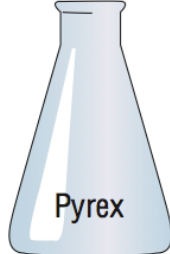
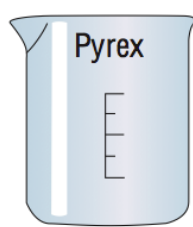
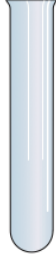


## S1/2 Science Summary

### Introduction to Science

#### Apparatus



Filter paper  
and Funnel

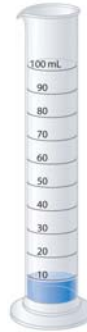
Test tube

Beaker

Conical flask

Heat-proof mat

Spatula



Thermometer



Bunsen burner

Tripod stand

Clamp stand

Measuring  
cylinder

A measuring cylinder measures volume. The units of volume are:

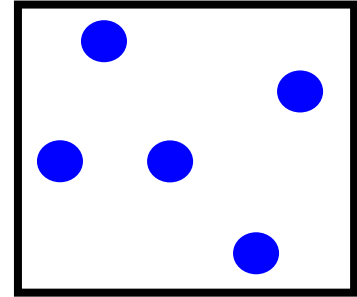
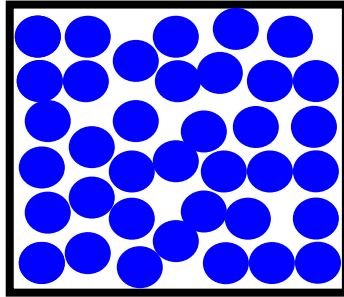
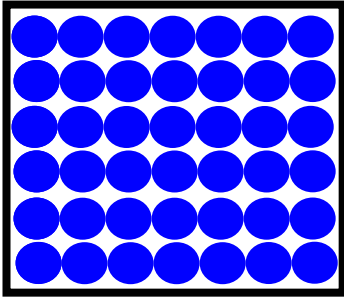
- Cubic centimetres ( $\text{cm}^3$ )
- Millilitres (ml)
- Litres (l)

A thermometer measures temperature in degrees Celsius ( $^{\circ}\text{C}$ ).

## Model of Matter

There are 3 states of matter:

- Solids
- Liquids
- Gases



**Solids:**

Have a fixed shape.  
Have a fixed volume.  
Cannot be compressed.

**Liquids:**

Have **no** fixed shape.  
Have a fixed volume.  
Can be slightly compressed.

**Gases:**

Have **no** fixed shape.  
Have **no** fixed volume.  
Can easily be compressed.

**Diffusion is the movement of particles to fill spaces.** Gases have the biggest spaces between particles so diffusion occurs faster with gases than with liquids. It occurs faster in liquids than in solids.

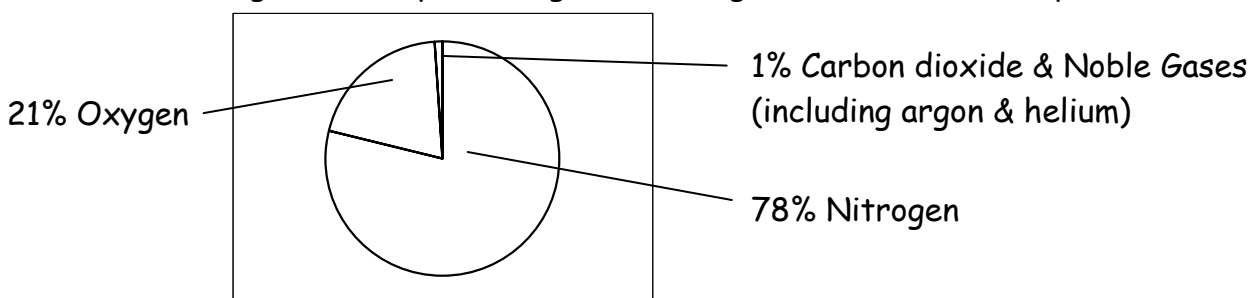
The sizes of particles and the spaces between them also explain the following:

- If we add 50ml of **water** and 50ml of **alcohol** together their total volume is **less than** 100ml.
- The particles of water and alcohol are **different sizes**.
- The **smaller water** molecules fit in the spaces between the **alcohol** molecules.

