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Infotectives

This unit is designed to allow students to participate in a range of activities to develop an understanding of mixing common substances. Students set themselves up to be 'infotectives' who, using a word processor, describe the results in a report. They describe their investigations, experiments and results to a designated audience, who can reproduce the experiment from the report and secure the same results.

Learning outcomes

This unit focuses on CSF learning outcomes in the Chemical science strand of Science and the Information strand of Technology but could be developed to include activities that focus on other key learning areas.

The relevant learning outcome and indicators for level 3 Science (Chemical science) are:

3.2 Describe examples of changes in common substances.  SCCS0302

- Identify changes that are reversible.
- Recognise that some changes are reversible and some are not.
- Identify differences between the processes of mixing, dissolving, melting, boiling and evaporating.
- Recognise that mixing, dissolving, melting, boiling and evaporating can often be reversible.

The relevant learning outcome and indicator for level 3 Technology (Information) are:

3.2 Develop and modify solutions to simple information problems experienced by various audiences, using a limited range of information technology skills, processes and equipment. TEIN0302

- Explain how particular presentation styles and techniques assist in meeting different audience needs.
Links to other key learning areas

English
Speaking and listening
3.1 Listen to and produce a small range of spoken texts that deal with familiar ideas and information. ENSL0301

Writing
3.9 Write texts that convey intended ideas and information, using a small range of text types. ENWR0301

Health and Physical Education
Health of individuals and populations
3.1 Explain ways in which people can improve physical and social environments or personal behaviours to enhance health and safety. HPIP0301

ICT chart reference
Application: Word processing
Example: Keys data, edits for accuracy and meaning, and formats to produce information for particular audiences, e.g. uses headings and formats to report on mixing, dissolving, boiling and evaporating common substances.

Unit objectives
This unit is designed to enable students to:
• conduct a range of tests using the principles of fair testing
• develop their understanding of different properties of materials through prediction, observation and analysis
• use a digital camera or digitised microscope
• use keying, editing, formatting and importing functions to report on their findings.

Prior learning
Students will need the following knowledge and skills to begin this unit:
Information and communications technology (ICT)
• use a digital camera or a digitised microscope
• use a word-processing or slide show program
• use data loggers.
Science

- set up a simple experiment
- POE – predict, observe, explain their results.

Teacher notes

The activities in this unit are influenced by a range of factors, including the accessibility and location of computers, preferred teaching styles, students’ learning styles and time.

In introducing the unit, teachers explain to students that during the unit they are ‘infotectives’ who are asked to write an article on the results of different experiments. In creating their report, students import images from digital cameras or digitised microscopes to add a visual element to their reports.

Class or group discussion is important for assisting student understanding of the procedures and results of all activities. It will also assist the students in identifying whether or not changes have occurred to the materials and which technology to use when recording observations. Students will need assistance in discussions about which experiments involved a physical or chemical change.

Each experiment requires students to observe changes over different intervals. Teachers set the intervals at which students record their observations. In each activity students can draw and scan in pictures or insert pictures from a digital camera of their observations. In addition a digitised microscope can be used. Teachers encourage students to compare their results after each experiment.

Teachers check students’ understanding of the processes of mixing, dissolving, melting and evaporation and reinforce the key ideas of these processes through group diaries and class discussion.

Materials for these activities include:
- a digital camera, digitised microscope or data logger as appropriate
- bicarbonate of soda
- white vinegar
- raw sugar
- corn flour
- food dye
- ice-cube trays
- Smarties or M&Ms – dark-coloured
- snaplock bags
- plastic cups
- saucers
- eye-droppers
- plastic ice-cream containers
- water – cold and hot
- absorbent paper
- plastic spoons (teaspoons and tablespoons)
- access to the freezing compartment of a refrigerator.
Students use the worksheets (pages 8–13) to work through a number of activities. For Worksheets 1–8 teachers provide copies as electronic files which students can access. Students save the files, each using a unique name to identify it. The worksheets are available as Microsoft Word files and can be modified as required.

**Activity 1: Mixing solutions**

Students mix one tablespoon of bicarbonate of soda in a cup of water, and mix one tablespoon of vinegar in another cup of water. They will observe that both ingredients (the soda and the vinegar) mix with the water to produce a 'solution'. Using Worksheet 1 (page 8), students follow the instructions for the experiment and record their observations of any visible changes over time.

**Activity 2: Comparing solutions**

Students compare two solutions of raw sugar and water – one made with cold water, the other made with hot water. Students can use the temperature probes on a data logger to record the temperature of both solutions over time. Using Worksheet 2 (page 9), students follow the instructions for the experiment and record their observations at regular intervals.

