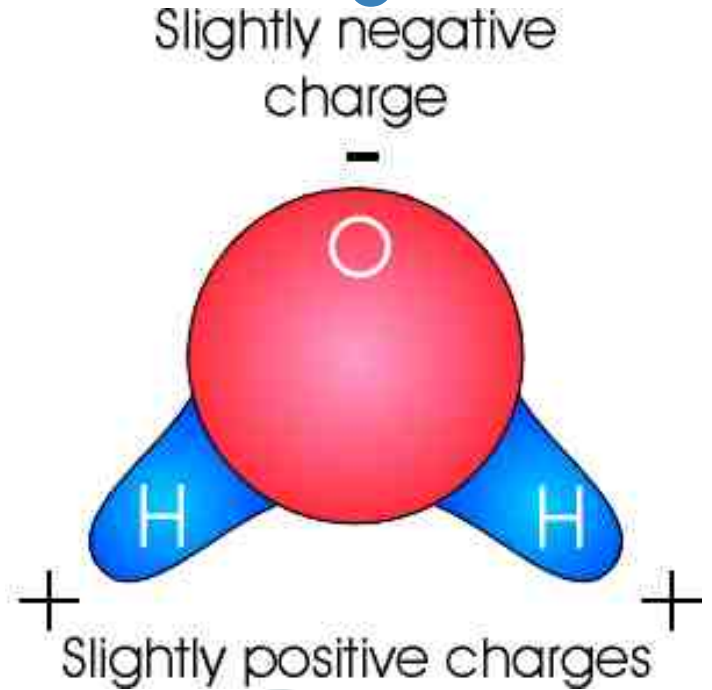


How is a water molecule arranged?



How is a water molecule arranged?

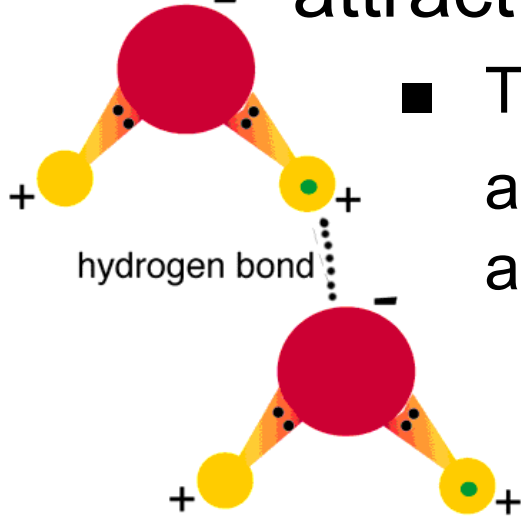
- A molecule where the charges are uneven are called “*slightly polar*”
 - The overall charge on the molecule is neutral!
 - The charges are like a magnet with two poles (+) and (-).



How is a water molecule arranged?

- The partial charges allow polar molecules to attract to one another.

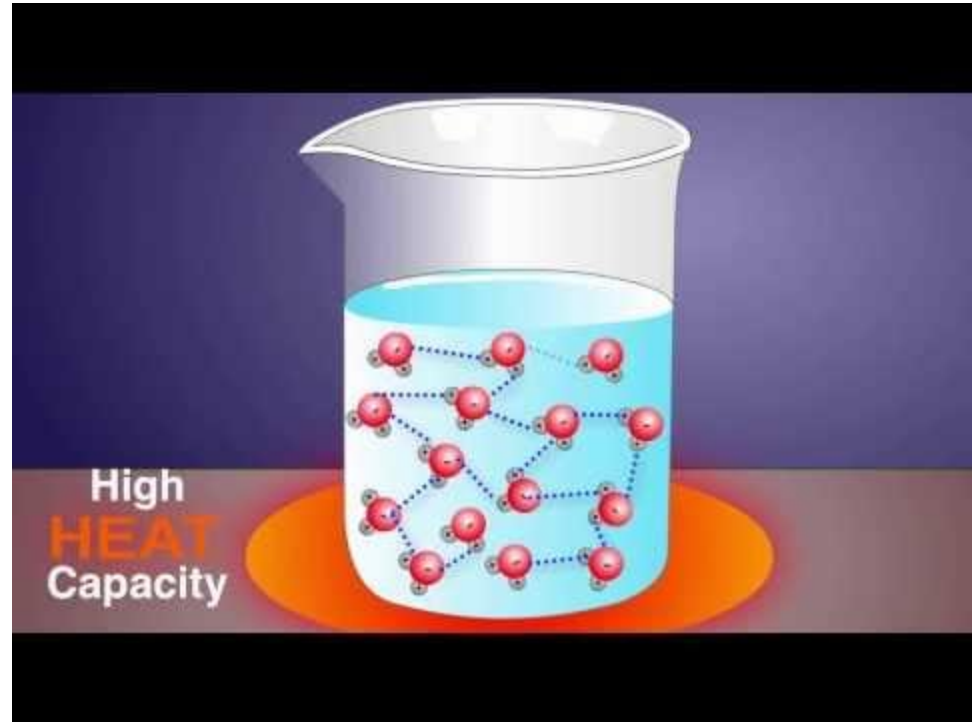
- The attraction between a hydrogen atom and another atom with a partial (-) charge is known as a **hydrogen bond**!
 - Oxygen, Nitrogen, Fluorine



What are the properties of water?

