

Secrets of the Ice

2002 Radio Telescope, USA

I'm certain there's intelligent life out there in the Galaxy. All we need is to find one signal with the telescope.



Come on, we're alone. We've searched for 50 years. If someone were trying to get in touch, we would know it by now.



May 17th, 2005 United Kingdom



It began as an ordinary night.

Then, a bright glowing object raced across the sky and disappeared. A steaming container was found on the grass outside the Houses of Parliament. What was it? The Government refused to give any information. Newspapers reported hundreds of UFO sightings, power cuts, and both people and animals showing strange behaviour.

Was this the first stage of an alien attack?

ASSIGNMENT

CODE NAME: Secrets of the ice

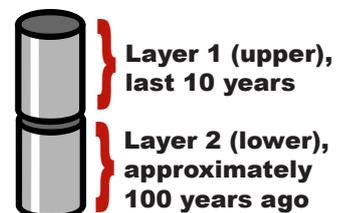
STATUS: The space object contains a cylinder of unknown material. Inside are two layers of ice. The ice is not toxic. We believe it is a message from extra-terrestrials.

SECURITY ACCESS: Level 3

- YOUR MISSION:**
- 1 Read the briefing data.
 - 2 Separate and melt the layers of ice.
 - 3 Carry out tests on them to find out what they contain.
 - 4 Decode the message, and report back to me.

BRIEFING DATA:

When snow falls, it settles and turns to ice. Every year, more ice forms on top. We believe the two ice cores from the alien planet are from two different periods in the planet's history — shown in the diagram.



Ice core tests 1

1

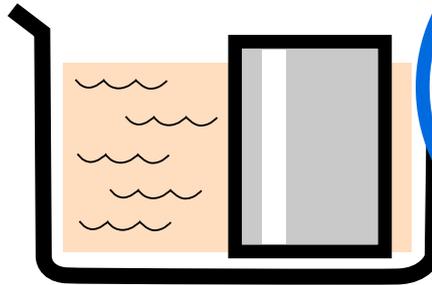
Separate the ice core layers

Vital data: Take precautions to stop water from one layer getting mixed up with the other.

Objective

Procedure

- 1) Put the can in a hot water bath (not boiling).
- 2) As soon as the ice around the edge starts to melt, remove the container.
- 3) Use a dinner knife to separate the ice from the can and remove the ice. (The ice should come out easily. If not, put it back in the hot water – don't force it).
- 4) Dry the ice. Break apart the two layers carefully.



2

Compare the rainfall in each layer

Vital data:

The depth of an ice layer tells you how much rainfall there was at the time. When the depth of ice layers is different on Earth, it can mean the climate has changed.

Objective

Procedure (work quickly before ice melts)

- 1) Measure the height of an ice core layer with a ruler.
- 2) Compare the results for both layers.
- 3) Suggest a conclusion, using the vital data.



BEFORE CARRYING OUT FURTHER TESTS, MELT BOTH LAYERS OF THE ICE CORE. FOR OBJECTIVES 3-6, TEST EACH LAYER SEPARATELY.

3

Compare the dust in each layer

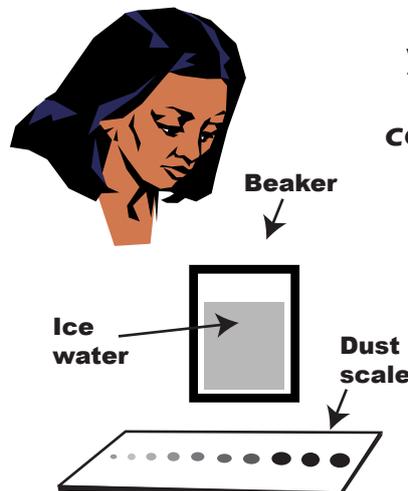
Vital data:

Finding dust in a layer tells you that the air on the planet could be polluted. On Earth, dust pollution can come from volcanic eruptions.

