

Ice Cube in Space

Teacher's Guide

The Initial View (Introducing the Activity)

The kids must be patient to see what is happening as the ice melts. *You need to have ice cubes prepared ahead of time tinted with various food colorings for the extension idea #2.*

Take a Deeper View! (More Science)

Water does this neat little trick due to the **Hydrogen Bonding** between the water **Molecules**. This kind of bonding occurs when molecules like water have an uneven distribution of electrons within their structure. What does this mean? Oxygen hoards the electrons and even **Pulls** hydrogen's electrons closer! This causes one end of the water molecule to be **Positive** and the other end **Negative**. This makes the water molecules attract each other. That's why the colored water drops on the container's bottom and then clumps together! These hydrogen bonds cause the **Solid** water to be slightly larger than the **Liquid** water it was made from. The **Density** goes down letting the solid water (ice) float on the liquid water! Fish and other **Aquatic Life** appreciate this simple fact. If ice was more dense, like the solid state of most liquids, ponds and lakes would freeze from the bottom up!! Fish, turtles, snails and anything else in the water are really glad for hydrogen bonding!

More and Bigger Views! (Additional Classroom Ideas)

1. Name several **Changes of State** or phases. What verbs are used in describing these changes? Have the students isolate and identify the verbs in these changes!
2. Try the activity over again using ice cubes made with various food colorings.
3. If you could find some dry ice, mix it and the regular ice into the cooking oil and see what happens! Be careful with the dry ice, it is dangerously cold!! Do not touch it with your bare hands! *Don't put the lid on the container, since a **Gas** is going to be made.*
4. Are there any other substances which show hydrogen bonding? Find examples.
5. Test some safe common items to find out if they are more or less dense than cooking oil and water by trying to float them in both liquids.
6. Ok, so the pond or lake doesn't usually freeze solid. How do life forms survive a solid sheet of ice as a "ceiling"? What ways do they **Adapt** to this icy winter covering?
7. Water "beads" on a shiny waxed car hood. This is caused by the hydrogen bonds pulling the water drops together. Look at what water does on a dull rough surface, it "sheets", it sticks both to itself and the surface.
8. Raindrops are usually drawn like tear drops. Should they be? Explain your answer.
9. Find some NASA video of astronauts playing with liquids in "zero g". The round shape and the fact they stick together is hydrogen bonding in action!
10. Tell why a fall on your stomach into the swimming pool hurts you so much in terms of hydrogen bonding.
11. Find out how **DNA** is held together by hydrogen bonding!

Answers

1. (it is less dense since it floated on top of the cooking oil)