Welcome to IntoScience and thank you for joining us on this journey of discovery. I hope you find this resource book useful and relevant to you and your students. I am confident that using IntoScience with your students will be extremely rewarding.

How students learn, and therefore how we teach is an ever-evolving process. The teaching of critical thinking skills and higher-order thinking are becoming more prevalent in today’s modern classroom. Skills such as these are invaluable to the scientific process and in developing scientific thinkers. Couple this with the exponential progression and access to technology, the classroom of today is a vastly different landscape even when compared to just the last five years.

Inquiry-based learning, and by that I mean the approach to learning which involves the investigation and exploration of problems or questions, is something every science teacher does through practical activities and experiments. Giving students problems, often with guidance, and letting them formulate questions, test hypotheses, record results and draw conclusions is the very essence of science and totally encapsulates inquiry-based learning. However, when it comes to teaching the theory side of science, the inquiry-based model is often lost. In many cases, this is due to not having the tools or resources to allow teaching and learning in an inquiry-based way.

This is exactly where IntoScience becomes an essential part of the teaching and learning process. From ‘doing’ mitosis to crashing cars when investigating friction, to playing basketball on the moon, IntoScience brings to life theories and concepts in a way in which no other resource can. It immerses students in a world of science, giving them the skills to grow as budding scientists. It brings scientific theories to life by questioning, doing, interacting and observing whilst staying true to the principles of science.

Having taught science for 11 years, I am very proud to be a part of the IntoScience team and to have the opportunity to truly enrich students’ lives. My aim as a teacher, and our aim at IntoScience is to inspire students to love science and to apply a scientific world view in their lives, which I am convinced is essential in today’s modern world. Seeing the way students respond to the program, how they love exploring and finding things out, and above all, how much they love learning science, is the most satisfying feeling you can have as a teacher.

I wish you well in your teaching of science and I am confident that IntoScience will help enrich your science teaching experience. Welcome to the future of education, and thank you for embarking on this incredible journey with us.

I hope you thoroughly enjoy it.

Dave Canavan MSc QTS

Dave completed his Biology Degree with Qualified Teacher Status in Manchester, where he taught High School science while completing his MSc in Behavioural Ecology. Dave then emigrated to Australia where he became the Head of Science in a government school which saw record numbers complete a science at Year 12 for that school. Dave then spent 5 years teaching science and eventually becoming the Principal of a British International School in Thailand where all students of varying ethnicities all achieved a grade C and above for their science IGCSE qualification during Dave’s time at the school. He now works to implement IntoScience in schools across Australia, the UK and the USA, changing one classroom at a time and bringing the teaching and learning of science into the future.
Catering to your style

We all have different teaching styles but whatever your style, IntoScience can cater for you. IntoScience can be applied in many different ways, and different activities lend themselves to different styles of teaching and learning. Here are a few different ways in which you may want to use the program:

**Flipping the Classroom**

What is it? – It is where students come to a new topic with some prior learning (generally as homework) from which you can then consolidate and build upon.

IntoScience example: – The *Characteristics of living things* activity in the *Cells* topic runs through the seven habits of all living things. The students could complete the activity at home achieving all seven inquiry points. Then in the first *Cells* topic you can bring up the activity on the projector or IWB and run through the activity to consolidate the concepts and alleviate any misconceptions.

Benefits? – It provides a great introduction to a topic, promotes class discussion from the outset and also provides a platform from which to build instead of starting from scratch.

**Independent Learning**

What is it? – Working and learning with minimal instruction and guidance.

IntoScience example: – In the *Elements, compounds and mixtures* topic, the *Properties and uses of elements* activity lets students explore and test the properties of elements. Whilst students are independently learning, you can walk around and help those who require it or have them explain to you what they are doing, thereby demonstrating their understanding.

Benefits? – When students are ‘doing’ as opposed to listening or taking notes, they discover, learn and understand more.

**Guided Teaching**

What is it? – A mixture of guided teaching and independent learning.

IntoScience example: – The *Particle matters* activity in the *States of matter* topic is structured so that on each screen within the activity there are things to do and explore for the students, and to have that explained and consolidated by the teacher at each step should ensure a thorough understanding of the concepts.

Benefits? – Sometimes it is helpful to have a concept projected at the front of the class, explain the science behind it and then let the students explore, before moving onto the next area.

