

Watch water freeze

Location

Ground floor, Our World exhibition

In a nutshell

Watch the beautiful crystal structure of ice unfold

Water can exist on Earth in three states - solid ice, liquid water and vapour - each found within the water cycle. Polarised lenses reveal the crystal structure produced as water moves from a liquid to a solid.



What to do

Press the tap to allow a thin layer of warm water to cover the viewing plate. Look through the polarised lenses to see the unique patterns created as the water changes state from a liquid to a solid as the ice forms

Time Required

KS3 & KS4 3 minutes per student.

What's happening?

The different states that water can exist in relate to how much energy the molecules have. As vapour the water molecules have lots of energy so they are free to move around and have lots of space between them. This enables them to fill any space they are in taking the shape of their container.

If we cool water vapour the molecules of water lose energy so they move around less and have less space between them.

Eventually they condense, turning back into liquid water. The molecules in liquid water are touching but are free to move around each other which is why it can be poured and it also takes the shape of whatever container you put it into. Cooling liquid water even more causes the water molecules to lose even more energy eventually freezing as a solid (ice). When in a solid the water molecules are arranged in a tight grid with no space between them, they also are not free to move so stay in whatever shape they formed when they turned into a solid.

Curriculum links

KS3	<p>Science - The particulate nature of matter</p> <ul style="list-style-type: none"> - changes of state in terms of the particle model <p>Science - Physical changes</p> <ul style="list-style-type: none"> - similarities and differences, including density differences, between solids, liquids and gases <p>Science - Particle model</p> <ul style="list-style-type: none"> - the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition <p>Science - Energy in matter</p> <ul style="list-style-type: none"> - changes with temperature in motion and spacing of particles <p>Geography</p> <ul style="list-style-type: none"> - physical geography relating to: geological timescales and plate tectonics; rocks, weathering and soils; weather and climate, including the change in climate from the Ice Age to the present; and glaciation, hydrology and coasts - understand how human and physical processes interact to influence, and change landscapes, environments and the climate; and how human activity relies on effective functioning of natural systems
KS4	<p>Science - Changes of state and the particle model</p> <ul style="list-style-type: none"> - define density and explain the differences in density between the different states of matter in terms of the arrangements of the atoms or molecules - describe how, when substances melt, freeze, evaporate, condense or sublimate, mass is conserved, but that these physical changes differ from chemical changes because the material recovers its original properties if the change is reversed <p>Science - Internal energy, energy transfers and particle motions</p> <ul style="list-style-type: none"> - describe how heating a system will change the energy stored within the system and raise its temperature or produce changes of state

Relates to:

Workshops & Theme Days	Shows	Trails	Other exhibits
<ul style="list-style-type: none"> • Colourful Chemistry (KS3) • The Water Cycle (KS3) 	<ul style="list-style-type: none"> • Splash and Bubble (KS1 & KS2 lower) 		<ul style="list-style-type: none"> • Changing world • Convection • Water Cycle

