

Will an Ice Cube Melt Faster in Freshwater or Saltwater?

Part 1 : Developing the Hypothesis

(May be done after viewing video segment 1: "Introduction.")

A **hypothesis** is a prediction or possible answer to a question based on background or prior knowledge. A good hypothesis can be tested.

Write any prior knowledge that you have that might help you form a hypothesis to answer this question. (This may be done individually or in groups).

What's your hypothesis to this question? _____

Come together as a class and share the hypotheses from students or groups.

Also share the rationale behind the hypotheses.

Next... watch video segment 2.

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Part 2: Experimental Design.

(May be done after viewing video segment 1: "Introduction.")

Individually, in small groups, or whole class.

Describe a simple experiment to see if an ice cube would melt faster in saltwater than freshwater.

What is the **independent variable** for this experiment ?

How is isolating this variable addressed in your experimental design?

Make a large labeled drawing of the set up for this experiment. and include a list of materials that you would need.

Come together as a class and share the experiment designs. Come to a consensus on the best experiment design to test our hypotheses.

Part of the discussion needs to include how will you need to record your results. In addition discuss what observations may be important and why.

Will an Ice Cube Melt Faster in Freshwater or Saltwater ?

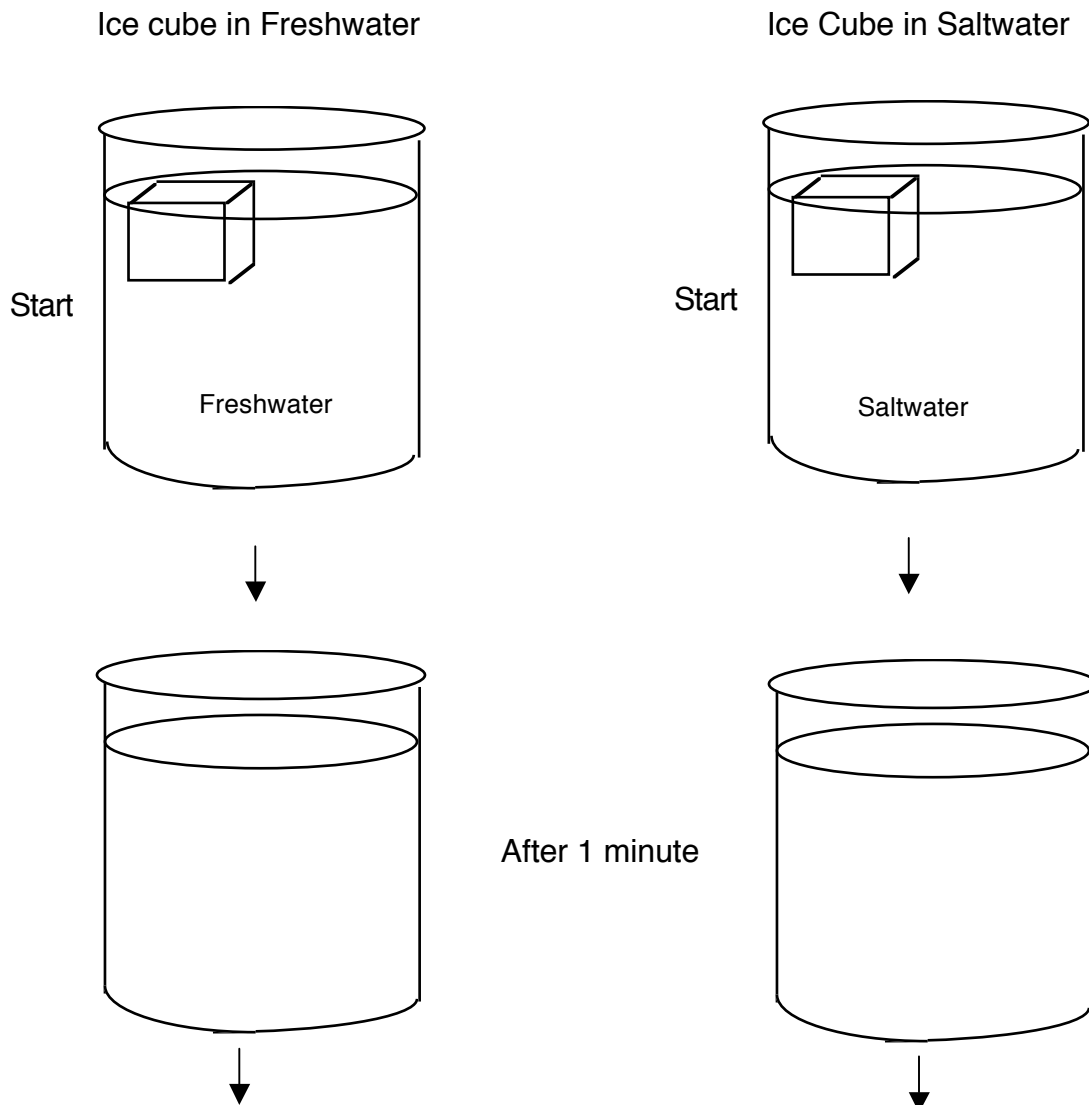
Part 3: Carrying out the experiment

Below is a template of diagrams that may be useful for to keeping track of observations and information gathered from the experiment.

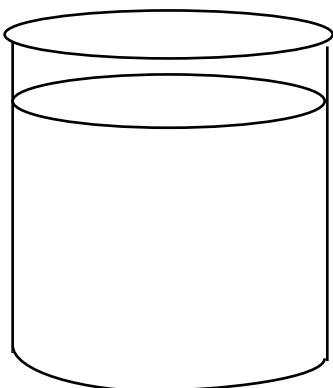
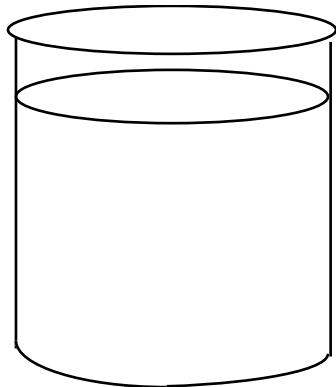
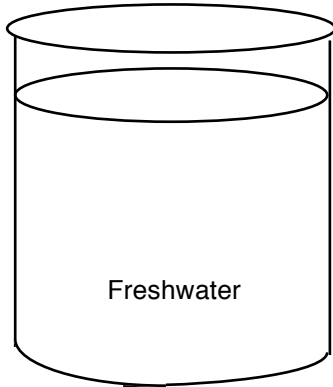
Working in small lab groups, you may carry out an experiment to determine whether an ice cube will melt faster in saltwater or freshwater or you may use this template while watching a video of this experiment.

Results: Will an ice cube melt faster in saltwater or freshwater?

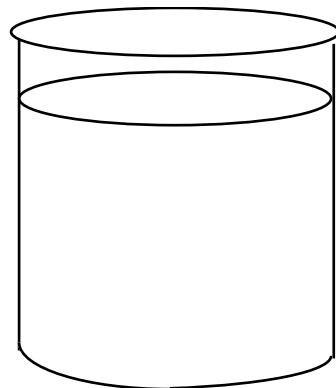
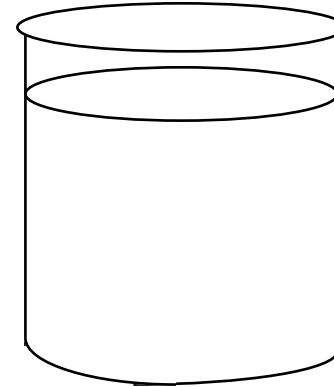
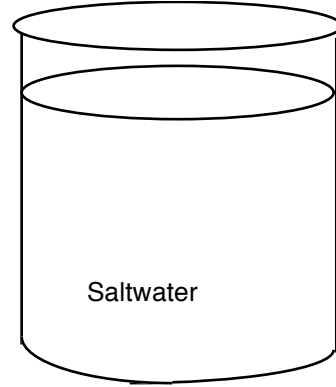
Make careful drawings and notes in/on the diagrams below.



