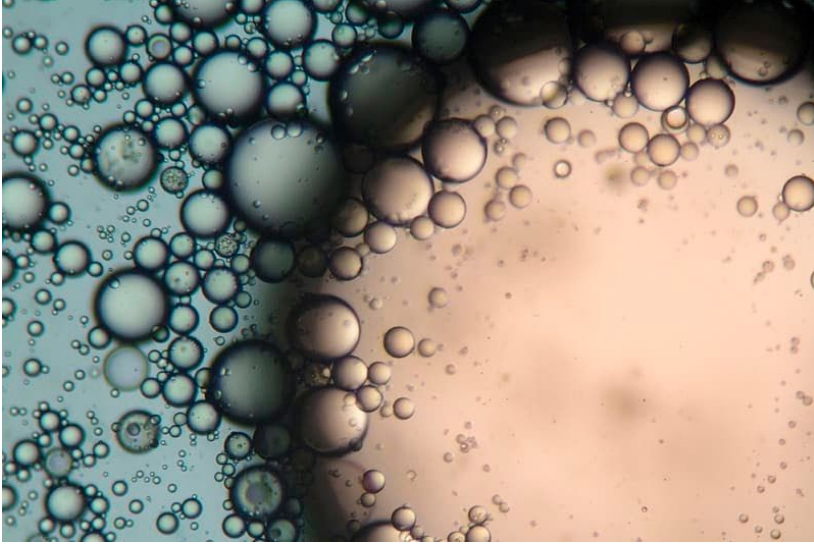


Marvellous Mixtures

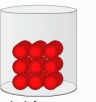


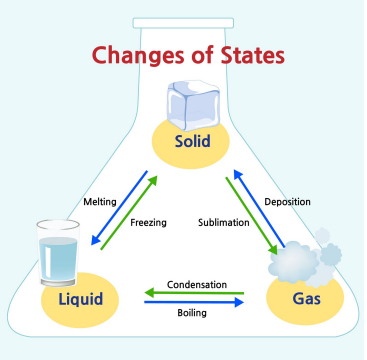


Year 5 - Spring 2

Name: _____

Class: _____

Year 5 Science Knowledge Organiser - Spring 2 - Materials

1	Solute	The substance that dissolves in a liquid to make a solution.
2	Solution	One or more substances have dissolved.
3	Solvent	The liquid in which a substance is dissolved to make a solution.
4	Soluble	Dissolves in a solvent.
5	Insoluble	It does not dissolve in a solvent.
6	Dissolve	When a substance mixes with a liquid to make a transparent liquid called a solution.
7	Liquid	A substance that flows freely but is of constant volume.
8	Filtration	The process used to separate a suspension mixture where small solid particles are suspended in liquid or air.
9	Mixture	A mixture is made when two or more substances are combined, but they are not combined chemically.
10	Filter	A porous device for removing solid particles from a liquid or gas passed through it.
11	Residue	Something that remains after the main part of it has gone, been taken or used.
12	Filtrate	A liquid which has passed through the process of filtration.
13	Sieve	A process to separate fine particles from more coarse particles by passing material through a sieve.
14	Particles	Tiny bits of matter that make up everything in the universe.
15	Evaporation	The process of a liquid changing into a gas due to the increase in temperature and/or pressure.
16	Condensation	The opposite of evaporation. When a gas condenses back into a liquid form.
17	States of Matter	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>solid</p>  <ul style="list-style-type: none"> ● rigid ● fixed shape ● fixed volume <p style="background-color: #ccc; padding: 2px;">cannot be squashed</p> </div> <div style="text-align: center;"> <p>liquid</p>  <ul style="list-style-type: none"> ● not rigid ● no fixed shape ● fixed volume <p style="background-color: #ccc; padding: 2px;">cannot be squashed</p> </div> <div style="text-align: center;"> <p>gas</p>  <ul style="list-style-type: none"> ● not rigid ● no fixed shape ● no fixed volume <p style="background-color: #ccc; padding: 2px;">can be squashed</p> </div> </div>
18	Changes of state	
19	Melting	When a solid turns into a liquid it is called melting. There is a temperature at which this happens called the melting point.
20	Freezing	Freezing is the process when a liquid turns into a solid. Freezing occurs when heat is lost from an object, which causes the molecules to slow down and form tighter bonds.
21	Evaporation	The process of a liquid changing into a gas due to the increase in temperature and/or pressure.
22	Condensation	The opposite of evaporation. When a gas condenses back into a liquid form.
23	Boiling	Boiling happens when a liquid becomes gas forming bubbles inside the liquid volume.
24	Sublimation	Sublimation is the process by which a solid transforms into a gas without passing through the liquid stage
25	Chemical Change	When a substance combines with another to form a new substance. For example, the rusting of an iron or burning of wood.
26	Physical Change	A change in the appearance of a substance (but what the substance is made of doesn't change); for example cutting wood or freezing water.