Objective

Procedure

- 1) Put 20cm³ of the ice water from a layer in a small beaker.
- 2) Make a dust scale: a series of dots on a piece of paper (see diagram). Start with a very pale dot, and make them gradually darker.
- 3) Put the beaker over the dust scale. Take your measurement by deciding which mark you can just see through the beaker.
- 4) Compare the results for both layers.
- 5) Suggest a conclusion, using the vital data.



Ice core tests 2

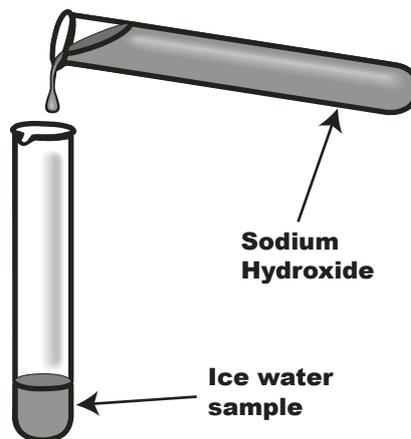
4

Compare the amount of 'heavy' metals in the layers

Objective

Procedure

- 1) Put 20cm³ of ice water in a small beaker. Place it over a piece of white paper.
- 2) Add a small amount of dilute sodium hydroxide.
- 3) Observe the result. If the sample contains copper, you will see a faint blue colour. To see if it has changed, look at your original sample.
- 4) Compare the results for both layers.
- 5) Suggest a conclusion, using the vital data.



Vital data:

On Earth, heavy metals like copper in the environment are a sign of pollution. They can be poisonous to life.

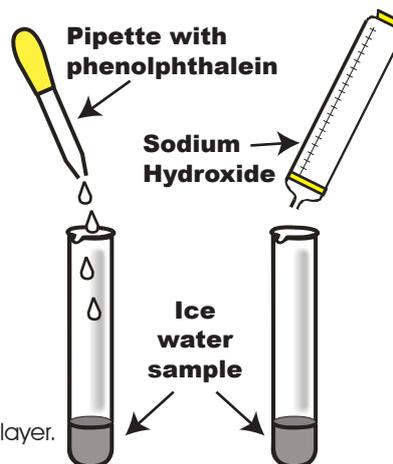
5

Compare the amount of CO₂ in the layers

Objective

Procedure

- 1) Put 5cm³ of your sample in a test tube.
- 2) Add a few drops of the indicator phenolphthalein. In acid, it goes clear. In alkali, it goes deep pink (CO₂ makes water acid, so it should stay clear).
- 3) You will be measuring out sodium hydroxide solution. If it is in a burette, record the starting volume.
- 4) Add sodium hydroxide (alkali) slowly to the sample. This will neutralize the acid from the CO₂. Stop as soon as the solution turns pink.
- 5) Record the final volume of sodium hydroxide. Work out how much of the alkali you added.
- 6) Compare the results for both layers. The more alkali needed, the more carbon dioxide there is in the ice layer.
- 7) Draw a conclusion, using the vital data.



Vital data:

The amount of carbon dioxide (CO₂) in an ice layer tells us what the air temperature was like. A difference in the temperature of the layers could be caused by aliens releasing CO₂ into the atmosphere.

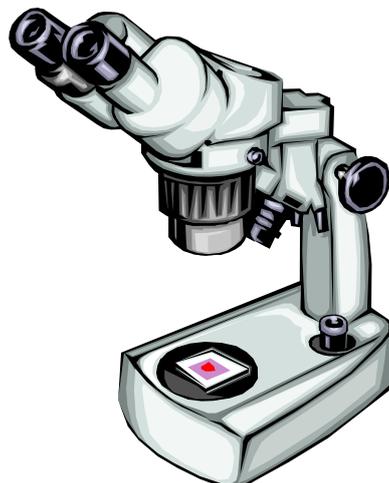
6

Discover if there is plant life in the layers

Objective

Procedure

- 1) Put a drop of sample on a microscope slide, using a pipette.
- 2) Observe whether there is any evidence for plant cells using a microscope.
- 3) Compare the results for both layers.
- 4) Draw a conclusion, using the vital data.



Vital data:

On Earth, many changes to the environment affect how well plants can grow.