This was explained using sand and peas in class. The sand particles are small enough to fit in between the peas.

## Gases of the Air

Air is a mixture of gases. The percentages of each gas can be shown in a pie chart.



Gas	Uses
Nitrogen	Freezing food, making fertilisers for plants.
Oxygen	Breathing and burning.
Argon	Filling light bulbs (as it is completely unreactive).
Carbon dioxide	Fire extinguishers, the gas in fizzy drinks.

### Gas Tests

**Oxygen** - Relights a **glowing** splint.

**Hydrogen** - Burns with a pop.

**Carbon Dioxide** - Turns lime water milky.

### Expansion & Contraction

When materials are **heated** they **expand** (get bigger). This is due to the particles moving faster and the **spaces** between them getting bigger.

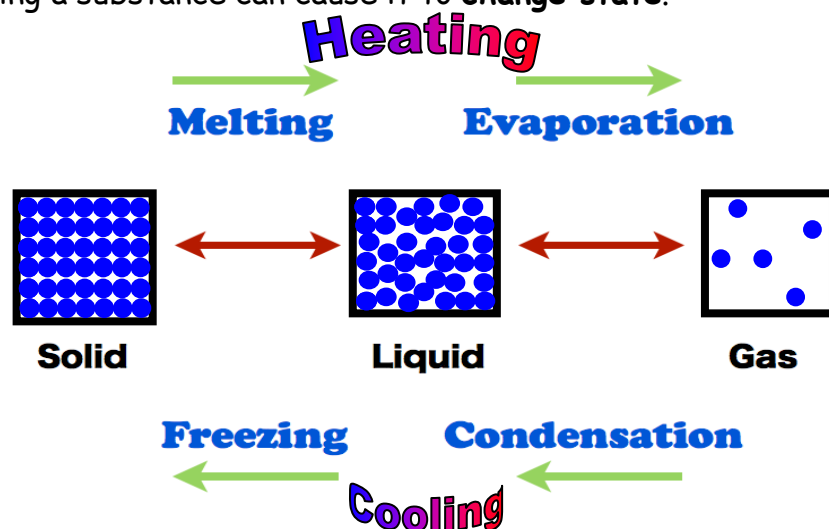
When they are cooled they **contract** (get smaller). This is due to the particles moving slower and the **spaces** between them getting smaller.

A **bimetallic strip** is made of 2 metals fixed together. It bends when heated because one metal expands **faster** and so, **more**, than the other. In this example, metal B has expanded faster than A.



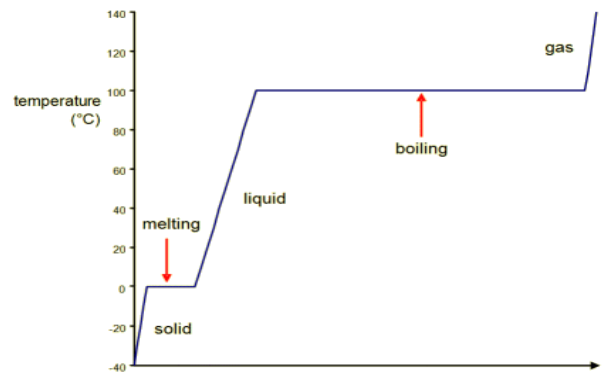
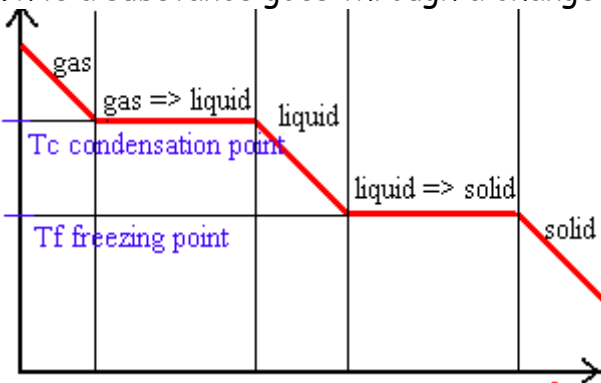
### Change of State

Heating and cooling a substance can cause it to **change state**.