LESSON ONE: How can we separate mixtures?

Retrieval Practice

What I already know about mixtures.	Questions I still have about mixtures.
<ul style="list-style-type: none"> • • • • 	<ul style="list-style-type: none"> • • • •

Outcomes	Key Vocabulary
To explain that materials can mix and to demonstrate that mixtures of solid materials can be separated by the technique of sieving	material, compare, contrast, separate, mixture, sieve, filter, evaporate, solid, liquid, powder, particle
Knowledge needed	
Separation techniques were previously encountered in Lesson 5 of the materials unit of work.	

Everybody Reads

In our previous topics we learnt about materials and their uses. In this topic we are going to deepen our knowledge of how to separate the materials from each other if they are in a mixture. We will be doing this in a more practical way.

Talk Task

First, what is a mixture?

Everybody Reads

We have previously read about and discussed how some mixtures cannot be easily separated without the use of chemical intervention. Today, you will have to conduct a series of experiments to separate materials.

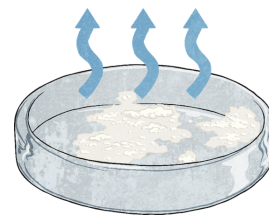
Let's remind ourselves of the various separation techniques.

Evaporation

This process is best used to separate the salt and water solution.

As the salt has dissolved in the water, filtering would not separate the two materials. The salt particles would go through the filter paper along with the water.

When the salt water solution is evaporated, the water will turn into water vapour and leave the salt behind.

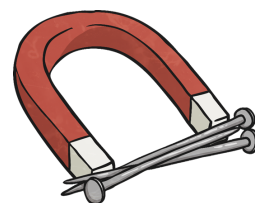


Magnetic Attraction

Use this process to separate the paper clips from the rice.

The paper clips are made of steel and will be attracted to the magnet.

The rice is not magnetic so will stay in the bowl.

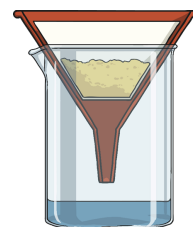


Filtration

This process should be used to separate the mixture of sand and water.

Sand is insoluble, so it has not dissolved in the water. The sand particles will not be able to get through the tiny holes in the filter paper, but the water particles will.

The sand will be caught in the filter paper while the water will get through to the bowl.



Sieving

Use this process to separate the mixture of raisins and flour.

The grains of flour are much smaller than the raisins, so they will be able to go through the sieve into the bowl below.

The raisins are much bigger, and will get caught in the sieve.



Group Task

A shelf has collapsed in the school storeroom and several of the containers, full of dried materials, have been tipped out and mixed together.

The caretaker, intending to help, has made things worse by sweeping up all the remains, including the odd dead spider, and putting them into this box.

Can you use your science knowledge to help sort out the mess?

You can use the science equipment that is around the classroom, if it will help you to separate the mixture.

Mixtures to separate:

1. Pasta and dried peas
2. Sand and pasta
3. Salt and dried peas
4. Paperclips and rice
5. Flour and pasta

LESSON TWO AND THREE: What happens when we mix liquids and solids?

Retrieval Practice One

Use your knowledge organiser to help you with these questions. Write the definition in your own words.

What is a solute? _____

What is a solvent? _____

Retrieval Practice Two

What is the difference between dissolving and melting? Write the answer in your own words.

Outcomes	Key Vocabulary
To identify through investigation some solids that dissolve and others that do not, and describe how to tell that a solid has dissolved	material, mixture, compare, contrast, separate, sieve, filter, evaporate, solid, liquid, gas, powder, particle, dissolve, soluble, solution, solute, suspension, saturated, reversible, non-reversible
Knowledge needed	
Understanding of what a solid and what a liquid is. To recall how a solid can dissolve.	

Everybody Reads

Can you remember the difference between melting and dissolving? Here is a quick reminder.

Dissolving	Melting
<ul style="list-style-type: none"> • Dissolving involves a liquid and another material, often a solid. • In dissolving, the solid mixes into the liquid to make a new liquid, called a solution. • Dissolving doesn't need heat to occur. 	<ul style="list-style-type: none"> • Melting involves only a solid. • In melting, the solid changes into a liquid that is the same material. • Melting needs heat to occur.

Some materials will dissolve easily in a solvent, but some will not;

Materials that will dissolve are known as **soluble**.

Materials that won't dissolve are **insoluble**.

If a **solute** dissolves in a **solvent**, it is now called a **solution**.

Everybody Watches!

Let's find out more about dissolving and how it happens

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

Talk tasks

Can you think of any other solids that 'disappear'/dissolve when they are put into water?
Why do you think this happens?

