

Ice Science

What is Ice?

Ice is frozen water.

Ice can float as it is less dense than water. This means that for a given volume there would be more water molecules in liquid water than in solid water (ice). This is quite unusual – when most liquids solidify, the solid formed is more dense than the liquid.



You can see this at home. Take a plastic drinks bottle and fill it with water. Freeze standing upright in your freezer. When you take it out, the ice should be above the level you filled your bottle to. So the volume of space taken up by the water is greater when it is frozen.

The bonds between the water molecules in ice mean that ice takes up more space than the same mass of liquid water.

Glacier Ice

Ice is frozen water. But the ice that forms glaciers is quite different from the ice cubes you get from your freezer. Instead it is snow that has been compacted over time – and all that compaction has given it quite a different crystal structure.

Glaciers contain more than just ice. As they move over the ground they pick up bits of soil, rock, and organic material. Glacial ice also contains lots of bubbles of air under great pressure because of the amount of compaction. If you put a piece of glacial ice in a glass of water, the air in these bubbles rushes out as the ice melts, and could cause your glass to explode!



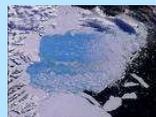
Glaciers, Ice Sheets and Icebergs.



A **glacier** is a huge mass of compacted snow and ice that originates on land and moves downslope in response to gravity.



Ice sheets are large masses of ice which can cover more than 50,000km².



Ice shelves are slabs of glacier ice which float on the sea.



Icebergs are large pieces of glacier ice that have broken off and are now floating on water.



Melting Icebergs

Because of the relative densities of the ice and the sea water, usually only 1/9 of the total iceberg is above sea level, the rest being below the surface of the water.



When ice that is floating in water melts, there is no change in water level. This can be seen in the beakers here – an ice cube has been placed in water in each one. Marked is the level of the water at the beginning of the experiment. You can see that, as the ice melts, the water level remains about the same. Why do you think this is the case?

So where does the rise in sea level from the melting of ice come from? It comes from the melting of ice which is formed on land. Icebergs have broken off glaciers which were on land. We need to worry about the melting of ice sheets – the Antarctic ice sheet is the largest single mass of ice on Earth containing 30 million km³ of ice! If this all melted, it would cause sea levels to rise by 61.1 metres!