

Solid, Liquid Or Gas

Most materials you encounter are either a solid, a liquid or a gas. These are called states of matter. The word “state” in this context refers to whether something is a solid, liquid or gas. Materials can move from one state to another, usually depending on the temperature.

You will have experienced water in all three different states. If you cool water to below 0°C , it turns into a solid. We call that solid ice. Not all solids are called ice, though. The temperature at which a material turns solid is called its freezing point.

When a liquid turns into a gas, it is called evaporation. This happens most quickly at the boiling point for the liquid. At this point, the pressure on the liquid is the same as the pressure within the liquid, and it turns into a gas. The boiling point of water is 100°C . However, liquids start to evaporate at temperatures below their boiling point. Water will evaporate at any temperature above its freezing point. It just happens a lot more slowly.

You can see this in action after a rainy day. If we had to wait for all of the puddles to reach 100°C before they evaporated, they’d never disappear. The more heat energy you apply to a liquid, the quicker it will evaporate. This is why liquids turn to gases quicker at their boiling point and why puddles disappear more quickly on a hot day.

Every material in the universe is made of tiny building blocks called molecules. These molecules act differently in each state, so let’s have a closer look.

Solids

When a material is in a solid state, its molecules are held together by short and strong bonds. Imagine a bunch of tennis balls glued together in a bundle. It would be very hard to change the shape of the bundle, and this is the same with solid materials.

Liquids

When you apply heat to a material, you add energy to the bonds



between the molecules. This makes them more flexible and means that the molecules can move about more easily. Imagine your tennis balls are now connected by short pieces of string. It would be much easier to change the shape of the bundle now.

Liquids flow and take the shape of their container. You see this when ice melts and flows into a glass. However, liquids are still heavy, and gravity stops them from floating away.

Gases

When a liquid is heated up, even more energy is transferred to the bonds between molecules. This makes them break so that each molecule can move on its own. Molecules are often lighter than air, so they expand in all directions to fill a container. If they aren't contained, then they float away. You can see this in the steam of a boiling kettle.

RETRIEVAL FOCUS

1. What is the freezing temperature for water?
2. What are materials made from?
3. What holds these things together?
4. Solid, liquid or gas refers to a material's _____
5. In which state would a material try to fill a container?

VIPERS QUESTIONS

V

If something "evaporates", what does it mean?

S

If a solid heats up, how does it become a liquid?

S

Explain how you know that water evaporates at temperatures less than its boiling point.

E

Why might the author have asked you to imagine a bunch of tennis balls?