**Activity 3: Colouring solutions**

Students place drops of food dye into approximately one tablespoon of water in a saucer. Students predict and observe any changes to the contents of the saucer at regular intervals. Using Worksheet 3 (page 10), students follow the instructions for the experiment and record their observations at regular intervals.

**Activity 4: Freezing solutions**

Students fill an ice-cube tray with water, add a few drops of food dye to each block and place the tray into a freezer until the water has frozen. (This may take a few hours). When the water has frozen, students place a coloured ice-cube onto a saucer. Using Worksheet 4 (page 10), students follow the instructions for the experiment and record their observations at regular intervals.

**Activity 5: Smartie fun**

Students place a dark-coloured Smartie (or M&M) on a sheet of absorbent paper. They then put a few drops of water onto the Smartie using an eye-dropper. Using Worksheet 5 (page 11), students follow the instructions for the experiment and record their observations at regular intervals.
Activity 6: Trapping gas

Students place one tablespoon of bicarbonate of soda into a snap lock bag. They then add one tablespoon of vinegar to the contents of the bag. If students are quick enough, they can try to seal the bag. This will trap the carbon dioxide gas that is produced by this reaction.

Using Worksheet 6 (page 11), students follow the instructions for the experiment and record their observations at regular intervals.

Activity 7: Separating solutions

Teachers ask students whether they can separate their solution back into bicarbonate of soda and vinegar. With a partner, students discuss a possible process and record their ideas.

Students present their separation process to the teacher before commencing the activity.

Using Worksheet 7 (page 12), students test their hypotheses using their experimental designs. Students record their findings using an appropriate form of technology.

Activity 8: Solid or liquid?

As an introduction to this activity teachers read Bartholomew and the Oobleck by Dr. Seuss to the students. Teachers explain to students that they will be making ‘Oobleck’. Students should predict whether ‘Oobleck’ is a solid or a liquid.

Students put two tablespoons of corn flour into a container. They pour one cup of water slowly into the container, while simultaneously stirring the mixture and observe what happens. Using Worksheet 8 (page 12), students follow the instructions for the experiment and record their observations.

As ‘Oobleck’ is a ‘stir-thickening’ material, teachers should advise students that it should be placed in the bin rather than be poured down the sink.

Activity 9: Infotectives report

Using Worksheet 9 (page 13) as a handout for reference, students write a report. Students select three experiments to include in their report, use a word processor to write a draft, then with another student, check the report and make any necessary alterations. Students can include images by scanning their own drawings of the experiments or inserting pictures they have taken with a digital camera. Students present their reports to the class.
Assessment

Student learning can be assessed against CSF learning outcomes and indicators as detailed in the Assessment Table below. Suggested strategies for collecting assessment data are also included.

<table>
<thead>
<tr>
<th>What to assess</th>
<th>Relevant indicators</th>
<th>Gathering assessment information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td><strong>Chemical science SCCS0302</strong></td>
<td>• Anecdotal records of student performance during activities.</td>
</tr>
<tr>
<td>Ability to:</td>
<td>• Identify changes that are reversible.</td>
<td>• Checklist in which students indicate to the teacher the changes that are/are not reversible.</td>
</tr>
<tr>
<td>• recognise that simple experiments can be performed to explore reversible changes in common substances such as water</td>
<td>• Recognise that some changes are reversible and others are not.</td>
<td>• Students can use a word processor to create either a written or pictorial description of what they observed.</td>
</tr>
<tr>
<td>• understand that some changes in substances are reversible and some are not</td>
<td>• Identify differences between the processes of mixing, dissolving, melting, boiling and evaporating.</td>
<td>• Small groups of students can present their activities to the class for peer evaluation.</td>
</tr>
<tr>
<td>• understand that the processes of mixing, dissolving, melting and evaporating are different.</td>
<td>• Recognise that mixing, dissolving, melting, boiling and evaporating can often be reversible.</td>
<td></td>
</tr>
<tr>
<td><strong>Skills</strong></td>
<td><strong>Information TEIN0302</strong></td>
<td></td>
</tr>
<tr>
<td>Ability to:</td>
<td>• Explain how particular presentation styles and techniques assist in meeting different audience needs.</td>
<td></td>
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<tr>
<td>• predict outcomes of experiments</td>
<td></td>
<td></td>
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<tr>
<td>• measure ingredients accurately</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• record observations appropriately using information and communication technologies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• reflect upon and analyse results of activities</td>
<td></td>
<td></td>
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<tr>
<td>• design activities appropriately to further refine understanding.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Resources

**Publications**
Dr. Seuss 1949, *Bartholemew and the Oobleck*
*Let’s Experiment* 2002, a joint initiative by The Royal Australian Chemical Institute Inc. and The Department of Education and Training, Victoria, CSIRO, Collingwood

**Audiovisual**
curriculum@work, *Chemical Science*, 2000, Department of Education, Employment and Training, Victoria
Software
Kid Pix Studio Deluxe
Microsoft Word.

