Some materials dissolve in water others just mix

(a) Present the class as a whole with a wide range of materials to mix so that there can be a comparative, plenary discussion. Each group of children can have a smaller selection to work with. Include soluble and insoluble materials and get the children to record what happens each time. Suggest they stir or shake the mixtures and be patient! This would be a good lead into work on dissolving.
Good examples are;
Water with sand, sugar, salt, oil, coffee, lemon juice, flour;
Vinegar with oil, lemon juice.
At this stage the amount of each ingredient mixed is not critical but when adding solid to a liquid use no more than 1 teaspoon of solid to at least 100 cm^3 of water to avoid saturation. Keep the various mixtures for the discussion.

Word processing

(b) The results of the activity could then be grouped into those materials that dissolve and those that do not, having discussed solubility first. In some of these mixings has anything new been made?

Water and:	Prediction: will it dissolve?	Did it dissolve?	Describe any other changes that occurred
Sand			
Chalk			
Sugar			
Salt			
Oil			
Flour			
Coffee			

The coffee dissolved and went brown.

There are a variety of factors which affect dissolving

Discuss this with the children first and get them to suggest the factors that affect dissolving from their own experiences such as making a cup of tea. Get them to suggest a hypothesis, for example; 'I think that stirring affects dissolving' and then plan a way to prove it. This would make a good **investigation** or series of small investigations,
eg **Investigate** Does stirring affect dissolving? This can have particular reference to fair testing due to the large number of variables that could be investigated. In this set of quantitative investigations, care should be taken if using salt, as impurities in the salt often leave the water cloudy after it has dissolved. Consequently, it is not always clear at what point the salt dissolves.

Making Still Lemonade

investigation 1

You will need:
a jug, a teaspoon, a pipette, lemons & lemon squeezer or concentrated lemon juice, sugar, water and yellow food colouring.

Show what you have done with drawings

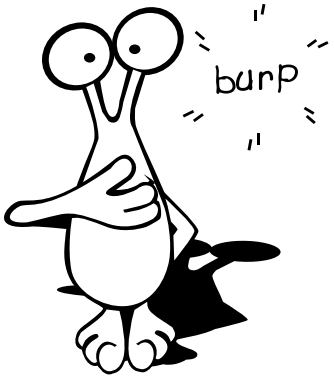
1. Measure 200ml of water.

2. Add 50ml of lemon juice.

3. Stir in 5 teaspoons of sugar. What happens to the sugar?

4. Add 2 drops of colouring.

5. Taste to test the flavour then drink.



investigation 2

Make a second batch of Still Lemonade and try different amounts of ingredients. Does it taste better with 40ml of lemon? How about 6 spoons of sugar? This is called "changing the variables". What is the perfect recipe for Still Lemonade?

The Perfect Still Lemonade Recipe		
ml of water	ml of lemon juice	spoons of sugar

investigation 3

Which do you think dissolves faster a spoonful of loose sugar or a sugar cube? How could you test this? You must make sure the test is fair. There must be the same amount of water in each beaker and you need to stir at the same rate. Did you get the result you expected? Why do you think this is?

What I Expected to Happen	The Result	Why ?

Making Still Lemonade - notes

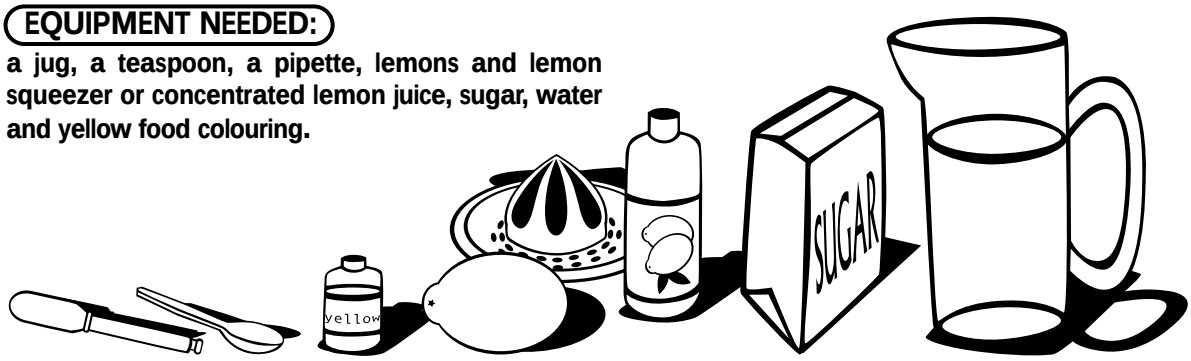
These activities show children what happens when solids are mixed with liquids; how to identify changes and what factors can affect the rate of change. Pupils need to recognise that dissolving is not the same as melting and that not all materials dissolve. The concepts of changing variables to affect outcomes and fair testing are also introduced.

investigation 1

This experiment is a practical demonstration of dissolving that gives the science a context.

EQUIPMENT NEEDED:

a jug, a teaspoon, a pipette, lemons and lemon squeezer or concentrated lemon juice, sugar, water and yellow food colouring.



