

Water Molecule Unit Notes

Name: _____

DO NOT LOSE! PUT IN SCIENCE BINDER

Area of Focus: Where is our water?

The six ways humans use water

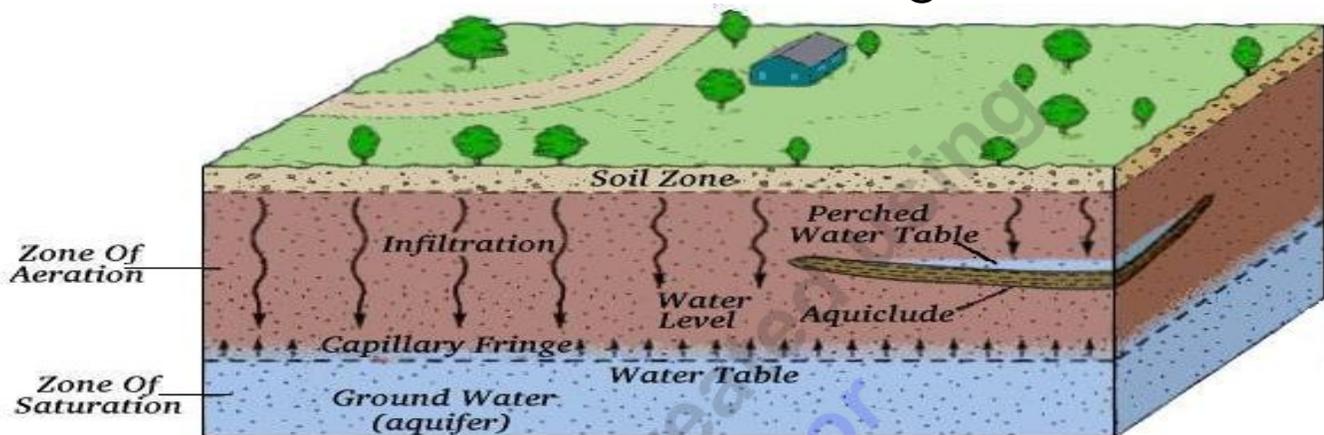
- Survival / Health
- Household
- Recreational
- Industrial
- Transportation
- Agricultural

Earth's Water Supply

- Oceans 97.3% - Salt (Cannot drink or use for Agriculture)
- Ice Caps 2.19% (Locked)
- Groundwater 0.5% (Most is too Deep)
- Soil Moisture 0.005% (Can't Obtain)
- Atmosphere 0.001% (Can't Obtain)
- Inland Lakes 0.018% (Available)
- Rivers 0.000096% (Available)

New Area of Focus: Groundwater

Groundwater – Water stored in the ground



Negative Effects of Groundwater Depletion

- Drying up of wells
 - Reduction of water in streams and lakes
 - Deterioration of water quality
 - Increased pumping costs
 - Land use decreases in quality
- Please create a line graph in journal with the following data.

Year Water level below land (Cook Co. Georgia)

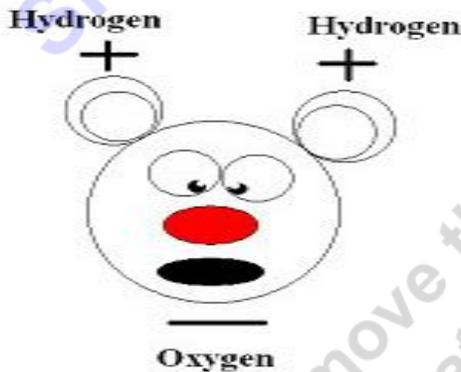
- 1967 - 163 ft
- 1974 - 170 ft
- 1981 - 173 ft
- 1988 - 175 ft
- 1995 - 172 ft
- 2002 - 183 ft
- 2008 - 190 ft



Groundwater Contamination: The act of contaminating or polluting the groundwater.

NEW AREA OF FOCUS: PROPERTIES OF WATER

Water is H₂O. Two hydrogen atoms, one oxygen.



