Frozen in time: hands-on evidence

Education in Chemistry
November 2019
rsc.li/2WJHjUl

Student sheet

In this activity you will get a model ice core from your teacher. You should use this to construct a timeline for your sample site.

Each layer in your sample represents a season of snowfall. There are two seasons per year, summer and winter, and their ice is slightly different. In this activity the winter ice is shown using blue dye.

Your teacher will tell you which end of your ice core represents the most recent snowfall. You should make measurements of your ice core and then take samples from each layer to add further evidence. Take notes as you go so you can build an overall timeline of changes over time.

Apparatus per group

- Potato/apple corers
- Rulers or calipers for measuring depth
- Evaporating basin
- Heating equipment
- Measuring cylinders
- Indicator paper

Evidence	Significance within the ice core
Number of layers	This tells you how many seasons there are in your ice core sample.
Depth of layers	This shows the snowfall in each season. From this you can tell if there was a particularly dry year.
Black solids in the layers	This represents ash from volcanic eruptions. You can determine how many seasons since an eruption took place.
Colourless layer	The colourless layers represent the summer ice which is less dense than the winter ice.
Blue layer	The blue layers represent winter ice, which is more dense than the summer ice.
Large bubbles in the ice	These contain trapped gases from the atmosphere and can be used to work out the percentage of gases over time. This is really difficult to do in a school lab. A simple test we can use is to melt the ice core and test its pH. Acidic gases like CO_2 or SO_2 will cause the pH to decrease.
Presence of plant material	This represents phytoplankton, organic material that is present when sea ice has expanded into the ice core area.
Salt water	The presence of salt in an ice core shows that sea ice has expanded into the ice core area.