**Formal Assessment**

What is it? – An assessment of understanding resulting in a grade reflecting their understanding.

IntoScience example: – The Mid and End Challenges contain curriculum-based questions from each topic. Mid Challenges contain a set of 10 randomised questions and the End Challenges contain 20 randomised questions. In the Teacher Controls menu, you can access the Teacher console to see the results of each student and if necessary, have them repeat the test knowing that the questions won’t be exactly the same.

Benefits? – A great way to gauge a student’s understanding of the concepts.

**Higher Order Thinking**

What is it? – This is where problems require students to think critically, applying logic and creativity in order to solve problems.

IntoScience example: – There are many text-entry areas in IntoScience where truly deep thinking can be demonstrated and assessed. In the *Taxonomic ranks* activity from the *Classification of organisms* topic, towards the end of the activity it asks students to choose one of the four models which they think best represents the classification hierarchy model. It then asks the students to explain the strengths and
weaknesses of this model in their own words. As a teacher, you can go into those text fields and view all of your students’ answers. You can choose to discuss these with the class or individually. This allows you to gain an understanding of how well your students grasped the concepts.

Benefits? – Developing these skills is the true making of a budding scientist. Not only can you as a teacher really glean whether the students understood a concept but you can also alleviate any misconceptions if and when they arise.

Homework
What is it? – Work completed outside school hours, generally for consolidating understanding.

IntoScience example: – Any activity can be undertaken by the students outside of the classroom, provided they have a suitable device and Internet connection. As IntoScience is multi-platform, and as work completed at school on one device is saved to the cloud, the students can simply log onto another device and continue working. Inquiry points can be seen in the View class results area, allowing you to check whether a student has done their homework or not.

Benefits? – If a student was given the choice to complete an IntoScience activity or work from a textbook for homework, IntoScience wins everytime!

Exam Preparation
What is it? – The necessary revision process undertaken by students before exams.

IntoScience example: – As IntoScience is broken down into topic areas, students can select the relevant topic area and work through all of the activities and Mid and End Challenges, thereby ensuring complete curriculum coverage for the topic in a fun and engaging way.

Benefits? – As each activity is a unique learning space, the students will have an anchor point from which to remember the concept. For example, if revising heat transfer methods, the camp fire scene used in the Conduction, convection and radiation activity is a great way to remember the concepts.

Explicit Teaching
What is it? – The classic ‘chalk and talk’, where a teacher is explaining a concept to all of the students in the class, generally from the front of the room.

IntoScience example: – Many activities are suitable for presenting directly to the class. There are also tools and simulations you can use as a reference whilst teaching, for example, the periodic table (accessed from the tools button on the top menu bar) allows you to select individual elements and read about their properties, or select groups, periods or filter between metals and non-metals, AMU and more.

Benefits? – Instead of having to trawl the net for suitable diagrams, simulations or videos, IntoScience has them all embedded within the program which you can find using the search function on the top tool bar.

Group Work
What is it? – Students collaborating, sharing ideas and discussing concepts in order to reinforce understanding.

IntoScience Example: – Students often gain a deeper understanding of concepts when working in groups, so wherever there are extended answer sections, it may be a good idea to have students discuss the answers in pairs or groups. They can then input their own answers using their own account.

Benefits? – When students talk to each other, they teach each other. The discussions taking place can often encourage deeper understanding.
This resource set has been created in four sections to reflect the four areas of science according to the Australian Curriculum: Biological sciences, Chemical sciences, Physical sciences and Earth and space sciences.

The books are broken down into individual topic areas within each science. They are then further broken down into the activities within each topic related to the specific curriculum elaborations. After the curriculum elaborations, you will find lesson guides for each of the IntoScience activities, followed by worksheets and worksheet answers.

Below is a suggested pathway for using IntoScience, which includes pre-lesson preparation followed by a guide for when the lesson commences.