Websites
At the time of publication the URLs (website addresses) cited were checked for accuracy and appropriateness of content. However, due to the transient nature of material placed on the Internet, their continuing accuracy cannot be verified. Teachers are strongly advised to prepare their own indexes of sites that are suitable and applicable to this unit of work, and to check these addresses prior to allowing student access.

www.sofweb.vic.edu.au/steps
education.jlab.org/beamsactivity/6thgrade/oobleck/stu01.1.html
www.brainpop.com

Victorian Curriculum and Assessment Authority
www.vcaa.vic.edu.au

This site contains the ICT Teacher Resource that provides advice about different ICT functions.

Student worksheets
1. Mixing solutions (page 8)
2. Comparing solutions (page 9)
3. Colouring solutions (page 10)
4. Freezing solutions (page 10)
5. Smartie fun (page 11)
6. Trapping gas (page 11)
7. Separating solutions (page 12)
8. Solid or liquid? (page 12)
9. Infotectives report (page 13)
Infotectives

In this unit you will:

- mix different solutions
- use a data logger, digital camera or digital microscope to record observations and results of your experiments
- write a report on your findings.

Calling all infotectives

Your task is to conduct a number of experiments and write a report on your findings. Your report will include scanned drawings or pictures from a digital camera of your experiments. You will produce the report electronically and present it to your class.

1 Mixing solutions

Experiment

1. Mix one tablespoon of bicarbonate soda in a cup of cold water.
2. Mix one tablespoon of vinegar in another cup of cold water.

What do you observe?

Record your observations here. Scan in your drawings or insert pictures from a digital camera that show any visible changes over time. Remember to label your pictures.
2 Comparing solutions

Experiment

1. Mix one tablespoon of raw sugar in a cup of hot water.
2. Mix one tablespoon of raw sugar in a cup of cold water.
3. Leave the sugar water uninterrupted. Check the water at regular intervals and monitor any changes. Check the samples again the following day.

What do you observe?

Record your general observations.

Record the temperature of both cups of water using the data logger.

Record the time it takes to dissolve the sugar in the water.
3 Colouring solutions

Experiment

1. Place a small amount of food dye into a tablespoon of water in a saucer.
2. Check the mixture at regular intervals.

What do you observe?

Record your observations by scanning in your drawings or inserting pictures from a digital camera. Remember to label your pictures.

4 Freezing solutions

Experiment

1. Fill an ice-cube tray with water, adding a few drops of food dye to each compartment.
2. Place it in the freezer. Leave until frozen.
3. Place a coloured ice-cube on a saucer.
4. Check it at regular intervals.

What do you observe?

Record your observations by scanning in your drawings or inserting pictures from a digital camera. Remember to label your pictures.
5 Smartie fun

Experiment

1. Place a dark-coloured Smartie (or M&M) on a sheet of absorbent paper.
2. Use an eye-dropper to put a few drops of water on the Smartie (or M&M).

What do you observe?

Record your observations by scanning in your drawings or inserting pictures from a digital camera. Remember to label your pictures.

6 Trapping gas

Experiment

1. Place one tablespoon of bicarbonate soda into a snaplock bag.
2. Add one tablespoon of vinegar.

What do you observe?

Record your observations by scanning in your pictures or using a digital camera. Remember to label your drawings.

Record your observations using an appropriate form of technology.
7 Separating solutions

Experiment

Can you separate your two solutions back into bicarbonate of soda and vinegar?

1. Discuss with a partner your ideas for doing this.
2. Record your ideas.
3. Present your design to the teacher and conduct the experiment.

What do you observe?

Record your observations by scanning in your drawings or inserting pictures from a digital camera. Remember to label your pictures.

8 Solid or liquid?

Experiment

1. Put two tablespoons of corn flour into a container.
2. Slowly pour one cup of water into the container, stirring the mixture at the same time.

What do you observe?

Record your observations by scanning in your drawings or inserting pictures from a digital camera. Remember to label your pictures.
Infotectives report

Now write a report using a word processor.

For the report:

- select three of the experiments from Activities 1–8
- using the information in your electronic file, describe each experiment and what happened
- include some images
- include a conclusion. The conclusion summarises what you have learnt.

When you have completed a draft, check your work with another student.

Check the following:

- Is your report easy to understand?
- Is the report free from spelling errors?
- Are your sentences well written and interesting?
- Is the information accurate?
- Have you included images?
- Are they labelled clearly?
- Is the conclusion clear?

Make any changes to your draft. You will then present your report to the class.