

Experiment Title

Separating mixtures of materials (dissolving)

The question to ask.

How can we speed up dissolving?

The things that might affect the experiment. (Possible variables)

1. The size, shape and material of the containers.
2. The volume of water used.
3. The amount of material which we are trying to dissolve.
4. Whether the material dissolves or not.
5. The temperature of the water.
6. Whether or not the water is stirred or not.
7. How long you stir the water for.
8. The amount of material that is added each time.
9. The time it takes for the material to dissolve.
10. Whether the material is a powder or not.

What you could do.

This is what I am going to change: The amount of stirring that we do.

This is what I am going to measure or observe: Whether the stirred sugar dissolves quicker than the sugar that is not stirred.

Place a sugar cube in both the containers. Cover the sugar cubes with a similar measured volumes of water at a similar temperature. Stir one of the containers but do not stir the other container. Which sugar cube dissolved first?

Possible use of the computer

Condition	Time it took for the sugar cubes to dissolve/seconds			
	First time	Second time	Third time	Average time
Stirred sugar cube				
Not stirred sugar cube				

Possible use of the binocular microscope.

The children could look at the solution and see if they can see the solute molecules. They will see the colour of the solute molecules if you use powder paint or some other coloured material that dissolves.

Evidence of achievement.

The child that realises that there is a limit to the mass of solid that can dissolve in a given amount of water and that this limit is different for different solids is working towards level 4 of materials and their properties. The child that can relate the speed of dissolving with the amount of stirring is working towards level 4 of materials and their properties.

What could go wrong.

There may not be a big enough difference in the conditions. Make sure that there is a big enough difference for the children to see.

Why this happens.

Stirring increases the dissociation of the sugar molecules from the solid so that it can be dispersed throughout the solvent. The materials are dissolved to make a solution. Solutions are a uniform mixture of two or more materials. The solvent is usually the material that is present in the largest quantity. The substance that is in the smallest quantity is called the solute. The solute can be a solid, liquid or a gas. Carbonated soft drinks are an example of a gas (carbon dioxide) dissolved in a liquid. The molecules of the solute are evenly distributed among the molecules of the solvent.

The solution looks uniform under a microscope and the solute cannot be separated by filtration.

Some liquids can dissolve in each other in any proportions but if salt is dissolved in water there is a limit to the amount that can dissolve. The solution that will not dissolve any more solute is called a saturated solution. The amount of a solute that will dissolve is dependent on the temperature and pressure. This is why carbonated soft drinks fizz when they are opened and the pressure is released. The gas in the drink comes out of solution because of the change in pressure. Most substances increase the amount that will dissolve as the temperature increases. There are substances that will increase in solubility as the temperature falls. When a solute is added to a solvent the solvents boiling point is raised and its freezing point is lowered.

Further investigations.

Crush the sugar cube and add to the water while keeping the other variables the same.

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7. How long you stir the water for.
8. The amount of material that is added each time.
9. The time it takes for the material to dissolve.
10. Whether the material is a powder or not.

What you could do.

This is what I am going to change: Whether I make the sugar cube into a powder or not

This is what I am going to measure or observe: Whether the crushed or uncrushed sugar cube dissolved first.

Crush one of the sugar cubes into a powder. Place a sugar cube in one of the containers and the crushed sugar cube in the other container. Cover the sugar cubes with a similar measured volumes of water at the same temperature. Stir the containers for the same amount of time. Which sugar cube dissolved first?

Possible use of the computer

Condition	Time it took for the sugar cubes to dissolve/seconds		
	First time	Second time	Third time
Crushed sugar cube			
Uncrushed sugar cube			

Evidence of achievement.

The child that realises that there is a limit to the mass of solid that can dissolve in a given amount of water and that this limit is different for different solids is working towards level 4 of materials and their properties. The child that can relate the speed of dissolving to whether the sugar cube was crushed or not is working at level 4 of materials and their properties.

What could go wrong.

There may not be a big enough difference in the conditions. Make sure that there is a big enough difference for the children to see.

Why this happens.

The materials are dissolved to make a solution. Solutions are a uniform mixture of two or more materials. The solvent is usually the material that is present in the largest quantity. The substance that is in the smallest quantity is called the solute. The solute can be a solid, liquid or a gas. Carbonated soft drinks are an example of a gas (carbon dioxide) dissolved in a liquid. The molecules of the solute are evenly distributed among the molecules of the solvent.

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Further investigations.

Try changing the pressure in some way.

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What you could do.

This is what I am going to change: Whether I use the sugar cube or crush it into small crystals

This is what I am going to measure or observe: Whether the crushed or uncrushed sugar cube dissolved first.

Crush one of the sugar cubes into a powder. Place a sugar cube in one of the containers and the crushed sugar cube in the other container. Cover the sugar cubes with a similar measured volumes of water at the same temperature. Stir the containers for the same amount of time. Which sugar cube dissolved first?

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