

Lesson Plan - Anti-Freeze

Grade Level: Grade Two

Learning Objectives:

- 1) To learn about how sugar plays the role of an antifreeze
- 2) To discover the changes of state that occur in the production of maple syrup
- 3) To learn how to conduct an experiment and make the necessary observations

Expectations: Matters and Materials: Properties of liquids and Solids

- Describe the properties of liquids and solids, using their observations;
- Recognise that the states of liquids and solids remain constant in some circumstances but may change in other circumstances

Materials:

- 2 plastic cups, sugar, water, a marker, a spoon, a freezer

Procedure/activities:

1. Provide information about what occurs (Sap is a watery liquid that carries nutrients from the roots of a tree to its leaves. This happens from early spring until late fall, but only spring sap is sweet enough to make into syrup. As the cold weather approaches in the late fall, the tree manufactures more sugar than usual. The sugar mixes with the watery sap and acts as antifreeze to keep the tree from freezing in all but the coldest parts of winter. In early spring, when the temperatures are milder, the sap thaws by day even though it may still freeze at night. The alternate freezing and thawing starts the sap flowing. The spring sap stays sweet until the nights warm and the tree no longer needs antifreeze.
2. Propose to the class that they make a sugary antifreeze of their own
3. Half fill 2 cups with water. Put one cup aside; this will be the "control" part of the experiment. Make sure the students understand what "control" means
4. To the other cup add two tablespoons of sugar. Stir until the sugar is dissolved. Mark the cup with an "S" for sugar.
5. Have the students draw a picture of what the cups look like before they go in the freezer.
6. Place both cups in the freezer. After an hour, compare the contents of the two cups. Have the students record their observations. Which one is frozen? (record the time that it froze) have the students draw a picture of what they see after the hour and comment on the differences between the two cups
7. Have the students hypothesise how much longer it will take the other water to freeze? On a graph record the students' guesses on how long it takes the other cup to freeze. Have their guesses be in 15-minute intervals. Record their guesses on a graph.
8. Let the students check ever 15 minutes, making sure they open and close the freezer quickly as possible so that the process is not disturbed.
9. Have the students comment on their observations in their science workbooks or science journals

Assessment:

Assess the responses filled in the observation chart

Extension Activities:

1. Reward student that made the right guess on how long the other water took to freeze.
2. Give the students a chance to try freezing other solutions that may have sugar in them.
3. Review the three states of matter and another change of state that could occur in the production of maple syrup

Anti-Freeze Observations

Water #1

Draw a picture of what you saw happening and underneath describe, in your own words, what occurred

Water #2

Draw a picture of what you saw happening and underneath describe, in your own words, what occurred