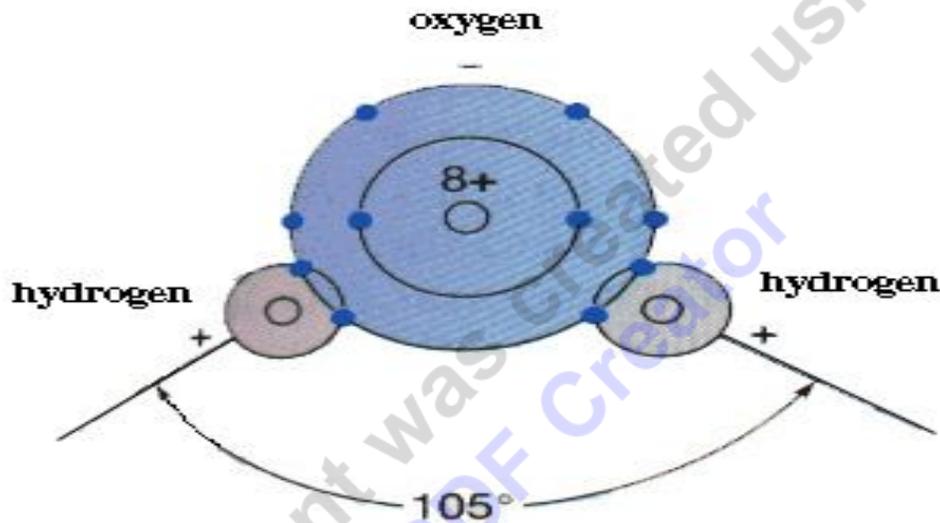
Properties of Water: Water has unique properties because of its lopsided + and - ends.

Some water basics

- Water freezes at 0 degrees Celsius, and boils at 100 degrees
- Water freezes at 32 degrees Fahrenheit (F) and boils at 212 degrees F (Sea-Level)
- Water weighs 28.3 Kilograms per cubic foot.

- Weight: 62.416 pounds per cubic foot at 32°F (It's heavy).
- Density: 1 gram per cubic centimeter
- Water is H₂O. Two hydrogen atoms, one oxygen.

Structure- H₂O (water) One oxygen bound by two hydrogen. Oxygen shares one electron with each hydrogen atom.

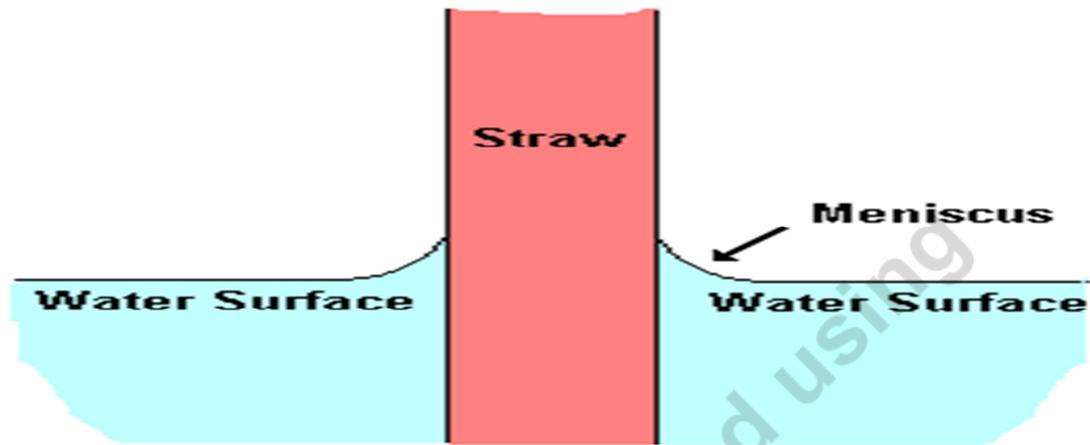


Polar molecule: One end of the water molecule tends to have a positive charge while the other has a negative charge.

