

Name: _____

Period: _____

Date: _____

The Water Cycle, Oxygen-18, and Ice Cores Worksheet

Demonstration

Before the demonstration, look at the styrofoam balls in the plexiglass container and then answer the following questions:

1. In what way are the styrofoam balls the same or different?
2. What do the styrofoam balls represent?
3. What do you think that the plexiglass container represents?
4. What do you think that the fan represents?

Next, your teacher will turn the fan on to simulate the evaporation of water. Watch the styrofoam balls closely and answer the following questions.

5. Which styrofoam balls seem to be rising the highest?
6. Which styrofoam balls tend to stay lower?
7. Come up with a hypothesis that will explain the observed motion of the styrofoam balls.

Heavy Water

8. How is heavy water (H_2^{18}O) different from light water (H_2^{16}O)?

9. The different masses of H_2^{16}O and H_2^{18}O behave differently in the water cycle.
 - a. Which one do you think preferentially evaporates?

 - b. Which one do you think tends to remain in the ocean?

10. Why would a sample of water vapor taken from above the ocean contain a higher ratio of H_2^{16}O compared to H_2^{18}O ? (Hint: think about the styrofoam balls in the demonstration).

Condensation and Precipitation

11. During a period of warmer temperatures, would you expect precipitation that falls over the poles to contain more or less heavy water (H_2^{18}O) compared to light water (H_2^{16}O) than during an ice age? Explain.

12. Refer to the $\delta^{18}\text{O}$ vs. temperature graph. What is the relationship that exists between $\delta^{18}\text{O}$ and temperature?