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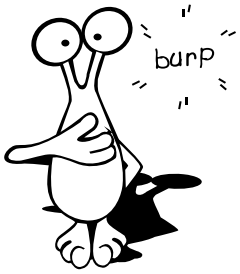


investigation 2

Make a second batch of Still Lemonade and try different amounts of ingredients. **This is called "changing the variables"**. Does it taste better with 40ml of lemon juice? How about 6 spoons of sugar?

Split the class into groups and ask each to try different amounts of ingredients.

What is the perfect recipe for Still Lemonade?

investigation 3

Which do you think dissolves faster a spoonful of loose sugar or a sugar cube? How could you test this?

This experiment introduces fair testing and making predictions.

Ask the children to predict which dissolves faster a spoonful of loose sugar or a sugar cube, and explain their reasoning. Ask them to design a fair test. To make it fair there must be the same volume of water in each beaker and you need to stir at the same rate.These answers can be prompted by holding up two beakers with unequal quantities of water, then miming stirring at different rates.
Ask them to discuss the results and suggest reasons.

The sugar lump should dissolve more slowly as only the outside of the cube is in contact with the water.

DO YOU KNOW HOW TO GET THE DISSOLVED SUGAR BACK? THE ANSWER IS SHOWN ON THIS CD-ROM UNDER "MORE ABOUT DISSOLVING"

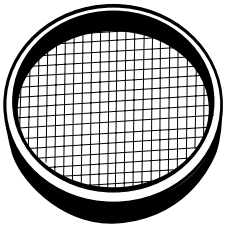
Separating Solids and Liquids

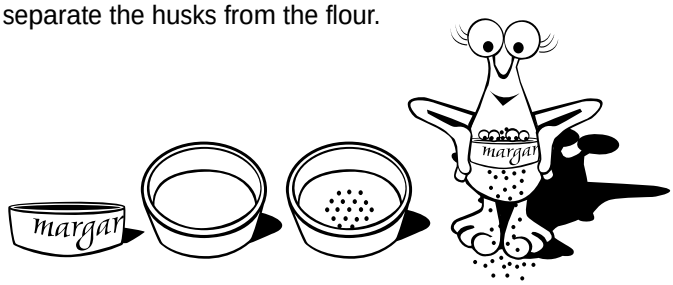
This worksheet is about separating big solids from little solids and liquids from solids that have not dissolved.

investigation 1

Why might you want to separate two types of solid?

If you were a keen gardener or farmer you might want to remove stones from your soil.
If you grind wheat to make flour you need to separate the husks from the flour.





Try separating some of the examples using a sieve. This is a fine mesh with little holes in.

Make your own sieve by making holes in the bottom of a plastic margarine tub. The holes must be big enough to let the particles of the smallest solid through, but too small for the bigger bits of the other solid.

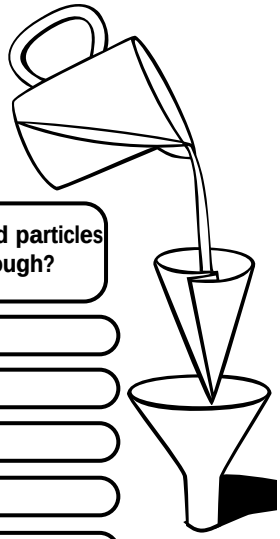
Try separating rice or lentils from water using a sieve. Sometimes solids are mixed into liquids, for example dirt in water, the bits floating in real orange juice or ground coffee in a coffee maker. If you have made the still lemonade in the worksheet 'Making Still lemonade' try separating the pips and bits of lemon from the juice.

investigation 2

Particles of soil in dirty water and coffee grinds are too small to be sieved - so you need something with smaller holes. This is called a filter. Filters can be made from paper or fabric.

Try out some different filters.

Cut circles and fold them to make a cone shape. Put the cone in the bottom of a funnel and pour in the mixture.
How can you make sure this test is fair? (Would it be fair to time a bucket of water compared to a glass full?)
Which do you think will be the best?

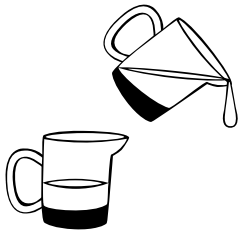


	Which filter do you think will work best?	Time for all the liquid to go through / mins	Did any solid particles get through?
paper towel			
copier paper			
sugar paper			
cleaning cloth			
cotton fabric			
coffee filter			

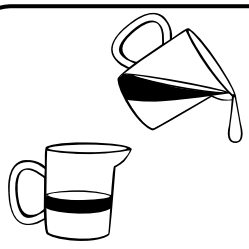
Which made the best filter? Use the back of this sheet to draw a bar graph of your results.

investigation 3

If the particles are heavier than the liquid they will eventually sink to the bottom. You can then carefully pour off the liquid. This is called decanting. Decanting can also be used to separate two liquids that do not mix



Try separating sand from water by decanting.



Try separating cooking oil and water.

