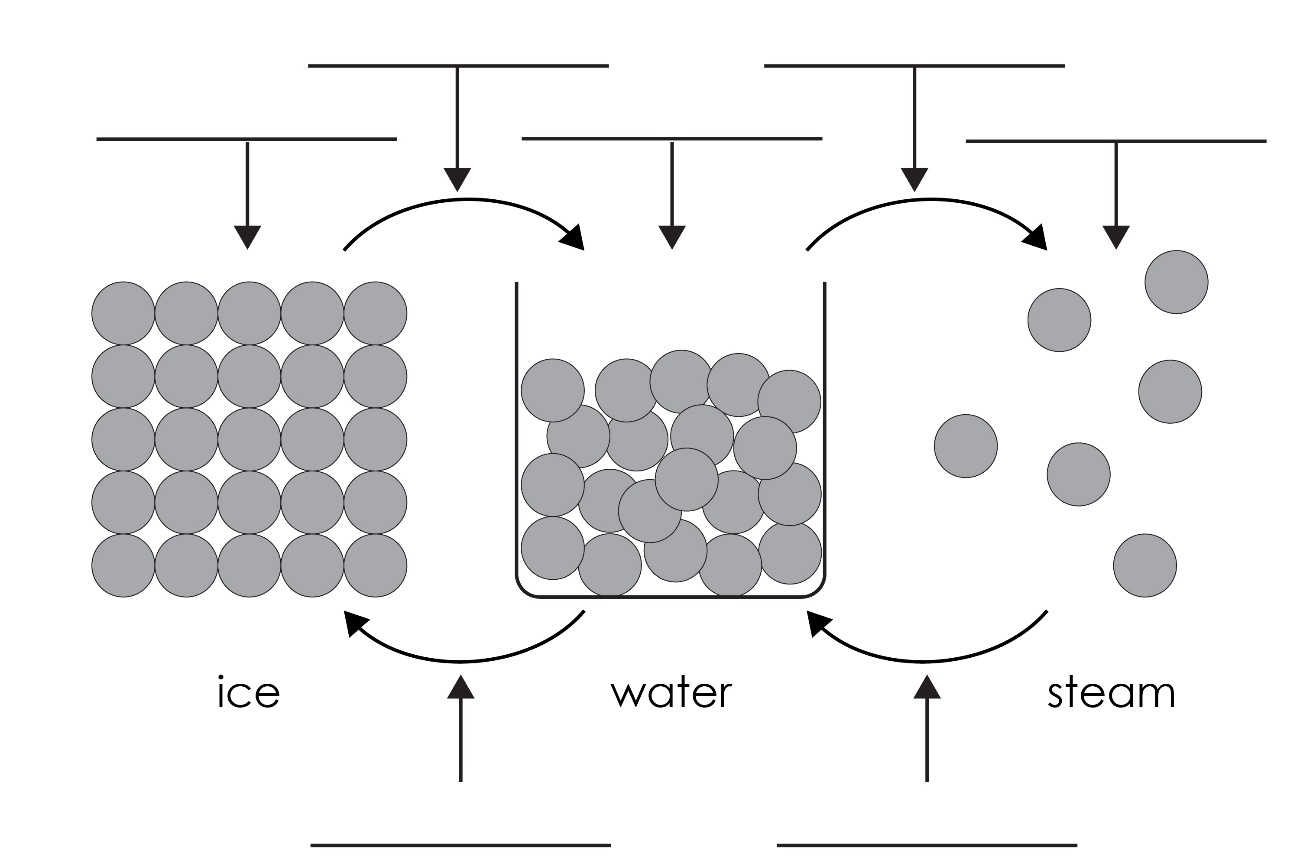
Particle model: knowledge check

1. Add the following labels to the diagram below.

boiling condensing freezing gas

liquid melting solid



1. (a) How are particles arranged in a solid?
   1. How do the particles in a solid move?
   2. Why is it very difficult to compress a solid?
2. (a) How are the particles arranged in a liquid?
   1. How do the particles in a liquid move?
   2. Do the particles in a liquid have more or less energy than the particles in:
      1. a solid? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      2. a gas? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. (a) How are the particles arranged in a gas?
   1. How do the particles in a gas move?
   2. Why is it easy to compress a gas?

Particle model: test myself

1. Write the words that describe the following changes of state.
   1. Solid liquid (eg ice to water) is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   2. Liquid solid (eg water to ice) is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   3. Liquid gas (eg water to steam) is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   4. Gas liquid (eg steam to water) is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. In which state do particles have most kinetic energy?
3. What happens to the kinetic energy of the particles when a solid changes to a liquid?
4. Describe the arrangement of particles in a solid.
5. How do the particles in a gas move?

What happens to the movement of gas particles when the temperature is increased?

1. What is meant by ‘melting point’?
2. What is meant by ‘boiling point’?

If a substance has a melting point of 50°C and a boiling point of 170°C, in what state will it be at 100°C?

If a substance has a melting point of –220°C and a boiling point of –112°C, in what state will it be at room temperature (25°C)?

Particle model: feeling confident?

1. Use the melting and boiling point data for the following substances to decide which state they are at –100°C, 0°C and 100°C. Write **solid**, **liquid** or **gas** to indicate the state.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Substance** | **Melting point (°C)** | **Boiling point (°C)** | **State at  –100°C** | **State at 0°C** | **State at 100°C** |
| A | 44 | 208 |  |  |  |
| B | 30 | 2403 |  |  |  |
| C | –39 | 357 |  |  |  |
| D | –101 | –35 |  |  |  |
| E | –209 | –183 |  |  |  |
| F | –71 | –62 |  |  |  |
| G | –7 | 59 |  |  |  |
| H | 302 | 669 |  |  |  |
| I | 27 | 677 |  |  |  |

Particle model: what do I understand?

Think about your answers and confidence level for each mini-topic. Decide whether you understand it well, are unsure or need more help. Tick the appropriate column.

|  |  |  |  |
| --- | --- | --- | --- |
| **Mini-topic** | **I understand  this well** | **I think I understand this** | **I need more  help** |
| I know the states of matter. |  |  |  |
| I can describe the arrangement of particles in:   * solids * liquids * gases. |  |  |  |
| I know the names of state changes. |  |  |  |
| I understand the relative energy of particles in:   * solids * liquids * gases. |  |  |  |
| I understand the changes in kinetic energy when substances change state. |  |  |  |
| I understand that different substances have different melting and boiling points and know what these represent. |  |  |  |
| I can use melting and boiling point data to deduce the state of a substance at a given temperature. |  |  |  |
| **Feeling confident? topics** | **I understand  this well** | **I think I understand this** | **I need more  help** |
| I can use melting and boiling point data to identify the state of a substance at different temperatures. |  |  |  |