Non-polar (lipids) equal charge

Properties of Water

- Cohesion-Hydrogen bonds hold water molecules together to each other.
- Adhesion – Holds water to a surface
- A meniscus is the curved surface at the top of a column of liquid



- Capillary action – water can move up plants by adhesion.



Chromatography - A method used to separate complex mixtures

Surface tension: Water molecules stick to themselves.

High Specific Heat- Hydrogen bonds absorb heat when they break, and release heat when they form.

It takes a lot of energy to heat water, a lot of energy to freeze it, and a lot of energy to melt ice.

Water stabilizes the temperature of the earth.

Lower Density of Ice- Molecules are spaced far apart. Ice floats

Lake Turnover Notes

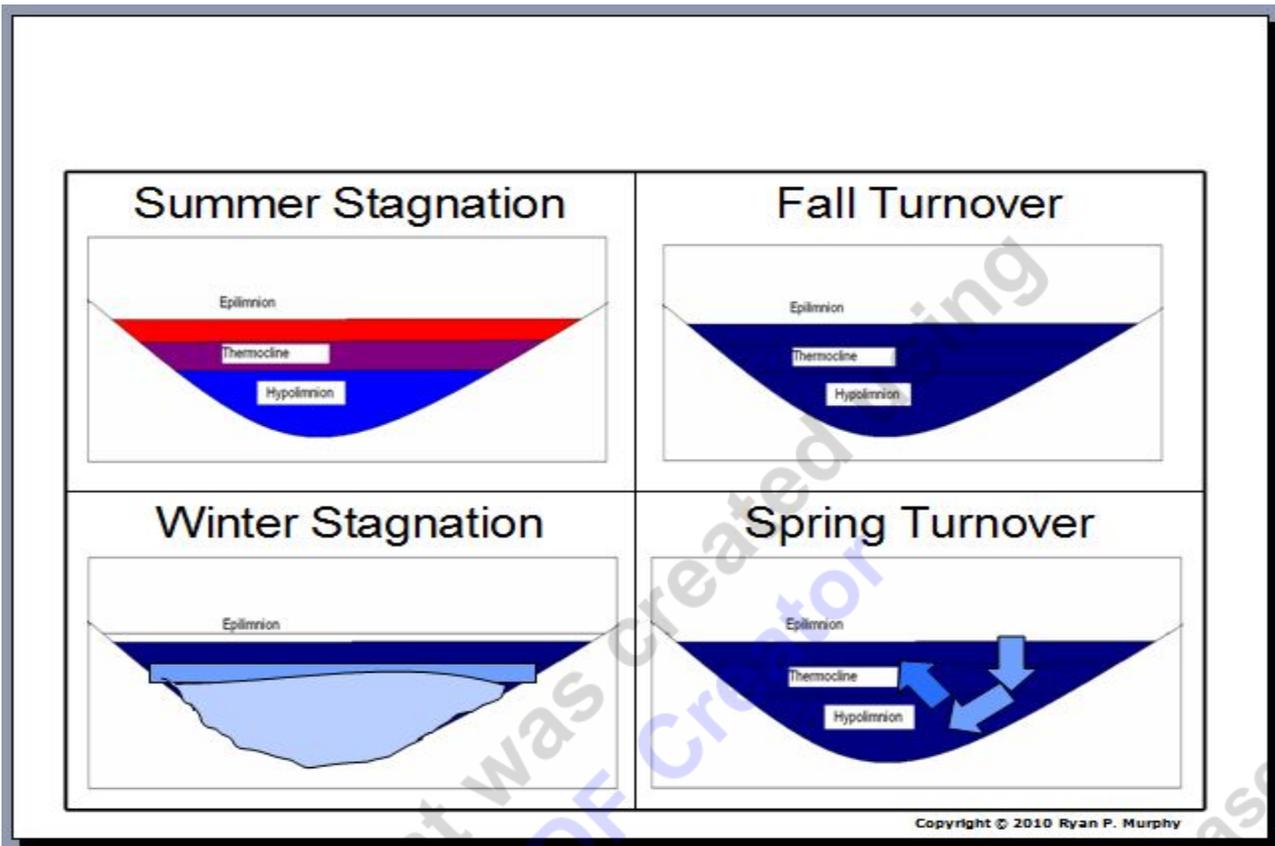
- Epilimnion: The upper layer in a layered lake.
- Thermocline: A layer within a body of water where the temperature changes rapidly with depth.
- Hypolimnion - The bottom and most dense layer of water in a lake. Non-circulatory and remains cold throughout the year

