

Questions in science

Can you make a hole in water?

Narrator:

Can you make a hole in water? Let's start by considering water molecules.

Chemists visualise molecules using spheres to represent atoms; the oxygen atom in a water molecule is represented in this model by a red sphere and each hydrogen atom is represented by a white sphere. Water is a bent molecule.

The bond joining oxygen and hydrogen in a water molecule is known as a covalent bond – this is made when atoms share electrons. However, the electrons are more attracted to the oxygen than to hydrogen. The oxygen atom is slightly more negative than the hydrogen atom.

Due to its bent shape, water is a polar molecule - one end of the molecule is slightly negative while the other end is slightly positive.

This causes the positive hydrogen of one water molecule to be attracted to the negative oxygen of another water molecule, forming a weaker type of bond called a hydrogen bond.

The hydrogen bonds are constantly breaking and reforming between water molecules. However, this movement is limited, and liquid water retains some order in its structure with molecules fairly close together.

When liquid water freezes it becomes a solid. Molecules of water in ice are packed in a highly ordered 3D arrangement, characterised by large open channels. These empty spaces in the structure of ice means that water molecules in the ice are further apart than molecules in liquid water.

Water has the unusual property of taking up more space as a solid than a liquid. Ice is lighter which is why floats in liquid water.

To discover more about the amazing properties of water and develop your scientific thinking, explore our introductory science module 'Questions in Science'.

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