Science Stage 4 – chemical world

# States of matter

CW1 - The properties of the different states of matter can be explained in terms of the motion and arrangement of particles. (ACSSU151)

1. describe the behaviour of matter in terms of particles that are continuously moving and interacting

|  |  |
| --- | --- |
| Guiding question: | How can the particle model explain the behaviour of solids, liquids and gases? |
| What are your students going to learn? (Objectives) | Students will have a clear understanding of the properties of solids, liquids and gases and how these can be explained by the particle model of matter, motion and energy. |
| How are they going to learn it? (Resources and Strategies) | Watch these clips on YouTube:   * [Veritasium States of Matter](https://youtu.be/KCL8zqjXbME) (duration 4:52) * [Part(icles) of Your World: Crash Course Kids](https://www.youtube.com/watch?v=npv74D2MO6Q) (duration 1:21)   Read and complete the test:   * [BBC Bitesize – three states of matter](https://www.bbc.co.uk/bitesize/guides/z93jfcw/revision/1)   Complete the interactive:   * [Scootle – types of matter](http://www.scootle.edu.au/ec/viewing/L5821/index.html)   Investigate:   * [states of matter](https://www.clcnwi.com/file_download/inline/d90eac90-10b1-4eaf-9301-cab0d5baca68) |
| Target date for completion | 1.5 hour |
| How are you going to know it has been learned? (Success criteria) | Students will be able to relate the particle model of matter, energy and motion of particles to the properties of everyday substances. |
| Collecting evidence of student learning (Verification) | Worksheets can be submitted electronically on your school’s preferred platform or by email, discussed if a live chat is possible.  Screenshot of Bitesize test result |
| Feedback (Evaluation) | Verbal feedback in live chat or written or recorded audio comments on submitted worksheet. |
| Communication | This lesson can be completed entirely online (synchronous or asynchronous), using your school’s preferred platform, for example, Google classroom, MS Teams and OneNote. Alternatively, students asynchronously, use the internet to find the information to complete worksheets provided as hard copy. |

## How can the particle model explain the behaviour of solids, liquids and gases?

### Activity 1: Properties of particles in solids, liquids and gases

**Use the following websites to gather information of the organisation of particles in solids, liquids and gases.**

* Video: [Veritasium States of Matter](https://youtu.be/KCL8zqjXbME) (duration 4:52)
* Video: [Part(icles) of Your World: Crash Course Kids](https://www.youtube.com/watch?v=npv74D2MO6Q) (duration 1:21)
* Information: [BBC Bitesize – three states of matter](https://www.bbc.co.uk/bitesize/guides/z93jfcw/revision/1)

**Tasks:**

1. Complete the test in Bitesize, screenshot your result and paste it here.

|  |
| --- |

1. Complete the following definitions:

Matter

Mass

Volume

1. Describe how you would measure:

Mass

Volume

1. Complete the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| State of Matter | Solid | Liquid | Gas |
| Diagram showing how particles are arranged | Image result for solids liquids and gases |  | Image result for solids liquids and gases |
| Properties |  |  |  |

1. Complete the table below to use the particle model to explain the properties identified in Question 4. An example is provided.

**Solids**

|  |  |
| --- | --- |
| Property of solids | How the particle model explains the property |
| Solids have a defined shape | The particles in solids are strongly bonded to each other, fixing their positions |
| Solids are incompressible |  |
| Solids expand when heated and contract when cooled |  |

**Liquids**

|  |  |
| --- | --- |
| Property of solids | How the particle model explains the property |
| Liquids flow to take the shape of the bottom of their container |  |
|  |  |
|  |  |

**Gases**

|  |  |
| --- | --- |
| Property of solids | How the particle model explains the property |
|  |  |
|  |  |
|  |  |

### Activity 2: Properties of everyday substances

1. Access the Scootle interactive ‘Types of Matter: Solids, liquids and gases’ using the link [scootle.edu.au/ec/viewing/L5821/index.html](http://www.scootle.edu.au/ec/viewing/L5821/index.html). Complete all parts of the interactive.
2. Choose two everyday items from the list below, each item must be a different state of matter.
   * Orange juice
   * Book
   * Coffee
   * Pencil
   * Air
   * An aerosol deodorant
3. Using your knowledge from task 1 and task 2 to write an explanation that relates the properties of each chosen substance to the particle model. Each substance requires a separate explanation and each explanation should be one paragraph in length.

Item: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

State: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Planning space:

What are the properties of your chosen item?

|  |
| --- |

Explanation:

|  |
| --- |

Item: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

State: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Planning space:

What are the properties of your chosen item?

|  |
| --- |

Explanation:

|  |
| --- |

1. Take some photographs of substances in your home, download some pictures from the internet or cut out some pictures from catalogues and classify them as solid, liquid or gas. Upload a photo or screen shot of your classification.

|  |
| --- |

### Activity 3: Complete an investigation of your choice:

1. Using everyday materials found around the home, construct models of solid, liquid and gas and describe the features of the model that make it representative of that state.

Hazard and risk assessment:

How will you reduce the risk?

Complete your report by completing the table:

|  |  |  |
| --- | --- | --- |
| State | Photograph, video or sketch | Features of the model |
| Solid |  |  |
| Liquid |  |  |
| Gas |  |  |

**OR**

1. Investigate the properties of cornflour paste. Write a report about the observed properties and make a prediction about the state of matter of cornflour.

**Hazards and risk assessment:**

Avoid breathing the dust of cornflour. Cover any surfaces with newspaper or do the experiment outside. Do not pour the mixture down the drain, put it in a bag in the rubbish bin. Wash your hands afterwards.

**Method:**

In a small baking tray or pie tin, make a paste of 2 parts cornflour and 1 part water and investigate the properties of the mixture.

**Observations:**

|  |  |
| --- | --- |
| Property | Solid, liquid or gas? |
|  |  |
|  |  |
|  |  |

**Conclusion**:

**OR**

1. Investigate the statement: “There are more than 3 states of matter”. Write a summary of each reference and a conclusion based on your research.