Pre-lesson preparation

- Open the relevant science manual and turn to the topic which you are teaching. Ensure the curriculum elaborations match what you are covering and then open to the appropriate lesson guide.
- Familiarise yourself with the Summary of Key Learning Points at the top of the lesson guide and glance over the talking points and extension ideas.
- Sign in to IntoScience on your device and click on Activities in the top left-hand corner.
- Find the topic you are teaching and click on it to see a list of the activities within the topic. Select the activity you would like to use.
- Work through the activity whilst referring to the lesson guide (by selecting the L on the bottom left of the screen) taking note of where the students will achieve their inquiry points and review the suggested completion levels to see how it will relate to your students.
- Print the worksheets to use as a supplementary resource, for advanced students or to use for homework.

During the lesson

- When the lesson begins, have the students sign in with their individual Usernames and Passwords. On your device, open the activity you want to teach and select the settings button in the top right-hand corner.
- Check you have selected the correct class in your teacher controls menu. Select Summon class. This will bring all of the students to the activity you want to teach from, restricting their navigation.
- Once the students have completed the activity and earned their inquiry points, you can release them by turning off Restrict navigation in your Teacher Controls menu.
- If there is time, a nice way to finish a lesson is to encourage the students to explore the quests or challenge each other in the interactive science quiz: The 3rd Degree.
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CHEMICAL SCIENCES

PURE SUBSTANCES AND MIXTURES
IntoScience topic: Pure substances & mixtures
Identify pure substances from mixtures and delve into solutions and suspensions.

Description:
Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques [ACSSU113]

ACTIVITY: RECOGNISING PURE SUBSTANCES FROM MIXTURES
Understand the differences between pure substances and mixtures. Explore examples and ways of grouping mixtures.

Elaboration: recognising the differences between pure substances and mixtures and identifying examples of each [ACSSU113-1]

Inquiry skills:
Questioning and Predicting
- Summarise data, from student's own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions [ACSIS130]
- Referring to relevant evidence when presenting conclusions drawn from an investigation [ACSIS130-4]

ACTIVITY: WHAT MAKES A MIXTURE?
Investigate the distinct properties of mixtures and their unchanging components.

Elaboration: recognising the differences between pure substances and mixtures and identifying examples of each [ACSSU113-1]

Inquiry skills:
Planning and Conducting
- Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed [ACSIS125]
- Developing strategies and techniques for effective research using secondary sources, including use of the internet [ACSIS125-4]

Communicating
- Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate [ACSIS133]
- Presenting the outcomes of research using effective forms of representation of data or ideas and scientific language that is appropriate for the target audience [ACSIS133-1]
- Using digital technologies to access information and to communicate and collaborate with others on and off site [ACSIS133-2]

General capabilities: Critical and Creative Thinking

ACTIVITY: EXAMPLES OF PURE SUBSTANCES AND MIXTURES
Decide whether each of these items are examples of pure substances or mixtures, and sort them out.

Elaboration: recognising the differences between pure substances and mixtures and identifying examples of each [ACSSU113-1]

Inquiry skills:
Processing and Analysing Data and Information
- Summarise data from student's own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions [ACSIS130]
- Discussing investigation methods with others to share ideas about the quality of the inquiry process [ACSIS130-1]

General capabilities: Critical and Creative Thinking
ACTIVITY: STIR IT UP! MIXTURES THAT ARE SOLUTIONS
Some mixtures can be classed as solutions. Which of these do you think are solutions?

Elaboration: identifying the solvent and solute in solutions [ACSSU113-2]

Inquiry skills:
Processing and Analysing Data and Information
- Summarise data, from student’s own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions [ACSIS130]
- Comparing and contrasting data from a number of sources in order to create a summary of collected data [ACSIS130-2]
- Referring to relevant evidence when presenting conclusions drawn from an investigation [ACSIS130-4]

ACTIVITY: SOLUTE + SOLVENT = SOLUTION
Identify solutions and work out which components are the solutes and which are the solvents.

Elaboration: identifying the solvent and solute in solutions [ACSSU113-2]

Inquiry skills:
Questioning and Predicting
- Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge [ACSIS124]
- Using information and knowledge from previous investigations to predict the expected results from an investigation [ACSIS124-3]

Processing and Analysing Data and Information
- Summarise data, from student’s own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions [ACSIS130]
- Identifying data which provides evidence to support or negate the hypothesis under investigation [ACSIS130-3]

General capabilities: Literacy, Critical and Creative Thinking

ACTIVITY: WHAT IS A SUSPENSION?
Explore the fact that suspensions are a different type of mixture where particles are suspended.

