

States of matter

What is matter?

- Matter is anything that takes up space.

What are the states of matter?

- Matter can be put into three groups: solids, liquids and gases. These are called the states of matter.

How does the particle model help us explain the states of matter?

- All matter is made from particles. The particles can be atoms (the smallest particles of an element) or molecules (two or more atoms bonded together)
- The particle model looks at the arrangement and movement of particles in solids, liquids and gases
- The particle model helps us to explain the typical properties of solids, liquids and gases.

What solids, liquids and gases can you see in your environment?

Look around you and categorise the things you see into solids, liquids and gases.

Go to bp.com/bpes to find out more about atoms and elements, solids, liquids and gases, the periodic table and pure and impure substances.

Air is a gas

Gases:

- can be squashed into a smaller volume
- take the shape of the container they are in

Gas

Particles in gases are:

- far apart and arranged randomly
- attracted to each other by very weak forces
- moving freely and quickly, and are bumping into each other

Water is a liquid

Liquids:

- cannot be squashed into a smaller volume
- take the shape of the container they are in

Liquid

Particles in liquids are:

- mostly touching each other but are arranged randomly
- attracted to each other by weak forces
- moving freely over one another

Rock is a solid

Solids:

- are usually dense
- have a fixed shape and volume

Solid

Particles in solids are:

- touching each other and arranged in a regular pattern
- attracted to each other by very strong forces
- vibrating on the spot

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- open the BPES website: bp.com/bpes

- click on 'Enter a student code' (top right on all pages if you are not logged in)
- enter the code below.

Student code: 14349

This should remind you about some of the things you have already learned about solids, liquids & gases.

What do the following have in common?



Answer at bottom of next page.

Have a look at the BBC 'Bitsize Daily' programme first shown on Wed April 22nd (available on i-player). Age 11-12 Week 1 Lessons 'Chemistry – *The particle model*'

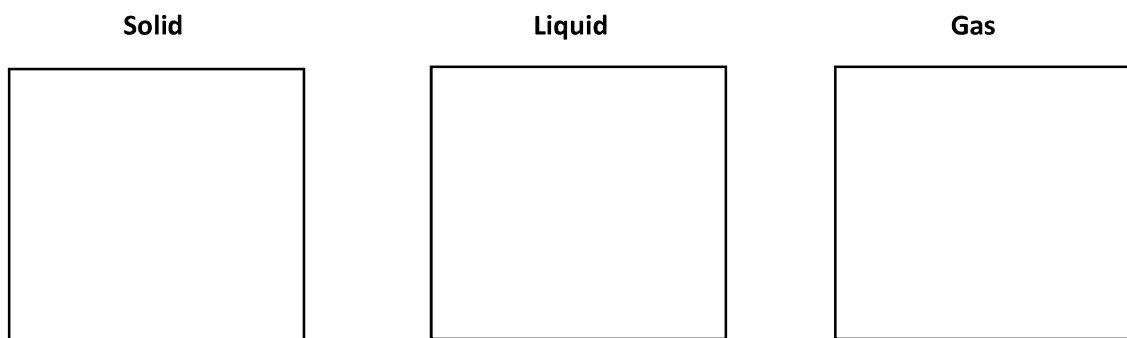
Now for some more serious questions!

Use the diagram on the previous page, the Bitesize programme and your class notes to answer the following questions.

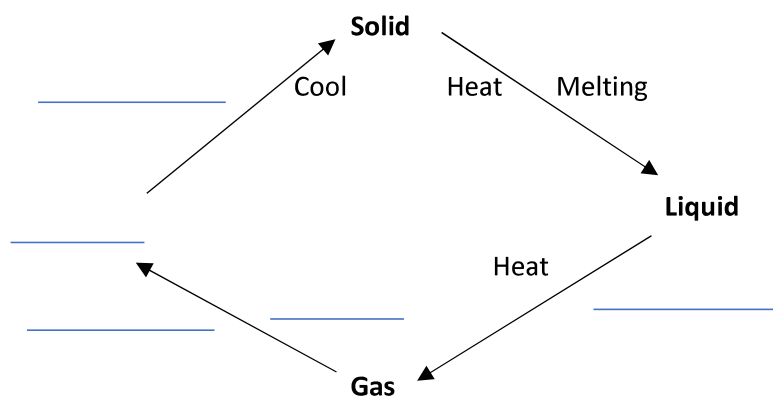
1. Complete the following table;

	Solid	Liquid	Gas
Arrangement of particles			
Movement of particles			
Closeness of particles			

2. Draw three diagrams to illustrate your answer to question 1.



3. Copy and complete the following diagram;



Answers will be found on the third worksheet for this week.

Today we're going to remind you about dissolving and making solutions.

You can start by having a look at the following link;

<https://www.bbc.co.uk/bitesize/topics/zcvv4wx/articles/zpbdpbk>

Experiment 1.

Take a cup of water. (water will be the **solvent**). Stir in a spoonful of sugar (sugar is the **solute**). Hopefully the sugar will **dissolve**. You have made a **solution**.

You can taste the solution if you want.

Can you dissolve more sugar in the water? Try to add more and keep going till no more sugar dissolves (There will be some sugar lying on the bottom which won't go away no matter how much you stir.) You have now made a **saturated solution**.

Write down the meanings of the terms in bold.

Experiment 2. -Strange Liquid

You'll make a liquid which flows easily if you push it gently but turns solid if you try to push it hard.

Apparatus;

Cornflour or custard powder

A bowl

Water

A teaspoon

Put two heaped spoonfuls of custard or cornflour into the bowl. Add water slowly and mix. When the proportions of water and powder are right, the liquid will have some strange properties.

1. If you move the spoon through it slowly it will flow easily.
2. If you try to move the spoon fast, the liquid will solidify.
3. As soon as you release the pressure it will liquefy again.

If your liquid is too runny, add more powder. If it's never runny add more water.



Experiment 3. – Stacking Liquids

Aim – To make a stack of liquids and find out what happens when you float different objects in them.

Apparatus;

A tall narrow glass

Cooking oil

Golden syrup

Water

Stones, pieces of plastic, pieces of cork,

Dried fruit



Method;

Put about 3cm of golden syrup into a glass with a spoon, trying to avoid getting the syrup on the sides of the glass.

Now pour in about 3cm of cooking oil. Now add 3cm of water on top of the oil.

Why do you end up with three layers?

Now drop a stone into the liquids and let it settle. Now add the dried fruit, plastic and cork one at a time to the liquids.

Draw a labelled diagram of your final result!

If something is heavy for its size we say it is **dense** or has a **high density**. If it is light for its size we say it has a low density.

Make a list of the following substances starting with the highest density at the top and lowest density at the bottom; golden syrup, water, vegetable oil, cork, stone, dried fruit and plastic.

Answers to questions in this lesson given in next lesson.