Water loss to the atmosphere is a significant problem in many parts of the world. When water supplies are low, anything that can be done to decrease water loss is important for farmers. An evaporation pan can be used to measure how fast water evaporates in a given location. This information can be used as part of projects to develop ways to cut down on evaporation and increase the amount of usable water in a region.

**Properties of Water**

Compared to other molecular compounds of relatively low molar mass, ice melts at a very high temperature. A great deal of energy is required to break apart the hydrogen-bonded network of ice and return it to the liquid state. Likewise, the boiling point of water is very high. Most molecular compounds of similar molar mass are gases at room temperature.

**Surface Tension**

Water has a high surface tension (attraction between molecules at the surface of a liquid) because of its hydrogen bonding. Liquids that cannot hydrogen bond do not exhibit nearly as much surface tension. Surface tension can be seen by the curved meniscus that forms when water is in a thin column such as a graduated cylinder or a buret.

![Figure 15.3.1: The meniscus of water in a graduated cylinder forms because of water's hydrogen bonding.](image)

**Vapor Pressure**

The vapor pressure of a liquid is the pressure of the vapor produced by evaporation of a liquid or solid above the liquid or solid in a closed container. The hydrogen bonding between liquid water molecules explains why water has an unusually low vapor pressure. Relatively few molecules of water are capable of escaping the surface of the liquid and enter the vapor phase. Evaporation is slow and thus the vapor exerts a low pressure in a closed container. Low vapor pressure is an important physical property of water, since lakes, oceans, and other large bodies of water would all tend to evaporate much more quickly otherwise.

Vapor pressure is influenced by temperature. As the temperature increases, more molecules are released from the surface of the liquid. This increases movement above the liquid surface, increasing the pressure in the vapor stage. The image below illustrates the effect of temperature on vapor pressure.
Figure 15.3.2: Vapor pressure of water at different temperatures.

Summary

- Water has high surface tension because of extensive hydrogen bonding.
- The vapor pressure of water is low due to hydrogen bonding.
- Vapor pressure increases as temperature increases.

Contributors

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