

SCIENCE, Yr.5 (ACSSU077): CHEMICAL SCIENCES



Australian Curriculum: Solids, liquids and gases have different observable properties and behave in different ways

Elaborations:

- ✓ recognising that substances exist in different states depending on the temperature
- ✓ observing that gases have mass and take up space, demonstrated by using balloons or bubbles
- ✓ exploring the way solids, liquids and gases change under different situations such as heating and cooling
- ✓ recognising that not all substances can be easily classified on the basis of their observable properties

BACKGROUND

What happens when you mix, heat or cool everyday items? We all know what happens to an egg when you boil it. But what happens when you mix vinegar and bicarbonate soda? Or, what happens if you heat a block of dry ice? How and why do these items change?

You are about to find out!

In this lesson, we will investigate six (6) everyday items and subject them to change. You are to:

- **predict** what you think might happen to each of the six (6) objects.
- form groups of four (4)
- **choose** one (1) experiment and **perform** the experiment with your group in front of the class
- **observe** the experiment and **describe** and **explain** what occurred.



1. Method

1. Read through the following experiments. Choose an experiment that you would like to perform with three other students. Negotiate this with your teacher.
Note: Do not complete any of the tables below. You will do this later.
2. Now that you have selected an experiment, collect all the materials you require from your teacher and set-up your experiment work station.
3. **Safety:** Check with your teacher for the safety equipment you require. E.g. splash goggles, lab coat/apron, gloves, face shields.
4. Read the directions for your experiment carefully. Ensure you fully understand how to perform the experiment and set-up everything ready to go!

Remember, you will be performing this experiment in front of the whole class.



2. Make your Predictions!

Ok – you are all set to do your experiment. However, there is one last thing you have to do; you have to predict what will happen to each of the six items when we subject them to change.

Be aware – anything could happen!

Read through each of the six (6) experiments and make your prediction by completing the multiple-choice questions.

How about a class record of your predictions? Can anyone get 6/6!!

3. Let the experiments Begin!

There are six (6) experiments:

Experiment 1: Dry Ice

Experiment 2: Mixing vinegar and bicarbonate soda

Experiment 3: Microwaving soap

Experiment 4: What freezes first; hot or cold water?

Experiment 5: Mixing a raw egg and vinegar

Experiment 6: Heating balloons over a candle

Ensure you have a pen ready to record your observations at each experiment station.

- Each group performs their experiment in front of the class.
- Carefully observe what happens and record your findings in the "OBSERVE" column in the tables below.
- As a class, do you know why the reaction occurred? Offer explanations to your class.
- Once all the experiments have been performed, research and provide a scientific explanation for what occurred by completing the "EXPLAIN" column in the tables below.
- A class discussion with your teacher will follow.

Note: You might like to start with Experiment 4.

To assist you in writing your explanations, you may like to use the following sentence starters and connectives:

EXPLAIN: SENTENCE STARTERS

- To put it simply, ...is/are caused by...
- Because...has...
- To understand the...it is useful to think of...
- When/if...then...
- ...There were/are a number of causes of...
- There are many reasons why/for...
- This...was/is created by...
- This sparked/caused...which ended with/resulted in...
- Another effect was...
- As a consequence, ...
- As a result...

EXPLAIN: CONNECTIVES

- whereas
- in the same way
- because
- caused by
- results from
- the effect of
- furthermore
- due to
- which leads/led to
- become/became
- started/launched/created

EXPERIMENT 1: DRY ICE

Assessment Task: **Predict** what will happen if you heat a block of dry ice.

PREDICT	OBSERVE	EXPLAIN
<p>Predict from the following:</p> <ul style="list-style-type: none">A. It will meltB. It will disappearC. It will remain the sameD. It will explode	<p><i>Record your observations here...</i></p>	<p><i>Describe what happened. Explain why it happened.</i></p>

You will need:

- A block of dry ice
- A heat source – the sun, a heat lamp, heater.

Perform the Experiment:

1. Place a block of Dry Ice on a table or a bench.
2. Apply heat to the ice. This can be done by leaving it in a sunny position or applying a heat lamp.
3. Carefully observe what happens and record your findings in the table above.

EXPERIMENT 2: MIXING VINEGAR AND BICARBONATE SODA

Assessment Task: **Predict** what will happen if you mix vinegar and bicarbonate soda in a bottle with a balloon over the top of the bottle.

PREDICT	OBSERVE	EXPLAIN
<p>Predict from the following:</p> <p>A. The vinegar and bicarbonate soda will form a sludge. The balloon will remain unchanged</p> <p>B. The vinegar and bicarbonate soda will disappear. The balloon will inflate</p> <p>C. The vinegar and bicarbonate soda will turn into water. The balloon will remain unchanged</p> <p>D. The vinegar and bicarbonate soda will turn into water. The balloon will inflate</p>	<p>Record your observations here...</p>	<p>Describe what happened. Explain why it happened.</p>

You will need:

- A bottle, spoon and funnel
- bicarbonate soda
- Vinegar (50ml)
- A plastic balloon.