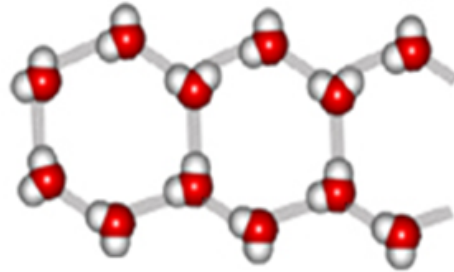
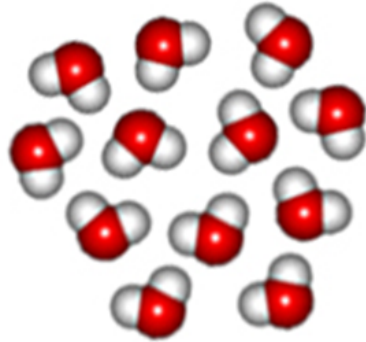
As the video plays.....

Write down the different properties of water. You do not need to get the specific details down; however, you should be able to list the different properties that are mentioned.

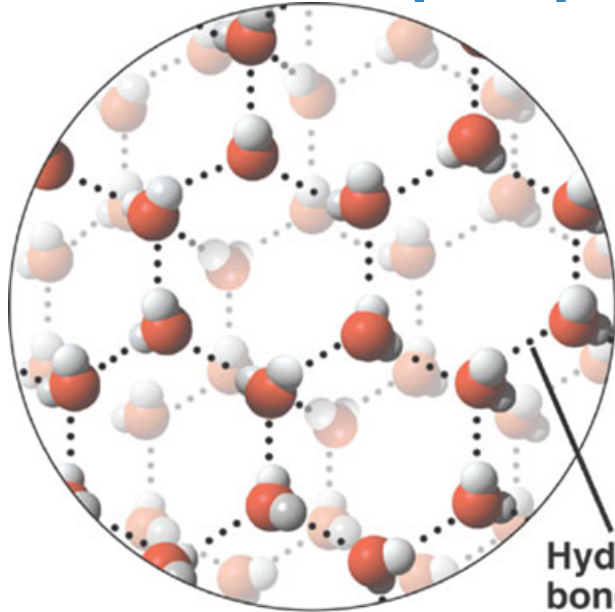


What are the properties of water?

- Water **expands** when it freezes.
 - Ice is less dense than liquid water
 - Why would this be important to fish living in a pond during the winter?



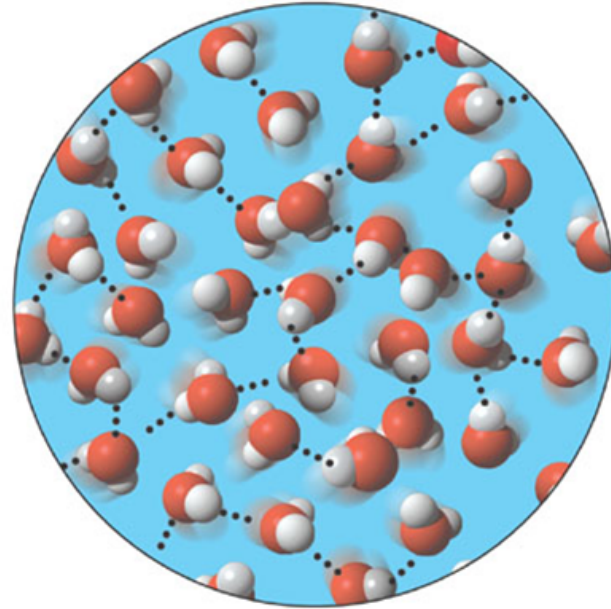
What are the properties of water?



Hydrogen
bond

Ice

Hydrogen bonds are stable



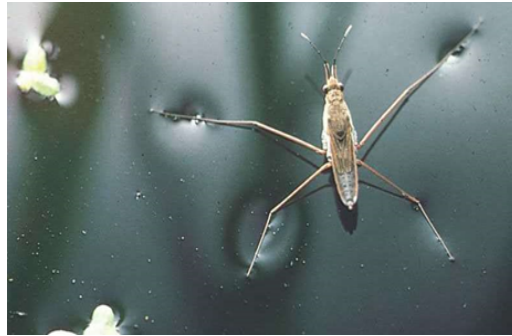
Liquid water

**Hydrogen bonds
constantly break and re-form**



What are the properties of water?

