



These notes represent a detailed interpretation of the professor's lecture. These notes are not a transcript of the lecture. TakeNote® is best used as a supplement to your own notes, not as a substitute.

Lecture Date: Tuesday, February 15, 2005

Announcements:

- There will be a guest speaker, Professor Tom Owens from the Plant Biology department, in class all this week. He will be speaking about the properties of water
- I. The Chemical and Physical Properties of Water
 - A. We can not go much further in oceanography without finding out more about the chemistry of seawater
 - B. The molecular properties of water affect the ocean current.
 - C. If you look across the universe, it will become apparent that water is a very **odd** substance.
 - D. Life as we know it couldn't exist without water
 - II. Properties of Water
 - A. Two important macro properties:
 1. Thermal properties: the ability of water to take up and store heat, or to release heat
 2. Density: the difference in water densities drive currents, which are very important in the distribution of life.
 - B. Unique Properties of Sea Water:
 1. Heat capacity: the heat required to raise 1 gram of liquid water 1 degree Celsius
 - a. Water has the highest heat capacity of all naturally occurring substances (except liquid ammonia).
 2. Latent heat of fusion: the heat required to melt one gram of ice at 0 deg. C to liquid water at 0 deg. C.
 3. Latent heat of evaporation: the heat required to melt one gram of water at 100 deg. C to one gram of water vapor at 100 deg. C.
 4. Thermal expansion: when you heat a substance up, it usually expands and becomes less dense. However, water reaches its maximum density before freezing. Therefore, ice (which is the solid phase of water) floats on liquid water, because it is less dense.
 - a. This fact has great consequences for the way that life exists on Earth.
 5. Dissolving power: the ability to dissolve a wide range of substances. Water has a very high dissolving power.
 - C. Chemical structure of Water:
 1. How do we account for these unique properties of water?
 2. A water molecule consists of one Oxygen molecule, which has 8 protons, 8 electrons, and 8 neutrons, and 2 Hydrogen molecules, which each have 1 proton and 1 electron.
 3. These three molecules are bonded with **covalent bonds:**
 - Covalent bonds hold the molecules together by sharing electrons.