Perform the Experiment:

1. Place a funnel in a glass or plastic bottle and pour 50mL of vinegar into the bottle.
2. Place a funnel in a balloon and pour a spoonful of bicarbonate soda into the balloon.
3. Stretch the balloon over the opening of the bottle. Lift the balloon so the bicarbonate soda falls into the bottle and mixes with the vinegar.
4. Carefully observe what happens and record your findings in the table above.

EXPERIMENT 3: MICROWAVING SOAP

Assessment Task: Predict what will happen if you place a bar of household soap onto a microwave safe dish and microwave it for 30-60 seconds.

PREDICT	OBSERVE	EXPLAIN
<p>Predict from the following:</p> <ul style="list-style-type: none">A. The soap will melt into a liquid formB. The soap will begin to dissolve and evaporateC. The soap will turn into a foamy massD. The soap will expand from the heat	<p><i>Record your observations here...</i></p>	<p><i>Describe what happened. Explain why it happened.</i></p>

You will need:

- A microwave-safe dish (one per group)
- A bar of soap – regular household soap is fine.
- A microwave
- A pen and paper to record your findings.

Perform the Experiment:

1. Form small groups.
2. Place your bar of soap in the microwave-safe dish.
3. Microwave the soap on high for 30-60 seconds (depending on the power of your microwave).
4. Remove the dish from the microwave but be careful not to touch the soap until it has fully cooled down!
5. Carefully observe what has happened to the soap and record your findings.

EXPERIMENT 4: WHAT FREEZES FIRST; HOT OR COLD WATER?

Assessment Task: Predict whether hot or cold water freezes first.

PREDICT	OBSERVE	EXPLAIN
<p>Predict from the following:</p> <p>A. The cold water will freeze first</p> <p>B. The hot water will freeze first</p> <p>C. Neither the cold or hot water will freeze</p> <p>D. The cold and hot water will freeze at the same time</p>	<p>Record your observations here...</p>	<p>Describe what happened. Explain why it happened.</p>

You will need:

- 1 cup of cold water
- 1 cup of hot water
- 1 stopwatch or timer
- A spoon for stirring
- A freezer
- A pen and paper to record your findings.

Perform the Experiment:

1. Form small groups.
2. Stir both cups of water for the same amount of time – make sure there is the same amount of water in both cups.
3. Place both cups of water inside the freezer.
4. Start your stopwatches!
5. Check the cups of water at 2-3 minute intervals.
6. Carefully observe what happens and record your findings.

EXPERIMENT 5: MIXING A RAW EGG AND VINEGAR

Assessment Task: **Predict** what will happen if you mix a raw chicken egg with vinegar.

PREDICT	OBSERVE	EXPLAIN
<p>Predict from the following:</p> <ul style="list-style-type: none">A. The egg shell will crack and dissolve in the vinegarB. The egg shell will disintegrate and the inside of the egg will be in-tactC. The egg will begin to cook inside and the shell will stay in-tactD. A tiny bird will hatch	<p>Record your observations here...</p>	<p>Describe what happened. Explain why it happened.</p>

You will need:

- 1 raw chicken egg
- 1 bottle of clear white vinegar (500mls)
- A stopwatch or timer
- 1 spoon for stirring
- 1 drinking glass (wide enough for the egg).

Perform the Experiment:

1. Form small groups.
2. Carefully place the egg into the drinking glass.
3. Pour the vinegar over the egg until it is completely covered.
4. Look closely at the egg – tiny bubbles should start to form on the egg shell!
5. Leave the glass and egg for 24 hours where it won't be touched.
6. The next day, check the egg!
7. Carefully observe what has happened to the egg and record your findings.

EXPERIMENT 6: HEATING BALLOONS OVER A CANDLE

Assessment Task: Predict what will happen if you place a naked flame underneath an air-filled balloon and a balloon filled with water.

PREDICT	OBSERVE	EXPLAIN
<p>Predict from the following:</p> <p>A. Both balloons will pop immediately</p> <p>B. The water filled balloon will not pop and the air-filled balloon will pop</p> <p>C. Neither balloon will pop when exposed to the flame</p> <p>D. The air-filled balloon won't pop but the water filled balloon will pop</p>	<p>Record your observations here...</p>	<p>Describe what happened. Explain why it happened.</p>

You will need:

- 1 candle per group and matches
- 1 Balloon filled with water
- 1 Balloon filled with air.

Perform the Experiment:

1. Form small groups.
2. Fill one balloon with water and tie it – keep the size fairly small.

3. Blow up another balloon with air to the same size as the water-filled balloon.
4. Carefully light the bottom of the candle and stick it onto a safe surface.
5. Light the candle – teacher/adult supervision may be required.
6. Place the water-filled balloon over the flame so that the flame touches the bottom of the balloon.
7. Count to ten and remove the balloon from the flame.
8. Try the same experiment with the air-filled balloon.
9. Carefully observe what happens and record your findings.



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