Elaboration: identifying the solvent and solute in solutions [ACSSU113-2]

Inquiry skills:
Questioning and Predicting
- Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge [ACSIS124]
- Using information and knowledge from previous investigations to predict the expected results from an investigation [ACSIS124-3]

Processing and Analysing Data and Information
- Summarise data, from student’s own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions [ACSIS130]
- Referring to relevant evidence when presenting conclusions drawn from an investigation [ACSIS130-4]

General capabilities: Critical and Creative Thinking
RECOGNISING PURE SUBSTANCES FROM MIXTURES

Students explore the differences between pure substances and mixtures, comparing different states of matter and their properties.

**Suggested time: 10 minutes**

**Summary of key learning points**

Students:
- recognise the differences between pure substances and mixtures
- recognise common liquids and gases as mixtures
- identify an alloy as a mixture and recognise its properties

**RECOGNISING PURE SUBSTANCES FROM MIXTURES**

**5 minutes**

This page introduces students to the definitions of pure substances and mixtures. They can then explore the items by selecting them to learn more about them. Selecting all items = Inquiry point 1

**Extra activity:** Get students to list pure substances and mixtures in the classroom around them.

**SCIENCE EXTRA: ALLOYS**

**5 minutes**

Alloys are interesting mixtures as their properties are often somewhat different from the elements they are made from. Brass (copper and zinc), steel (iron and carbon) and bronze (copper and tin) are all common alloys.

**Extra activity:** Students could research the properties of the alloys brass, steel and bronze and research one more alloy and describe its properties and uses. Other common examples of alloys are: pewter (used for making trophies), amalgam (used for dental fillings), rose and white gold (and yellow gold for jewellery) and solder.

Students answer a question about the benefits of alloys.

**Suggested answer:** (Inquiry point 2)

Alloys can combine the best properties of elements. For example, 9 carat gold has gold for its appearance and lack of reactivity, but includes metals like copper and nickel to make it harder and more durable.

**Suggested completion levels**

**Basic - Inquiry point goal = 1**

Students at this level will: define the terms 'pure substance' and 'mixture'.

**Core - Inquiry point goal = 2**

Students at this level will: explain how a pure substance is different from a mixture, using examples from everyday life.

**Advanced - Inquiry point goal = 2**

Students at this level will: describe the similarities and differences between pure substances and mixtures; identify examples of pure substances and mixtures, listing their major components; assess the importance of man-made pure substances and mixtures to everyday life.
Students identify the properties of mixtures and recognise that the properties of the constituents do not change when the mixture is formed.

**Suggested time: 15 minutes**

**Summary of Key Learning Points**

Students:
- identify the properties of mixtures

**IDENTIFY THE PROPERTIES OF MIXTURES**

**15 minutes**

Mixtures are different from both pure substances and compounds in that they:
- can easily be separated into their constituents through physical means
- do not involve a chemical reaction
- have the properties of their constituent substances
- are not combined in a fixed proportion

Students are introduced to an alloy (yellow gold, which is used in jewellery making and which is a copper and gold mixture) and are asked to consider why an alloy might be used and what elements are mixed with gold to make jewellery.

White gold: usually nickel and gold
Rose gold: copper and gold (a higher proportion of copper than yellow gold)

Students then look at mixtures of water and sand and salt and pepper to see that mixtures are:
- not in fixed proportions
- maintain the same properties of the substances that are mixed together

Students are then asked to consider that sodium hydroxide solution is a mixture as it has no fixed proportions and the properties of both the water and the sodium hydroxide are unchanged.

**Science Extra:** A closer look at mixtures reveals that they can be made up of elements or compounds or combinations of the two.
Students understand the differences between pure substances and mixtures, and identify examples of each.

**Suggested time: 15 minutes**

**Summary of Key Learning Points**

Students:
- understand that pure substances are composed of one type of element or one type of compound
- understand that mixtures are composed of two or more types of elements or compounds
- accurately identify the pure substances and the mixtures in a line-up of substances

**Extension activity:** Create a table of pure substances and mixtures. (additional 15 minutes)

**UNDERSTAND THAT PURE SUBSTANCES ARE COMPOSED OF ONE TYPE OF ELEMENT OR ONE TYPE OF COMPOUND**

5 minutes

Students read a definition of a pure substance and see a number of examples.
A pure substance is just one type of element or compound on its own.

