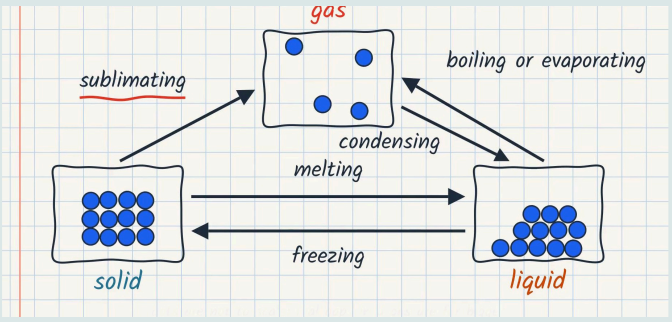
Changes of state

and internal energy

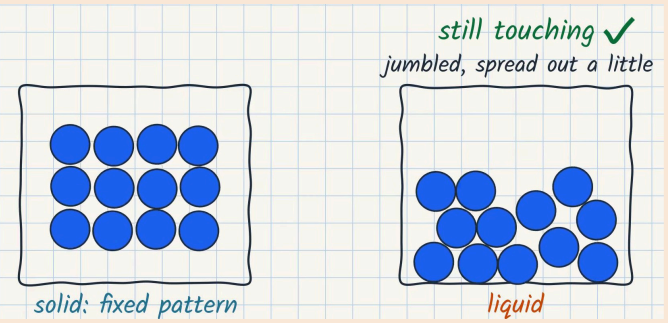
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Summary sheet

1 The six changes of state



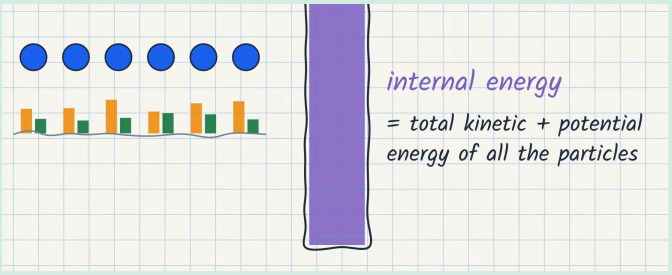
- **Melting** (solid → liquid), **freezing** (liquid → solid), **boiling** or **evaporating** (liquid → gas), **condensing** (gas → liquid).
- **Sublimating**: a solid turns straight into a gas, like dry ice (solid carbon dioxide).

2 What happens to the mass



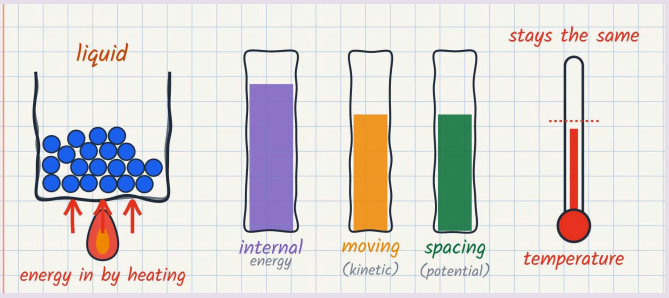
- **Mass is conserved**: the particles rearrange, but none are made and none are lost.
- A change of state is a **physical change**: reverse it and you get back the same material.

3 Internal energy



- Moving particles have **kinetic energy**. Forces between them, and their spacing, give **potential energy**.
- **Internal energy** = the total kinetic and potential energy of all the particles in a system.

4 What heating does



- Heating raises the internal energy. Either the particles move faster, so the **temperature rises**,
- or they move further apart and the **state changes**: then the temperature **stays the same**.

Exam tip

Melting: write "the particles stay in contact but are no longer in fixed positions", not only "the ice turns to water".

Check yourself

- 1 What is the name for a solid turning straight into a gas?
- 2 50 g of water freezes. What is the mass of the ice?
- 3 What is internal energy?

Answers: 1. Sublimating 2. 50 g (mass is conserved) 3. The total kinetic and potential energy of all the particles