

Lesson 2.5 Density of Solids

Solutes and Density

Did you know that there is a way to make water denser? Dissolving a solute in water gives it a higher density. Adding salt, for example, increases the density of water from 1 g/cm^3 to about 1.03 g/cm^3 . This is because the salt adds weight to the water, but the volume barely changes. With more mass, but almost the same volume, the density increases. Adding sugar to water is another way to increase the water's density.



Water is denser when salt is dissolved in it.

It's easier for things to float when the water is denser. A simple experiment can demonstrate this. If you put a raw egg into a cup of fresh water, it will sink to the bottom. Add some salt to the water, mix it around, and you'll see that the egg will slowly float to the top! In the fresh water, the egg is denser than the water, so it sinks. When salt is added to the water, its density increases to a higher density than the egg, making it float.

How Do Icebergs Float?

We all know that ice cubes float when they're put in a drink. The fact that ice floats is actually strange! Solids are usually denser than liquid. We would expect ice to have a higher density than the water, and therefore sink. But water works differently. As it cools down, its molecules spread further apart and the water expands as it turns into ice. With a larger volume but the same mass, ice actually has a lower density than water and floats¹.



That explains how huge icebergs, that can sometimes be the size of big buildings, can float in the ocean! An iceberg has a density of about 0.90 g/cm^3 , which is 10% less dense than water, so only 10% of it floats above the ocean. The rest of it is hidden under the water.

Huge icebergs can float because ice is less dense than water.

Buoyancy and Displacement

We know that a little marble sinks because it's denser than water, and a log of wood floats because it's less dense than water. However, there's a little more to it.

When an object is put into water, there are two **forces** that act on it. (A force is a push or a pull on an object.)