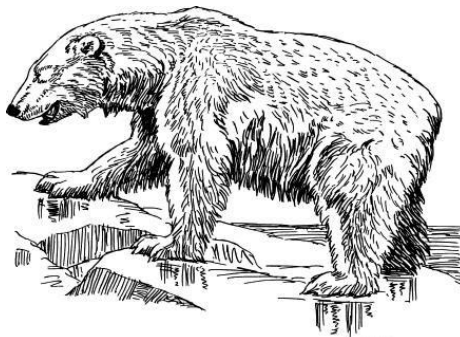


Insulating Effect - Teacher Notes

Aim To demonstrate that ice insulates seawater.

Materials

- Two beakers
- Two thermometers
- Water
- Radiant heat from sunlight, a bar heater or from a microscope lamp



Method

Before the lesson

1. Pour 100mL of water into one beaker
2. Set the pen upright in this beaker and freeze. When the ice has formed tap out the ice disc and remove the pen.

Students:

1. Half fill both beakers with water
2. Place the ice disc (prepared by your teacher) in one beaker with the thermometer inserted through to the water below.
3. Place the other thermometer in the ice-free beaker
4. Apply radiant heat from above.
5. Measure temperature increase of the water in the beaker over 20 minutes

Results/observations

Draw up a table for your results

To ensure precision and accuracy, which units shall you use for time and for temperature? _____

Time	Water temperature of container with ice (°C)	Water temperature of container without ice (°C)	Comments

(In my experiments, the container without ice had reached ambient temperature (25°C) in 7 minutes and 30 seconds. Ice was still remaining on the other container 12 minutes later and water below was still 16°C)

Conclusion

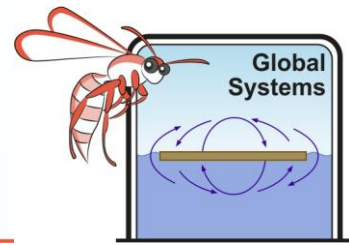
What conclusion can you draw from these results? **Ice is an efficient insulator**

Discussion

Why do you think ice is a good insulator? **Frozen ice has air trapped between the ice crystals. Air is a good insulator. Ice has a reflective surface, which will return radiant heat to the atmosphere (albedo effect).**

How will increased sea ice melt affect polar bears in the northern oceans? **Polar bears hunt for fish and seals from sea ice. Their hunting habitat will disappear.**

Insulating Effect - Teacher Notes



ALBEDO: Albedo is the degree to which radiant energy is reflected from a surface. Ice reflects radiant heat from its surface back into space. This is known as the albedo effect. When ice melts heat is retained in the atmosphere causing further melting.

In the geological past Earth has iced over several times. During the “Snowball Earth” times in the Ordovician most of the planet was ice covered. Albedo from the white surface dropped surface temperatures to -40°C . Present surface temperature is 15°C .

<https://nsidc.org/arcticseaicenews/>

NSIDC State of cryosphere data was used for this worksheet and can be accessed for up to date mapping of changes.