**UNDERSTAND THAT MIXTURES ARE COMPOSED OF TWO OR MORE TYPES OF ELEMENTS OR COMPOUNDS**

5 minutes

Students read a definition of a mixture and see a number of examples.
A mixture is made up of two or more elements or compounds.

**DIFFERENTIATE BETWEEN PURE SUBSTANCES AND MIXTURES**

5 minutes

Students identify the pure substances and the mixtures in a line-up of substances.

Identify 10 or more substances in the classroom or home and create a table of pure substances and mixtures. (Additional 15 minutes)
This activity expands on the differences between solutions and suspensions. Students watch a video and make their own observations.

**Suggested time: 15 minutes**

**Summary of Key Learning Points**

Students:
- observe the difference between suspensions and solutions
- understand the process by which a solute dissolves in a solvent

**OBSERVE THE DIFFERENCE BETWEEN SUSPENSIONS AND SOLUTIONS**

**15 minutes**

Students watch a video that shows four different substances being stirred into four separate glasses of water.

Students are asked to record their observations for each glass of water.

Soil - does not dissolve in water and remains suspended in the glass of water, settling to the bottom of the glass.

Sugar - appears to dissolve in the water. It disappears from view.

Oil - appears to be mixed in the water, but then settles on top as the stirring slows.

Coffee powder - appears to dissolve in the water, changing the colour of the water.

Students are also introduced to the concept of a solvent and a solute in a solution. The water being the solvent, and the sugar being the solute.

**UNDERSTAND THE PROCESS BY WHICH A SOLUTE DISSOLVES IN A SOLVENT**

Students see that, when a solute dissolves in a solvent, the particles are completely spread throughout the solution and invisible to the naked eye. Students watch a video illustrating that light rays can pass straight through the solution. Conversely, light rays would not pass directly through a suspension.

**The question is posed:** why does salt water dissolve in water sometimes, but at other times makes the water cloudy? (The water appears cloudy when it becomes saturated with salt.)

Students understand that solutions cannot be filtered. They are asked whether solute residue would be visible on filter paper. (The answer is 'no' because the solute particles are so small, they would pass directly through.)
Solutions are mixtures and have certain characteristics. Solutions are composed of a solute and a solvent. In this activity familiar solutions are explored.

**Suggested time: 30 minutes**

**Summary of Key Learning Points**

Students:
- describe the characteristics of a solution
- identify mixtures as solutions or not solutions
- label the solute and solvent in known solutions

**DESCRIBE THE CHARACTERISTICS OF A SOLUTION**

**10 minutes**

All solutions have certain characteristics in common:
- it is a mixture with at least one substance dissolved in another
- it is homogenous
- it may be either colourless or coloured
- it cannot be easily separated by simple filtration
- the particles do not settle out when left to stand

Students can be encouraged to think of household items that might be solutions such as cordial, vinegar and bleach.

A further talking point is also to determine some household items that are liquids, but are not solutions such as milk, paint and jelly.

**IDENTIFY MIXTURES AS SOLUTIONS OR NOT SOLUTIONS**

**10 minutes**

Students watch 4 short videos of mixtures in a glass being stirred. After each video, the students are asked whether the mixture is a solution or not a solution.

This is a further opportunity to discuss the properties of a solution before the next part of the activity introduces the concept of a solute and a solvent.

**LABEL THE SOLUTE AND SOLVENT OF KNOWN SOLUTIONS**

**10 minutes**

Students label the solute and solvent in four different mixtures:

Students are then introduced to the state of matter of both the solute and the solvent in common solutions:
- alloy (solid/solid)
- perfume (liquid/liquid)
- sugar solution (solid/liquid)
- carbonated water (liquid/gas)
- air (gas/gas)

Students then are asked to suggest another solid-liquid solution, possible examples are copper sulfate solution, salt water, instant coffee and powdered cordial in water.

In each case the liquid is the solvent, and the solid is the solute.

**Interesting fact:**

Water is known as the universal solvent as more substances dissolve in it than any other solvent. This is because of the polarity of the water molecule. H₂O is made up of two positive hydrogen atoms and one oxygen atom (carrying effectively two negative charges). This not only makes water a very good conductor, but also makes it able to dissociate ionic compounds (such as NaCl) with ease.

