IGCSE Physics Worksheet – States of Matter

Reading Passage

Matter exists in three main states: solid, liquid, and gas. These states differ in the arrangement and movement of their particles.

In a solid, particles are packed closely together in fixed positions. They can vibrate but cannot move from place to place. This gives solids a fixed shape and a fixed volume. Because the particles are tightly held by strong forces, solids cannot be easily compressed.

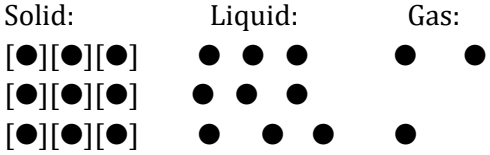
In a liquid, particles are still close together but are not fixed in place. They can slide past one another, allowing liquids to flow and take the shape of their container. However, liquids still have a fixed volume because the particles remain close together.

In a gas, particles are far apart and move rapidly in all directions. The forces between particles are very weak. This allows gases to spread out to fill any container and makes them easily compressed.

When matter changes from one state to another, the movement and spacing of particles change. For example, when a solid melts, its particles gain energy and vibrate faster until they can move freely. When a liquid boils, particles gain enough energy to break away completely and form a gas.

Diagram

States of Matter – Particle Arrangement



Solid: particles tightly packed, fixed positions
Liquid: particles close but able to move past each other
Gas: particles far apart, moving quickly in all directions

Section A – Multiple-Choice Questions

1. In which state are particles arranged in fixed positions? A. Solid B. Liquid C. Gas D. Plasma

2. Which statement best describes particles in a liquid? A. Far apart and moving rapidly B. Fixed in place and vibrating C. Close together but able to move past each other D. Arranged in a rigid lattice

3. Why can gases be compressed easily? A. Their particles are very heavy B. Their particles are far apart C. Their particles vibrate in fixed positions D. Their particles are strongly attracted

4. When a solid melts, the particles: A. Lose energy and move closer B. Gain energy and move apart C. Gain energy and vibrate less D. Lose energy and stop moving

5. Which change of state requires particles to gain enough energy to break free from the liquid? A. Freezing B. Condensation C. Boiling D. Sublimation

Section B – Structured Questions

6. Describe the arrangement and movement of particles in a gas.

7. Explain why liquids have a fixed volume but no fixed shape.

8. A balloon expands when it is warmed. Use the particle model to explain why.

9. Ice is less dense than liquid water. Use particle ideas to explain this.

10. Describe what happens to the particles when steam condenses into liquid water.

Answer Key

Section A Answers

1. A

2. C

3. B

4. B

5. C

Section B Detailed Answers

6. Gas particles are far apart, move rapidly in all directions, and experience very weak forces.

7. Liquid particles are close together (fixed volume) but can slide past each other (no fixed shape).

8. Heating gives gas particles more kinetic energy; they move faster, collide more often and with greater force, increasing pressure and expanding the balloon.

9. Ice has an open particle structure with more space between particles, making it less dense than liquid water.

10. Steam particles lose energy, slow down, move closer together, and form a liquid where particles stay close but can slide past each other.