- Water is **cohesive**
 - cohesion is an attraction between molecules of the **same** substance.
 - Pulls water molecules together
 - Responsible for **surface tension**



What are the properties of water?



Cohesion

- Water is **adhesive**
 - adhesion is an attraction between molecules of **different** substances..
 - Responsible for water rising up a narrow tube.
 - **Capillary action.**
 - helps draw water out of the roots of plants.



Adhesion



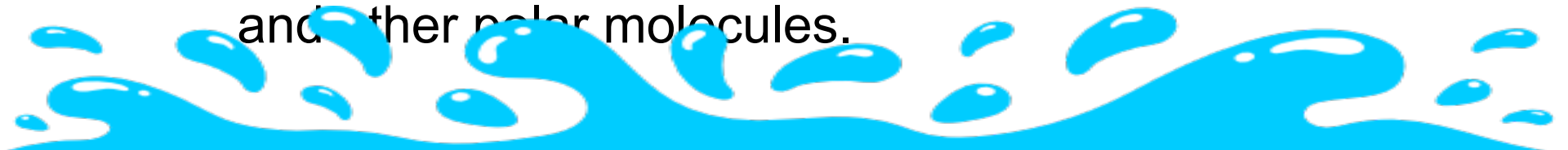
What are the properties of water?

- Water has a high ***heat capacity***
 - Heat capacity is the amount of heat energy needed to increase a substance's temperature.
 - Hydrogen bonds in water make it hard for molecules to move faster and increase in temperature.

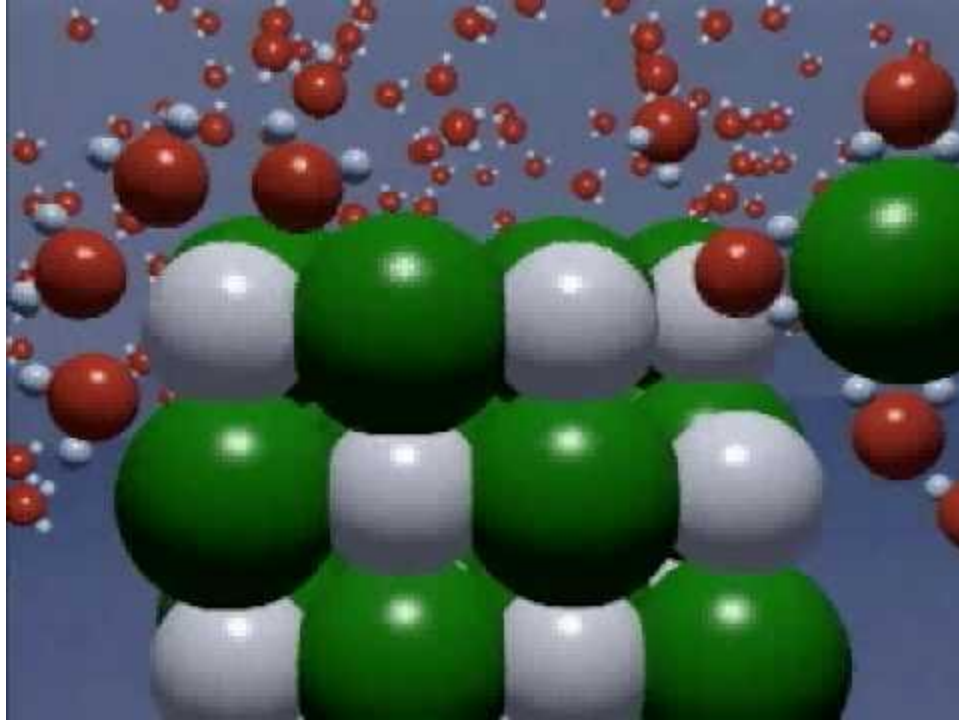


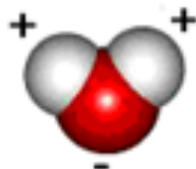
What are the properties of water?

- Water is the ***universal solvent***
 - Water dissolves more substances than any other liquid.
 - Solutions are made up of one or more solutes in a solvent.
 - Solute = what is dissolved
 - Solvent = what does the dissolving.
 - Since water is polar, it can dissolve ionic compounds and other polar molecules.

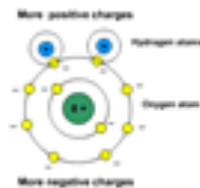


What are the properties of water?





PROPERTIES OF WATER



Cohesion & Adhesion

High Specific Heat

Expands when Frozen

Universal Solvent

Definition:

Definition:

Definition:

Definition:

Why is it important?

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