

**Solids, Liquids and Gases:**

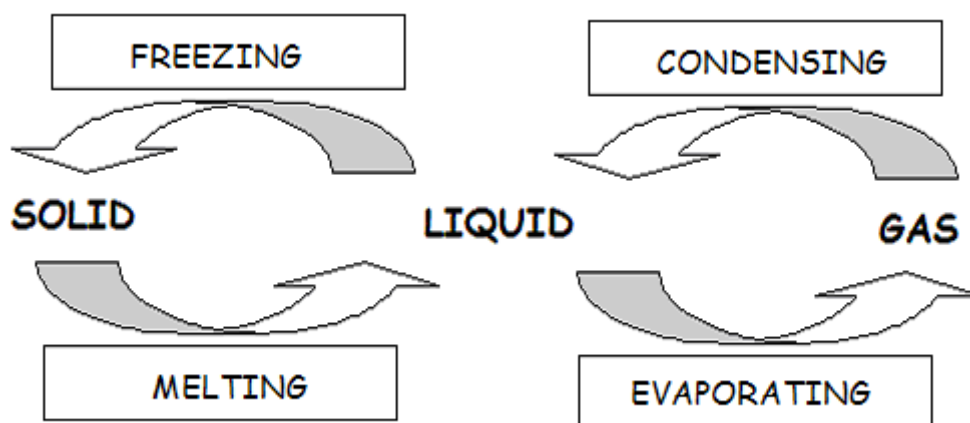
All materials we use are solids, liquids or gases. Solids, liquids and gases contain particles which are arranged differently. In a solid the particles are very close together in rows and can vibrate. In a liquid the particles are close together, but can swap places. In a gas the particles are all very far apart.

	Particles	Shape	Compression
SOLID	Very close together in rows Vibrate	Fixed shape	Cannot be compressed due to lack of space between particles
LIQUID	Close together Not in rows Can swap places	Takes the shape of the container	Cannot be compressed due to lack of space between particles
GAS	Very far apart	Fills the container	Easy to compress due to large spaces between particles

**Changes of State:**

Solid, liquid and gas are called the three states of matter.

Some substances can change state if they are heated or cooled.



The melting point is the temperature at which a solid melts.

Different materials have different melting points and boiling points.

For example water melts at 0 °C and boils at 100 °C.

A liquid changes to a gas (evaporates) when it boils. It is also possible for a liquid to evaporate at a lower temperature, for examples puddles of rain water can dry without boiling.

## Expansion and Contraction:

When a material is heated it **expands**. This happens because the particles vibrate more energetically and move further apart. If a material is cooled down, it **contracts**. Its particles vibrate less and move closer together.

## Diffusion:

Diffusion is the movement of particles to fill up empty spaces. Diffusion in a solid is very slow because the particles in a solid are very close together, and move slowly. There are bigger spaces between the particles in a liquid so diffusion is faster. Diffusion is fastest in gases because there are much bigger spaces between gas particles, and the particles move quickly.

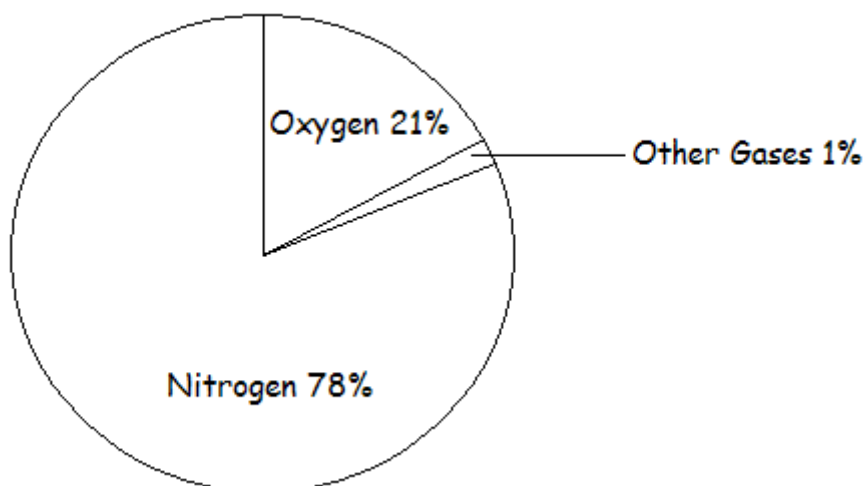
## Uses of Solids, Liquids and Gases:

Solids, liquids and gases have many different uses. A few are shown below:

SOLID	LIQUID	GAS
Building material	Soft drinks	Air
Sugar	Paint	Balloons
Salt	Honey	Fizzy drinks
Ice	Water	Water vapour

## Gases of the Air:

The air is mainly Nitrogen (78%) and Oxygen (21%) with some Argon, Carbon Dioxide and some other gases. This information is shown in the pie chart below:



## Uses of the Gases of the Air:

The gases of the air have many different uses. Some are shown in the table below:

NAME OF GAS	EVERYDAY USE
Nitrogen	Freezing food Making fertilisers
Oxygen	Breathing Burning fuels
Argon	Filling light bulbs
Carbon dioxide	Fire extinguishers Fizzy drinks

## Solutions:

The most important liquid is water. 75% of the Earth is covered with water. Sea water has salt dissolved in it. So sea water is called a **solution**. The salt is the **solute** and water is the **solvent**.

Some substances are insoluble - they do not dissolve in water.

Although the salt seems to 'disappear' in water, we can prove that it is still there in two ways:

1. The mass of water increases when a solute is added.
2. Water can be evaporated from the solution to give the dry solute.

Usually the solubility of a substance increases as the temperature of the water increases. When heated, the water particles move further apart creating bigger spaces so that more solute particles move into these spaces.

## The Water Cycle:

Heat from the sun makes sea water evaporate into a gas (water vapour), which rises up. It cools down and condenses to form little droplets of liquid water (clouds). Larger, heavier droplets fall as rain while lighter droplets are carried higher and further inland by the wind where they may freeze into snow. Snow falls high in mountains while rain falls lower down. Both form into rivers which carry water back to the sea where the cycle starts all over again.