

Icebergs - experiment scenario

Objective: understanding the formation of icebergs, visualisation of their dynamics.

You will need:

- A rectangular container that fits into a freezer.
- A clear container, larger than the previous one.
- A freezer.
- A knife.

What to do:

- Put water in the first container and place it in a freezer.
- When the water is completely frozen, remove the container and extract the ice block, will represent a floating . Take a few stabs on one end of the block, without breaking it, to create areas of least resistance.
- Fill the second container with lukewarm water and immerse the weakened part of the ice block. The part not immersed in the water is roughly the edge of the ice sheet.



After a while we see that pieces of the ice is detached from the submerged part, while the rest of the block remains massive.

Icebergs have variable sizes and they stand out in the areas of lesser resistance, because lukewarm water that gently melts the ice.

This simple experiment simulates the formation of icebergs. If we then observe the ice cubes, we may wonder why they float and why part of their volume (almost always the

same proportion) is located above the surface of the water.

Why does an ice cube float?

When an ice cube is immersed in the water it undergoes a vertical force from the bottom up the surface. This force is equal to the weight of the volume of water displaced by the ice cube (Archimedes law).

Why does the ice cube stick out of the surface?

For at least 3 reasons.

The water has dilated by freezing, with equal weight the ice cube has a greater volume ($11/10^\circ$) than the amount of water it took to form it (the density of ice is lower than that of water. The Archimedes force is therefore larger than the weight of the iceberg.

Most icebergs contain a lot of air. Far from being the solid blocks of ice many people imagine, icebergs are riddled with billions of tiny, trapped air bubbles, giving the huge bergs their white appearance.

Third, icebergs are made from fresh water . Because of the dissolved salts in ocean water, it is denser than freshwater, adding bouyancy to the icebergs.

Will the water level rise when the ice cube is melted?

No, because he has already raised the level in the container by a height almost equivalent to his volume in water. That's why the sea level will not rise if the sea ice melts. However, if ice sheets and glaciers melt, the sea level will rise.