Separating Solids and Liquids - notes

This worksheet involves making mixtures and reversing the changes. Children should become aware that not all solids dissolve. They will also investigate how to separate undissolved solids from liquids and how to separate solids of different sizes. It can also be used to introduce bar graphs.

Where ever possible it is important to give children a context for their experiments.
Ask why might you want to separate two types of solid?
If you were a keen gardener or farmer you might want to remove stones from your soil.
If you grind wheat to make flour you need to separate the husks from the flour.

investigation 1

Sieving can be used to separate two sizes of solid or larger solids suspended in a liquid.

EQUIPMENT NEEDED: **sieves, beakers and containers, old margarine tubs.**

MIXTURES TO SEPARATE: Soil & stones; flour and rice; water & rice; sand & marbles; jelly tots and loose sugar; Rice crispies from the crushed dust at the bottom of the packet, or anything else to hand

Begin by asking children how they can be separated. Then suggest using a sieve.

Make a sieve by piercing holes in the bottom of a plastic margarine tub. The holes must be big enough to let the particles of the smallest solid through, but too small for the bigger bits of the other solid. Sometimes solids are mixed into liquids, for example dirt in water, the bits floating in real orange juice or ground coffee in a coffee maker. Try separating rice or lentils from water using a sieve. If you have made the still lemonade in the earlier example try separating the pips and bits of lemon from the juice.

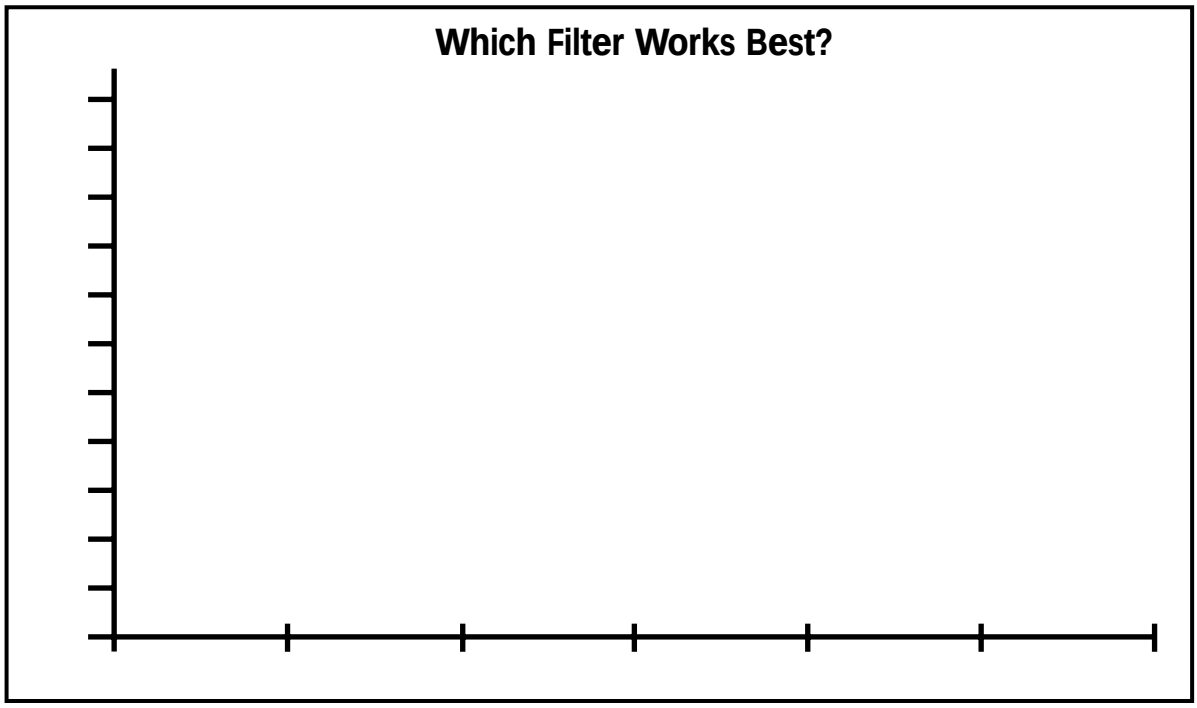
investigation 2

This experiment asks children to predict results and design fair tests. Older children can also time activities. The results can be recorded as a bar graph as each result is discrete from the others.

EQUIPMENT NEEDED: **funnel, beaker, scissors and a clock with second hand or stopwatch.**

MATERIALS TO TEST: paper towel; copier paper; sugar paper; cleaning cloth; cotton; coffee filter
(Make a filter by folding a circle into quarters and forming it into a cone shape).

Ask how this test can be made fair? - By using the same amount of water each time. This answer can be prompted by asking "would it be fair to time a bucket of water compared to a glass full?"
Ask them to predict which will be the best?



investigation 3

Decanting. If the particles are heavier than the liquid they will eventually sink to the bottom and the liquid can then be carefully poured off.

EQUIPMENT NEEDED: **jug, beaker, sand & water.**

Decanting can also be used to separate two liquids that do not mix

EQUIPMENT NEEDED: **jug, beakers, cooking oil and water**