


Bio 115 Cells & Evolution of Life

The Basics of Life

Water and pH




Start Audio Lecture!

1

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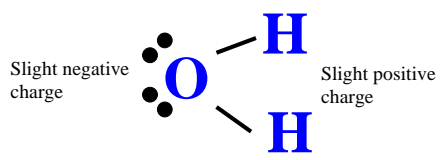
Essential Water



2

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Molecular Structure of Water



3

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Special Properties of Water

(a) Solid water (ice) (b) Liquid water (c) Gaseous water (steam)

Hydrogen bonds constantly forming, breaking, reforming.

4

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Special Properties of Water

(a) Solid water (ice) (b) Liquid water (c) Gaseous water (steam)

Transition requires much energy (high heat of fusion)

Transition requires much energy (high heat of vaporization)

Numerous hydrogen bonds result in high heat capacity

5

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Heat Capacity and Heat of Vaporization

Portland, OR

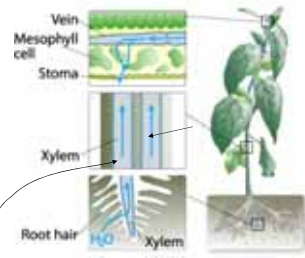
Minneapolis, MN

California Current

Gulf Stream

6

Cohesion and Adhesion



Water striders take advantage of the surface tension of water.

Water molecules cohere to each other and adhere to the walls of xylem cells to form a continuous column of water.

7

The Density of Water

Floating ice not only gives these penguins a place to rest out of the water, but helps insulate the water below from freezing solid.



8

Determining the pH of a Solution

$$\text{pH} = -\log_{10} [\text{H}^+]$$

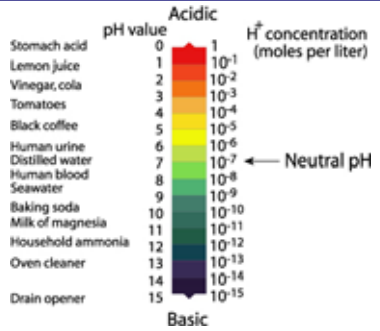
Ex. If $\text{H}^+ = 10^{-9} \text{ M}$, then

$$\begin{aligned} \text{pH} &= -\log_{10} [10^{-9}] \\ &= 9 \end{aligned}$$

9



The pH Scale





Buffers

Buffers are solutions of weak acids and their corresponding bases that are able to resist changes in pH.

The figure here shows how the pH of a buffered solution can change very little as more and more base is added.