I have beakers that contain water, using a pen, I will mark the level of the water.

What do you predict will happen to the level of the water if we add sand to one of the beakers.

What will happen if I add fruit syrup? What about some brown sugar?

As I ask each question, **draw on a whiteboard** what you predict will happen and share your ideas.

I will add the same substances to a beaker on their own with the water. What do you predict will happen to the water level in each beaker?

Group Tasks

Task 1

Test these solids to find out whether they dissolve in water. Place a small amount of each solid in a transparent beaker or plastic cup and watch carefully as you add a small amount of water (initially, without stirring).

Solid	Soluble or insoluble in water?
Flour	
Baby powder	
Bath salts	
Bicarbonate of soda	
Coffee	
Salt	

What did you notice when you added the water to the solid?

Were there any changes straight away?

Did stirring your solid help? If so, why?

How do we know the solid had dissolved?

What happened to the solids that did not dissolve?

Task 2

Test these solids to find out whether the way they dissolve changes with the solvent you use. Use the same amount of solid and stir after adding to find out if they dissolve.

Solid	Water	Vinegar	Cooking oil
Bath salts			
Sugar			
Coffee			
Salt			

Observations from task 2

Task 3

How much of a solid can dissolve in a measured amount of water? Record your results in a table and produce a series of diagrams to explain your findings

The solids you will use are; sugar, salt, coffee granules and bath salts.

Fill each of your beakers with 50 ml water.

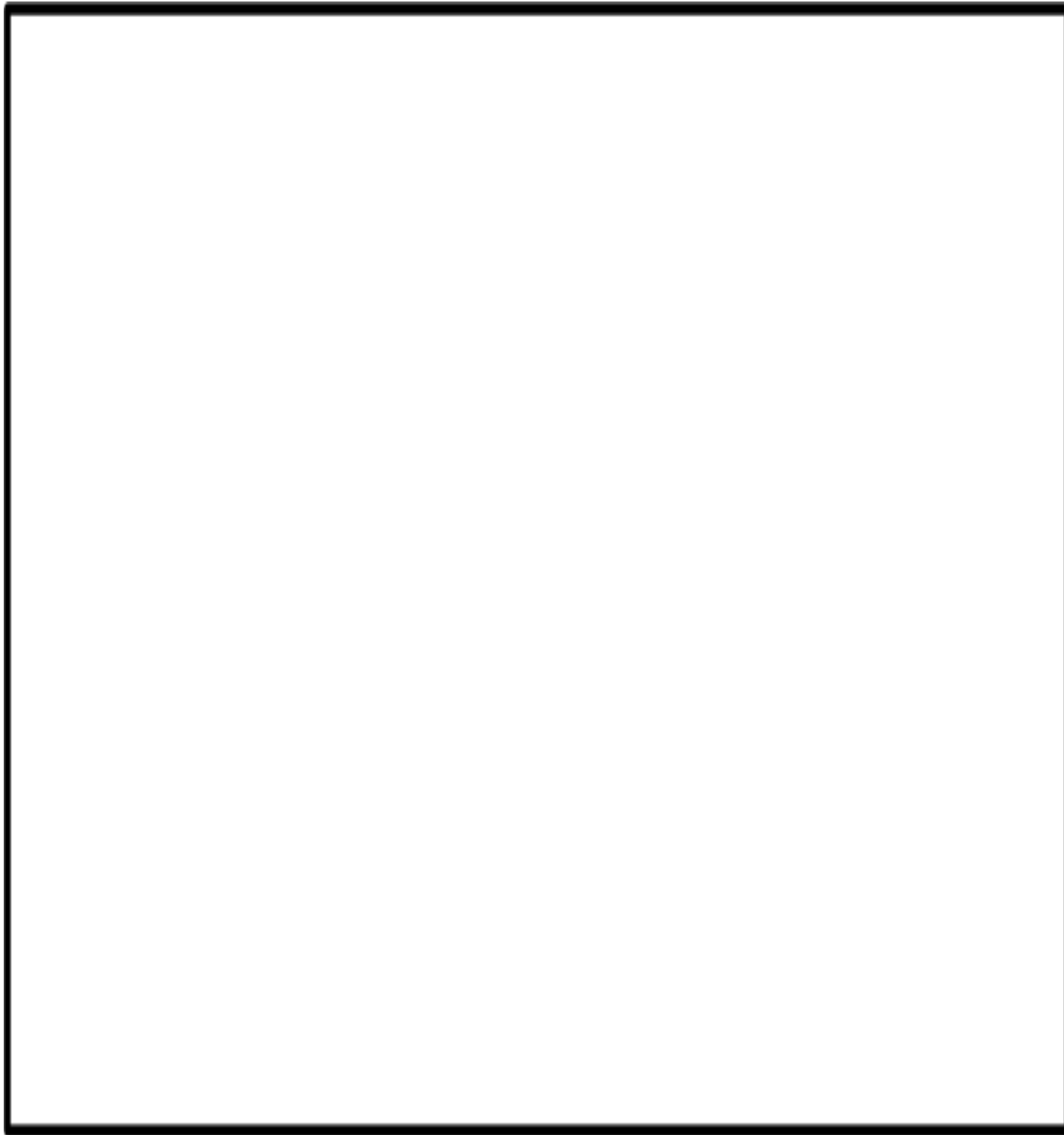
Add one spatula of solid at a time and stir.

