

# Y4: 'Potions' (states of matter) knowledge organiser

## What is a potion?

Potions are liquids that are said to have healing or magical properties. Before people knew about modern medicines, healing potions, often made from herbs, were thought to cure a range of health problems. In fantasy stories and films, potions are usually made by a magician or a witch. They can do magical things such as healing, bewitching or poisoning. In Lewis Carroll's *Alice's Adventures in Wonderland*, Alice drinks a potion labelled 'Drink me' that magically makes her shrink.

## Potions in Shakespeare's plays

William Shakespeare used potions for different effects in some of his plays. In *A Midsummer Night's Dream*, the character Puck uses a love potion to create chaos:

*The juice of it on sleeping eyelids laid  
Will make man or woman madly dote  
Upon the next live creature that it sees.*

A sleeping potion is used in *Romeo and Juliet*, with tragic consequences:

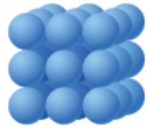


*Take thou this vial, being then in bed,  
And this distilled liquor drink thou off,  
When presently through all thy veins shall run  
A cold and drowsy humour*

In *Macbeth*, three witches make a potion to help Macbeth see into the future. It contains all sorts of strange things:

*Fillet of a fenny snake,  
In the cauldron boil and bake,  
Eye of newt and toe of frog,  
Wool of bat and tongue of dog,  
Adder's fork and blind-worm's sting,  
Lizard's leg and owlet's wing*

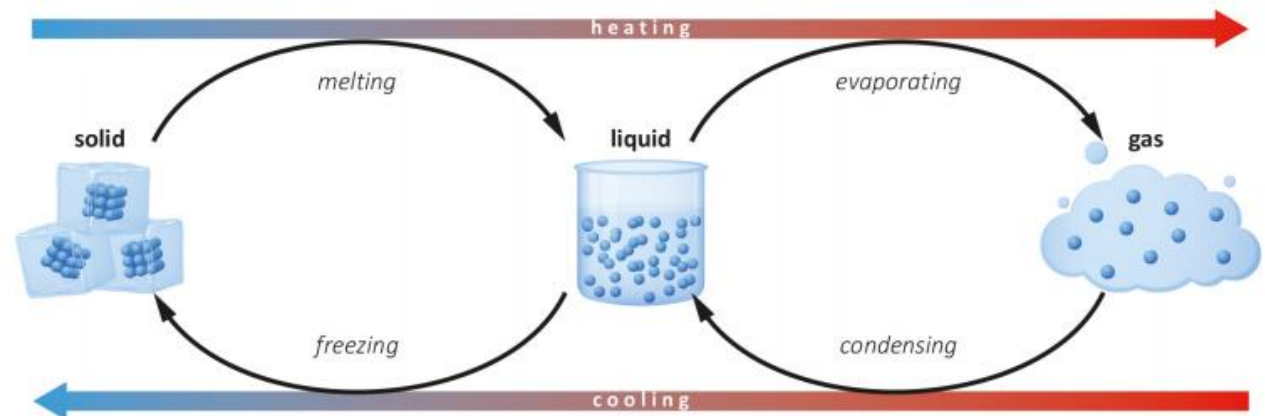
## Solids, liquids, and gases

All matter is made up of particles. The arrangement of the particles determines whether the matter is a solid, liquid or gas and its properties.

Particle arrangement	Properties	Examples
<b>Solid</b> 	Particles are tightly packed together, which means solids hold their shape and can't be squashed.	wood, brick, rock, sand, ice, butter
<b>Liquid</b> 	Particles are slightly further apart so liquids can flow from one container to another. Liquids cannot change their volume.	water, milk, oil, honey, lemonade, blood
<b>Gas</b> 	Particles are far apart so gases can spread out to fill all the space available. A gas can be squashed to change its volume.	air, oxygen, carbon dioxide, helium, nitrogen, water vapour

## Changes of state

Matter can be changed between states by heating or cooling.



## Glossary

<b>acupuncture</b>	A treatment for pain where thin needles are positioned just under the skin at special points around the body.
<b>anaesthetic</b>	A substance that makes someone go to sleep or stops them feeling pain during an operation.
<b>condensation</b>	The process of a gas cooling to become a liquid.
<b>evaporation</b>	The process of a liquid becoming a gas by heating.
<b>freezing</b>	The process of a liquid becoming a solid by cooling.
<b>laudanum</b>	A solution containing morphine that is used as a painkiller.
<b>mafeisan</b>	A powder containing drugs to make patients sleep and stop them from feeling pain. It is not known exactly what it contained.
<b>mandrake</b>	A plant with purple flowers. The root was used as an anaesthetic in ancient times.
<b>matter</b>	A physical substance that takes up space.
<b>melting</b>	The process of a solid becoming a liquid when it is heated.
<b>morphine</b>	A drug made from opium that is used to stop people from feeling pain.
<b>particle</b>	An extremely small piece of matter.
<b>potion</b>	A liquid that is not a medicine and is believed to have a magical effect on someone who drinks it.
<b>sedate</b>	To make a person feel very calm or go to sleep.
<b>vapour</b>	A gas or very small drops of liquid that result from heating a liquid.

## Gases

Gases are all around us but cannot often be smelt or seen.

Gas	Uses
oxygen	found in air and used by the body to get energy from food
nitrogen	found in air
carbon dioxide	makes drinks fizzy and is released when people breathe out
helium	filling balloons
propane	fuel for barbecues
nitrous oxide	anaesthetic and painkiller
ether	vapour used as anaesthetic
ethylene	vapour used as anaesthetic

## Anaesthetics

Anaesthetics are drugs used to put people to sleep when they have an operation. Having an anaesthetic means the patient will not feel pain during surgery. Many anaesthetics are gases and patients breathe them in through a breathing mask or tube. In 1846, an American dentist, William Morton, first used a gas called ether for pain relief when pulling a tooth out. Before that, there was no pain relief during operations. The discovery of anaesthetics is thought to be one of the greatest discoveries of all time.



William Morton uses ether on a patient

## Timeline of anaesthetics

<b>4000 BC</b>	Sumerians use opium poppy as an anaesthetic.
<b>1600 BC</b>	Acupuncture is used in China for pain relief.
<b>600 BC</b>	Sushruta, an Indian doctor, uses wine with herbs to sedate his patients.
<b>AD 64</b>	Dioscorides, a Greek surgeon in the Roman army, writes about using mandrake root boiled in wine to numb soldiers' wounds.
<b>AD 160</b>	In China, Hua Tuo performs surgery with his own general anaesthetic, mafeisan, a mixture of Chinese herbs and wine.
<b>1493–1541</b>	Paracelsus, a Swiss doctor, discovers laudanum and uses it as a painkilling drug served in an alcoholic drink.
<b>1771–1786</b>	Joseph Priestly, an English chemist, discovers oxygen and nitrous oxide ('laughing gas').
<b>1798–1801</b>	Sir Humphry Davy experiments with nitrous oxide as an anaesthetic.
<b>1805</b>	Friedrich Serturner, a German pharmacist, discovers a painkilling drug called morphine.
<b>1846</b>	American dentist William Morton uses ether as an anaesthetic for a tooth extraction.
<b>1923</b>	Isabella Herb, an American doctor, uses ethylene gas as an anaesthetic.
<b>1981</b>	A British anaesthetist called Archie Brain invents a safer way of delivering anaesthetics using a laryngeal mask which keeps a patient's airway open during an anaesthetic.