Your notes

GCSE Physics: revision notes

Changes of state and specific latent heat

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Changes of state

- The changes of state are melting, freezing, boiling (and evaporating), condensing and sublimating (solid straight to gas).
- When a substance changes state, its mass is conserved.
- Changes of state are **physical changes**: if the change is reversed, the material gets back its original properties. They are not chemical changes.

Internal energy

- **Internal energy** is the energy stored inside a system by the particles that make it up. It is the total kinetic energy and potential energy of all the particles.
- Heating a system increases the energy of its particles. This either raises the temperature or produces a change of state.

Specific latent heat

- During a change of state, the energy supplied changes the **internal energy** (by breaking bonds between particles) but not the temperature.
- **Specific latent heat** is the energy needed to change the state of 1 kg of a substance with no change in temperature.
- $E = m L$: energy (J) = mass (kg) × **specific latent heat** (J/kg).
- **Specific latent heat of fusion**: changing between solid and liquid. **Specific latent heat of vaporisation**: changing between liquid and vapour.

Heating and cooling graphs

- A heating graph shows temperature against time. Where the line is flat, the substance is changing state, and energy is being used to break bonds.

- The first flat section is melting (at the melting point); the second is boiling (at the boiling point).
- On a cooling graph, the flat sections show condensing and freezing, where energy is released.

Your notes

Key terms

Internal energy	The total kinetic and potential energy of all the particles in a system.
Physical change	A change, such as a change of state, that can be reversed.
Specific latent heat	The energy needed to change the state of 1 kg of a substance without changing its temperature.
Specific latent heat of fusion	The energy to melt (or freeze) 1 kg of a substance.
Specific latent heat of vaporisation	The energy to boil (or condense) 1 kg of a substance.
Sublimation	A change directly from solid to gas.
Evaporation	A liquid changing to a gas at its surface, below the boiling point.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Is a change of state a physical or chemical change?
2. What happens to mass when ice melts?
3. What is internal energy?
4. What happens to temperature while a substance is melting?
5. What is specific latent heat?
6. How much energy is needed to melt 0.5 kg of ice? (L = 334 000 J/kg)
7. How much energy is needed to boil 0.2 kg of water? (L = 2 260 000 J/kg)
8. What does a flat section on a heating graph show?

Answers

1. Physical
2. It stays the same
3. The total kinetic and potential energy of the particles
4. It stays the same
5. The energy to change the state of 1 kg without changing its temperature
6. 167 000 J
7. 452 000 J
8. A change of state

What to do next

Practise 10 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

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