## Energy and Changing State

While a substance goes through a change of state, there is **no change of temperature**.

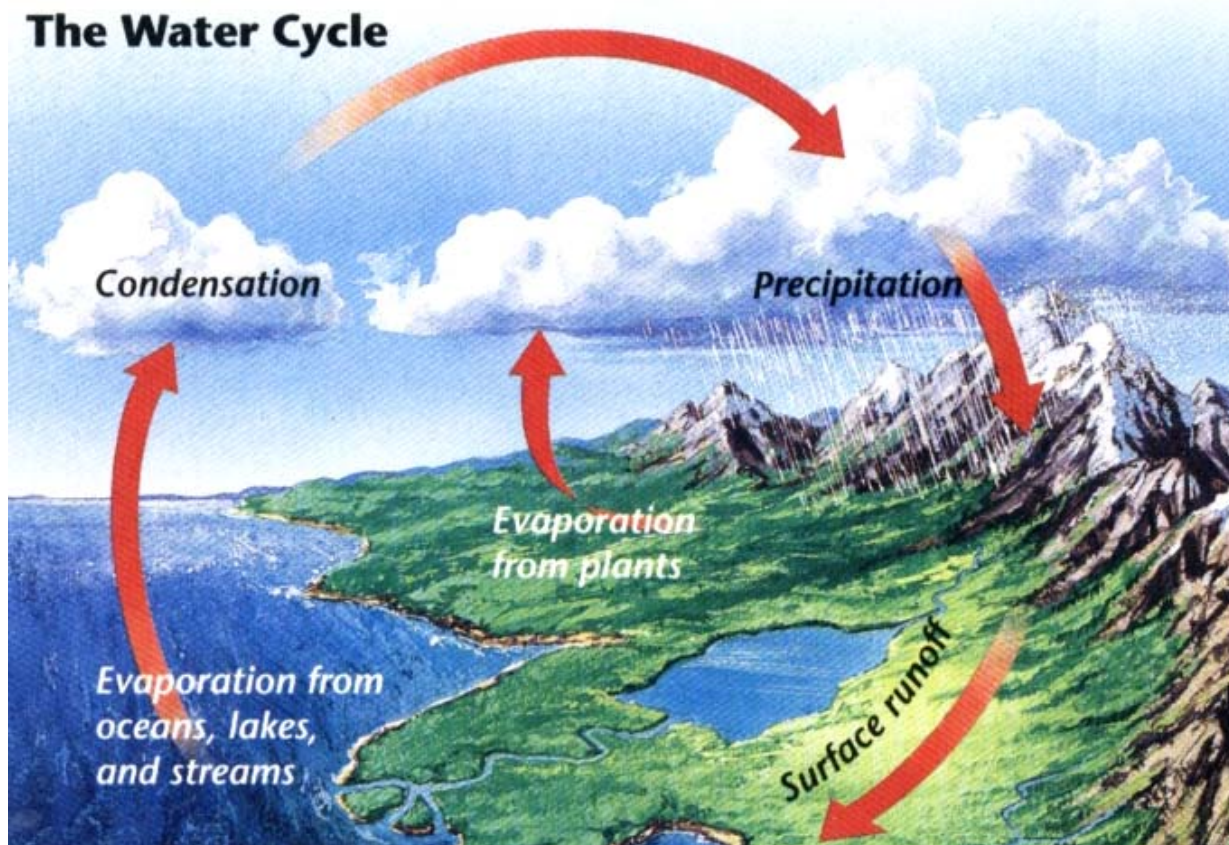


This is because:

- Energy is **produced** when bonds are **formed**, which happens during these changes: gas → liquid → solid.
- Energy is **used up** when bonds are **broken**, which happens during these changes: solid → liquid → gas.

## The Water Cycle

Water naturally exists in all 3 states and changes state throughout the Water Cycle.



There are different types of precipitation, including rain, snow and hail.