Summer Lake Stratification Zones

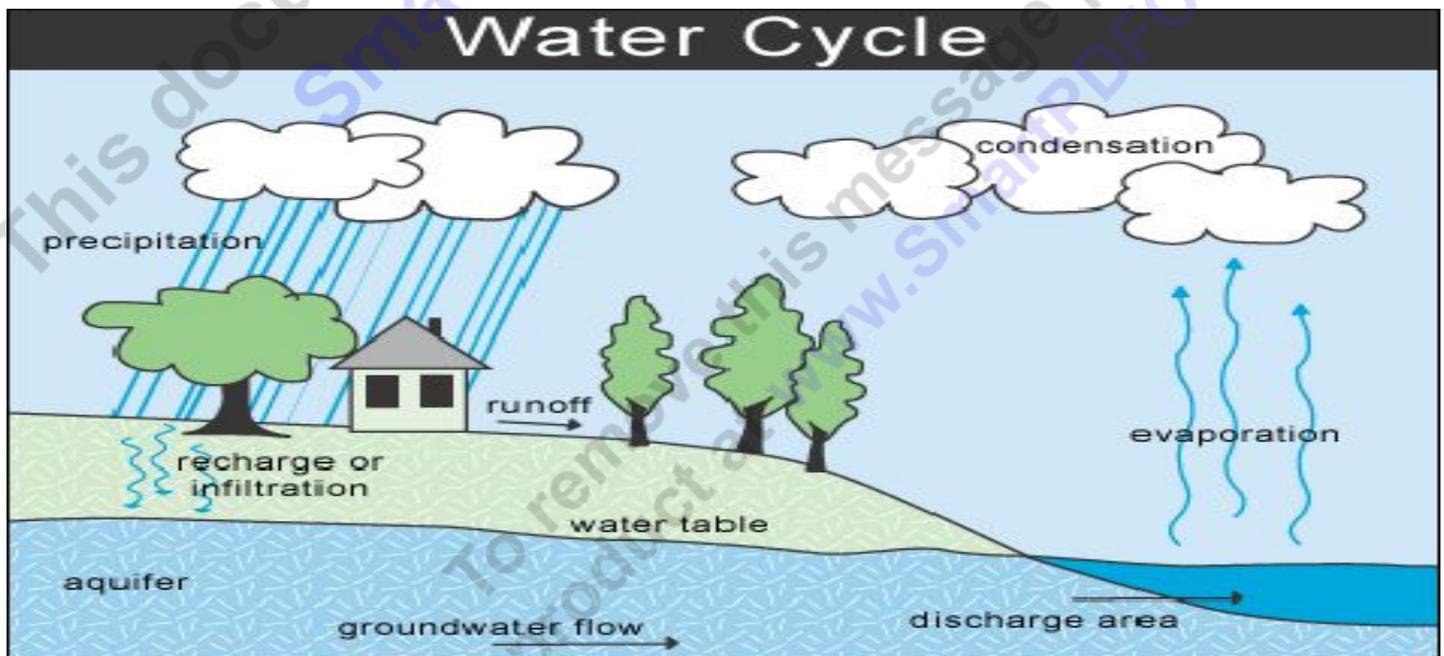


Throughout the year, a lake goes through many changes. In the summer the lake has three distinct layers. Colder temperatures and wind in the fall mix the layers. After the ice forms across the lake, winter layers form. The melting ice mixes the layers in the spring. The lake returns to its summer layering when the temperatures

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The hydrologic cycle: The continuous movement of water on, above, and below the surface of the earth.