Ice cube in Freshwater



Ice Cube in Saltwater



After 2 minutes

After 3 minutes

After 5 minutes

In which water did the ice cube melt faster... saltwater or freshwater?

Conclusions: What we learned..... *(after the experiment)*

Next.. Watch Video Segment : “Results of the Experiment.”

- From our experiment we found out that the ice cube melted faster in

By taking what we observed in this experiment, write a possible explanation for the results of this experiment?

What was the evidence from your observations throughout the experiment which would support your explanation.

Propose an experiment to verify this explanation.

Next... View Video Segment 5: “Evidence based reasoning.”

Part 4: Why does an Ice Cube Melt Faster in Saltwater than Freshwater?

May be done after viewing Video segment 3:
“Analysis of the Experiment.”

Test the proposed explanation for why an ice cube melts faster in saltwater.

Materials:

- Two clear containers (cups)... about 8-10 cm in height.
- Concentrated saltwater solution along with freshwater at ambient temperature
- Ice cubes that have been made with water containing food coloring or dye.
- Thermometer(s) .. not required*

Repeat the prior activity using colored ice cubes to visualize the path of the cold “melt water” released from the ice cubes as they melt in fresh and saltwater.

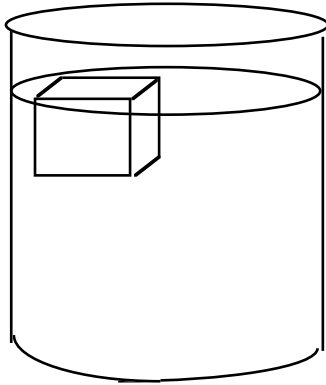
Observe the movement of the COLD COLORED WATER from the melting ice. Using arrows, labels, and appropriate shading, record the path of the COLD FRESHWATER from the melting ice cube in the diagrams provided on next page.

Compare the temperature of the surface water with bottom water in each cup after ice melts.

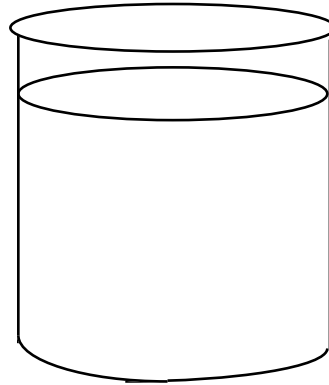
*If thermometers are not available record what you feel with your fingers by touching the outside of the cup at the water’s surface and bottom.

On the following page is a template that you may use to keep track of the experiment.

Colored Ice Cube placed in Freshwater



As ice is melting
(beginning)



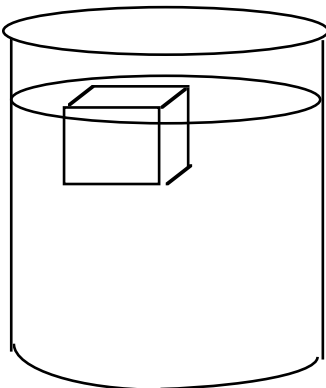
End

Water temp.

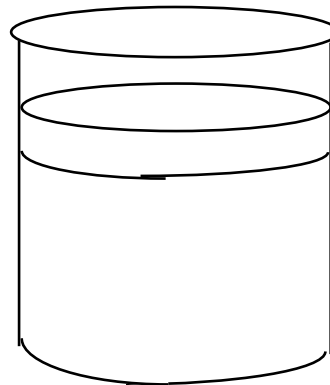
top ____

bottom ____

Colored Ice Cube placed in Saltwater



As ice is melting
(beginning)



End

Water temp.

top ____

bottom ____

Conclusion:

Why does an ice cube melt faster in saltwater?

What was the evidence from your observations and measurement throughout this experiment which support your explanation.

What new questions do you have following this experiment ?

Students might come up with new experiments to answer additional questions.

Ideas for summarizing this lesson and extending these activities are outlined in the “Teacher Notes.”

In order to explore relevant connections to this experiment students may view video segment 4: “Connections to Ocean Circulation.”