Watch what happens and make detailed observations and record the quantities of solid you have added systematically.

When no more solid can be dissolved into a liquid, the solution is said to be '**saturated**'.

Solid	Prediction of the number of spatulas will dissolve.	Actual number of spatulas dissolved.
Bath salts		
Sugar		
Coffee		
Salt		

Draw and label diagrams to explain what has happened during each of the tests.



Exit Ticket

Write the meaning for these key terms.

Soluble: _____

Insoluble: _____

KO Quiz: / 5 and /5 Date: _____ and _____

LESSON FOUR AND FIVE: What makes a difference to how fast sugar dissolves?

LESSON FOUR - Retrieval practice

What does the term 'saturated' mean? _____

What can affect how well a solid dissolves? _____

LESSON FIVE - Do now: FEEDBACK

Look through what you have completed in your booklet so far and complete any blank pages. If you were absent, read the **Everybody reads** sections and write **ABSENT BUT READ** in **purple pen** and sign your name.

If you **complete all** of your feedback, on your whiteboard write 5 questions about **mixtures** for another person in the class to answer.

Outcomes	Key Vocabulary
To identify, through investigation, some variables that affect the rate at which salt or sugar dissolves.	material, compare, contrast, separate, mixture, sieve, filter, evaporate, solid, liquid, gas, powder, particle, dissolve, soluble, solution, suspension, reversible, non-reversible, variable
Knowledge needed	
In the previous unit we tested how the rate of dissolving changed with the temperature of the water.	

Talk Task 1

What is the relationship between the temperature of the water and the rate (how fast or slow) a solid will dissolve? Write an er, er statement on a whiteboard and get ready to show me.

Everybody Reads

In the previous topic, we tested how quickly sugar would dissolve in waters of different temperatures. We discovered that the **hotter** the water the **faster** the sugar would dissolve. If you think about a hot cup of tea or coffee, you usually add the sugar at the beginning, so it dissolves into the liquid quickly.

However, when adding sugar to a drink, you have to be careful not to **saturate** the solution.

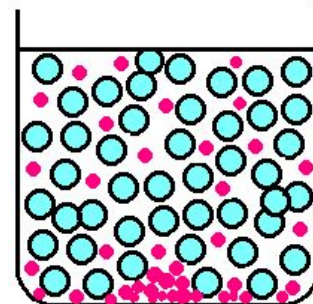
What is a saturated solution?

A **saturated** solution is a solution in which no more solid/solute can be dissolved.

The particles in a liquid are constantly moving in a random motion.

The particles of the solute nestle between those of the solvent.

When there is no more room, the excess solute settles on the bottom.



Over the next two lessons, you are going to test whether or not the type of sugar affects how quickly it dissolves in water.

You are going to undertake a **Comparative Test**.

In a comparative test you have to:

- Record observations at **regular intervals of time**.
- Compare results.
- Spot patterns.
- You need to be clear about your **independent variable (what you will change and compare)**, **dependent variable (what you will measure – there should only be one dependent variable)**, and **controlled variables (these are aspects of the investigation you will keep the same so that they don't affect your results because you end up measuring their effect)**.

Planning Sheet

Question: How does the type of sugar affect how quickly it dissolves in _____ water. (You need to decide if the water will be **hot, warm or cold**)

Prediction: _____

Independent Variable (changes):

Dependent Variable (the effect of the independent variable):

Controlled Variables (what you will keep the same):

Control:

Equipment:

Method:

What further tests would you want to do and why?

Exit Ticket

Read the paragraph below, I have changed some of the words! Can you write the correct word next to the number it should be next too.

When a solid dissolves in a liquid it makes a special type of mixture called a **1.saxophone**. The solid part of the solution is called the solute and the liquid it dissolves in is called the **2. sargeant**. The most common type of solvent is water, but some solutes dissolve in other solvents such as oil or nail varnish remover. A substance which dissolves in water is called **3. sausage**, as a substance which does not dissolve is called **4. unsolvable**.

1. _____ not **saxophone**!
2. _____ not **sargeant**!
3. _____ not **sausage**!
4. _____ not **unsolvable**!