Whilst water is a great solvent, it doesn't dissolve everything - students will know that you can't get a biro pen mark out of their school shirt with water - another solvent must be used. Students can hypothesise about what might be the best solvent for biro pen ink (methylated spirits).
Question 1
Complete this sentence
_________________________________ + ______________________ = solution

Question 2
For each of these solutions identify the solute/s and solvent.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Solute/s</th>
<th>Solvent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft drink</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perfume</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Question 3
Identify whether the following statements are true or false by putting a T or F next to them.
(a) Solutions are homogeneous.
(b) Solute can be separated from solvents by filtration.
(c) In solutions, the solvent is always water.
(d) There can be more than one solute in the same solution.
(e) Solutions are always colourless.
**Question 4**

Copper(II) sulfate forms a bright blue solution with water. In the beaker on the left, represent a concentrated solution of copper(II) sulfate and in the beaker on the right, represent a dilute solution of copper(II) sulfate.

Label your drawings.

---

**Question 5**

Identify a:

(a) liquid-liquid solution

(b) liquid-gas solution

(c) gas-gas solution
Question 1

Complete this sentence
_____________________ + ______________________ = solution

Question 2

For each of these solutions identify the solute/s and solvent.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Solute/s</th>
<th>Solvent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea water</td>
<td>Salt</td>
<td>Water</td>
</tr>
<tr>
<td>Soft drink</td>
<td>Carbon dioxide</td>
<td>Flavoured water</td>
</tr>
<tr>
<td>Perfume</td>
<td>Fragrant oil</td>
<td>Alcohol</td>
</tr>
<tr>
<td>Wine</td>
<td>Ethyl alcohol</td>
<td>Water</td>
</tr>
<tr>
<td>Air</td>
<td>Oxygen, Hydrogen, rare gases</td>
<td>Nitrogen</td>
</tr>
</tbody>
</table>

Question 3

Identify whether the following statements are true or false by putting a T or F next to them.

(a) Solutions are homogeneous. T
(b) Solute(s) can be separated from solvents by filtration. F
(c) In solutions, the solvent is always water. F
(d) There can be more than one solute in the same solution. T
(e) Solutions are always colourless. F
Question 4
Copper(II) sulfate forms a bright blue solution with water. In the beaker on the left, represent a concentrated solution of copper(II) sulfate and in the beaker on the right, represent a dilute solution of copper(II) sulfate.

Label your drawings.

Question 5
Identify a
(a) liquid-liquid solution
Perfume (fragrant oil dissolved in alcohol)
(b) liquid-gas solution
Soft drink (carbon dioxide dissolved in water)
(c) gas-gas solution
Air (oxygen, carbon dioxide and rare gases dissolved in nitrogen)
This activity compares the main differences between a suspension and a solution by comparing soil and salt mixed with water.

**Suggested time: 15 minutes**

**Summary of Key Learning Points**

Students:
- identify a solution and a suspension
- recognise the characteristics of a suspension

**IDENTIFY A SOLUTION AND A SUSPENSION**

10 minutes

Students watch a video demonstrating soil being mixed with water to observe the properties of a suspension.

A suspension differs from a solution in that the solid, liquid or gas that is being mixed into the water does not dissolve and will eventually settle out. A good example of this is calamine lotion. There are also special types of suspensions called colloids (eg foams and gels) and emulsions (eg mayonnaise or oil and water mixed together).

Two further videos are shown to demonstrate the difference between a solution (dissolved salt) and a suspension (soil and water). Students are asked to identify the suspension and write in their own words what the difference is between a solution and a suspension. (A suitable answer might be that a solution is a homogenous mixture in which soluble particles are dissolved in a liquid or gas, whereas a suspension is a heterogenous mixture in which insoluble particles are suspended in a liquid or gas.)

**RECOGNISE THE CHARACTERISTICS OF A SUSPENSION**

5 minutes

Students are introduced to the major characteristics of a suspension and are asked to match common suspensions with their type names: gas-gas (smoke in air); liquid-gas (insecticides); liquid-liquid (cordial in water); solid-gas (dust in air); solid-liquid (sand in water); solid-solid (soil).