

The Particle Model of Matter

Time: 15 min. 6 questions.

Instructions

Answer all six questions. For multiple choice, write the letter of the correct answer. For short answer, write one or two sentences. For true or false, write the word True or False. For the numeric question, show your working and write your final answer with the correct unit.

Questions

1. Which statement best explains why a gas spreads out to fill a container?

- A) Gas particles are held tightly together by attractive forces.
- B) Gas particles are separated by large spaces and move constantly in all directions.
- C) Gas particles vibrate in place and cannot move away from each other.
- D) Gas particles are denser than the container they are in.

[\(Details\)](#)

2. A block of wood has a mass of 500 grams and takes up 1000 millilitres of space. Calculate the density of the wood in grams per millilitre. [\(Details\)](#)

3. Explain why a liquid can change shape but a solid cannot, using ideas about how particles are arranged in each state of matter. [\(Details\)](#)

4. True or false: In a solid, particles are close together and slide past each other easily. [\(Details\)](#)

5. A balloon filled with air is squeezed tightly. What property of gases does this demonstrate?

- A) Compressibility
- B) Density
- C) Volume
- D) Mass

[\(Details\)](#)

6. Describe one way that attractive forces between particles are different in a solid compared to a gas. [\(Details\)](#)

Curriculum Coverage

Question	Learning Outcome	Specific Knowledge or Skill
1	Details	Particle arrangement and movement in gases
2	Details	Density calculation using mass and volume
3	Details	Relating particle arrangement to physical properties
4	Details	Particle arrangement in solids
5	Details	Compressibility as a physical property

6	Details	Attractive forces across states of matter
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Answer Key

- B)** Gas particles are separated by large spaces and move constantly in all directions. This explains why gases spread throughout a container instead of staying in one place.
- 0.5 grams per millilitre** (or 0.5 g/mL). Divide mass by volume: $500 \text{ g} \div 1000 \text{ mL} = 0.5 \text{ g/mL}$.
- A liquid can change shape because its particles are separated by spaces and can slide past each other, whereas a solid's particles are close together and vibrate in place, so the solid keeps its shape.
- False.** In a solid, particles are close together and vibrate in place; in a liquid, particles slide past each other.
- A)** Compressibility is the ability of a gas to reduce in volume when under pressure, which is what happens when the balloon is squeezed.
- Attractive forces are strongest in solids, so particles stay close together and vibrate in place, whereas in gases the attractive forces are weakest, allowing particles to move far apart and in all directions.