

The Particle Model of Matter

Time: 20 min. 6 questions.

Instructions

Answer all six questions. For multiple choice questions, write the letter of the best answer. For short answer questions, write one or two sentences. For the true or false question, write "True" or "False". For the numeric question, show your calculation and write your final answer with units.

Questions

1. In the particle model of matter, what is true about the particles in a gas?
A) The particles are close together and vibrate in place.
B) The particles are separated by large spaces and move in all directions.
C) The particles are separated by small spaces and slide past each other.
D) The particles do not move at all.
([Details](#))
2. A block of wood has a mass of 240 grams and takes up 400 millilitres of space. Calculate the density of the wood in grams per millilitre. Show your work.
([Details](#))
3. True or false: In a solid, the attractive forces between particles are stronger than the attractive forces between particles in a liquid.
([Details](#))
4. Explain why a gas can be compressed more easily than a liquid, using ideas from the particle model of matter.
([Details](#))
5. Which of the following best describes what happens to particles in a liquid?
A) They vibrate in fixed positions and cannot move from place to place.
B) They are separated by large spaces and move randomly in all directions.
C) They are separated by spaces and can slide past each other.
D) They have no attractive forces between them.
([Details](#))
6. A student measures the volume of water in a container as 500 millilitres. What is this volume in litres?
([Details](#))

Curriculum Coverage

Question	Learning Outcome	Content Focus
1	Details	Particle arrangement and movement in gases
2	Details	Density calculation using mass and volume
3	Details	Attractive forces in solids and liquids
4	Details	Compressibility and particle spacing
5	Details	Particle arrangement and movement in liquids

6	Details	Volume conversion between millilitres and litres
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Answer Key

1. **B.** Gases have particles separated by large spaces that move constantly in all directions, which explains why gases spread out to fill containers.
2. **0.6 g/mL.** Divide mass by volume: $240 \text{ g} \div 400 \text{ mL} = 0.6 \text{ g/mL}$; this shows how much mass is packed into each unit of volume.
3. **True.** The attractive forces between particles are strongest in solids, where particles are held tightly in place, and weaker in liquids, where particles can move more freely.
4. **Gases have large spaces between particles, so the particles can move closer together when pressure is applied; liquids have smaller spaces between particles, so there is less room for compression.** This relates particle spacing directly to compressibility.
5. **C.** Liquid particles are separated by spaces (unlike solids) and can slide past each other (unlike gases), which allows liquids to flow and take the shape of their container.
6. **0.5 L.** Divide millilitres by 1000 to convert to litres: $500 \text{ mL} \div 1000 = 0.5 \text{ L}$; this uses the SI unit conversion where 1 litre equals 1000 millilitres.