Evaporation – Substance changes from a liquid state to gas state (requires energy).

Condensation – Water vapor (gas) turns back to a liquid. (energy required / cold) -cloud formation.

Precipitation – Water that is so heavy it falls as liquid / solid.

Sublimation – Solid state turns directly to a gas state skipping liquid phase.

Transpiration – Water released by plants into air.

- Non-living to the living, and back again.

Surface run-off: The water flow which occurs when soil is full to capacity and excess water travels over the land.

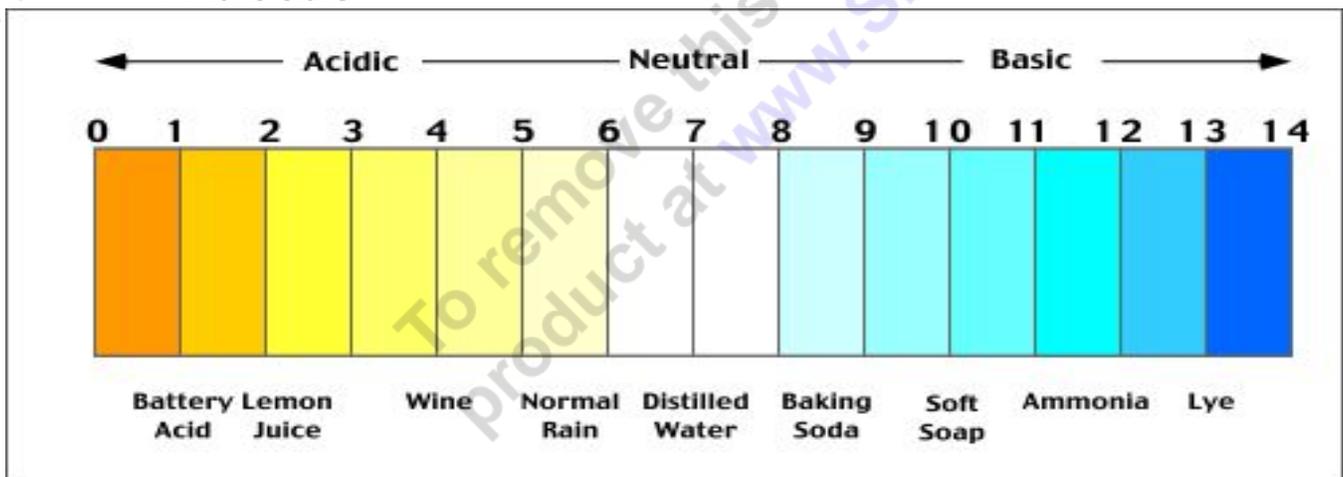
Percolation: The slow movement of water through the soil.

Groundwater discharge: Water that has been underground seeps back into the oceans, or into rivers or lakes.

Water in a pure state has a neutral **pH**. As a result, pure water is neither **acidic** nor **basic**.

pH scale goes 1-14

- 7 is neutral or very little pH
- 1 is Acidic
- 14 is basic



pH - An expression for the effective concentration of hydrogen ions in a solution.

The strength of an acid is based on the concentration of H⁺ (hydrogen) ions in the solution.

- Hydrochloric Acid can induce chemical change.
- $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$ (gas)

Acid rain: Any form of precipitation that is unusually acidic. Usually around a pH of 5

Acid Rain is caused by Nitrogen and Sulfur dioxides. Aka – Air pollution.

Universal Solvent: Liquid water is able to dissolve a large number of different chemical compounds.

Homogeneous mixture – Same throughout.

Heterogeneous – A mixture of two or more compounds.

Solvent – The substance that does the dissolving (usually larger amount)

Solute – The substance that gets dissolved (usually lesser amount)

Solubility - How much solute can dissolve in a substance before it becomes saturated.

Supersaturated: When no more solute will dissolve. (crystals visible)

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