

Why Temperature Stops Rising During Phase Change

You supply heat continuously, yet the thermometer gets stuck. Where is the energy going?

In Section 10.8, we uncover the physics of melting, freezing, boiling, and the hidden transformations of matter.



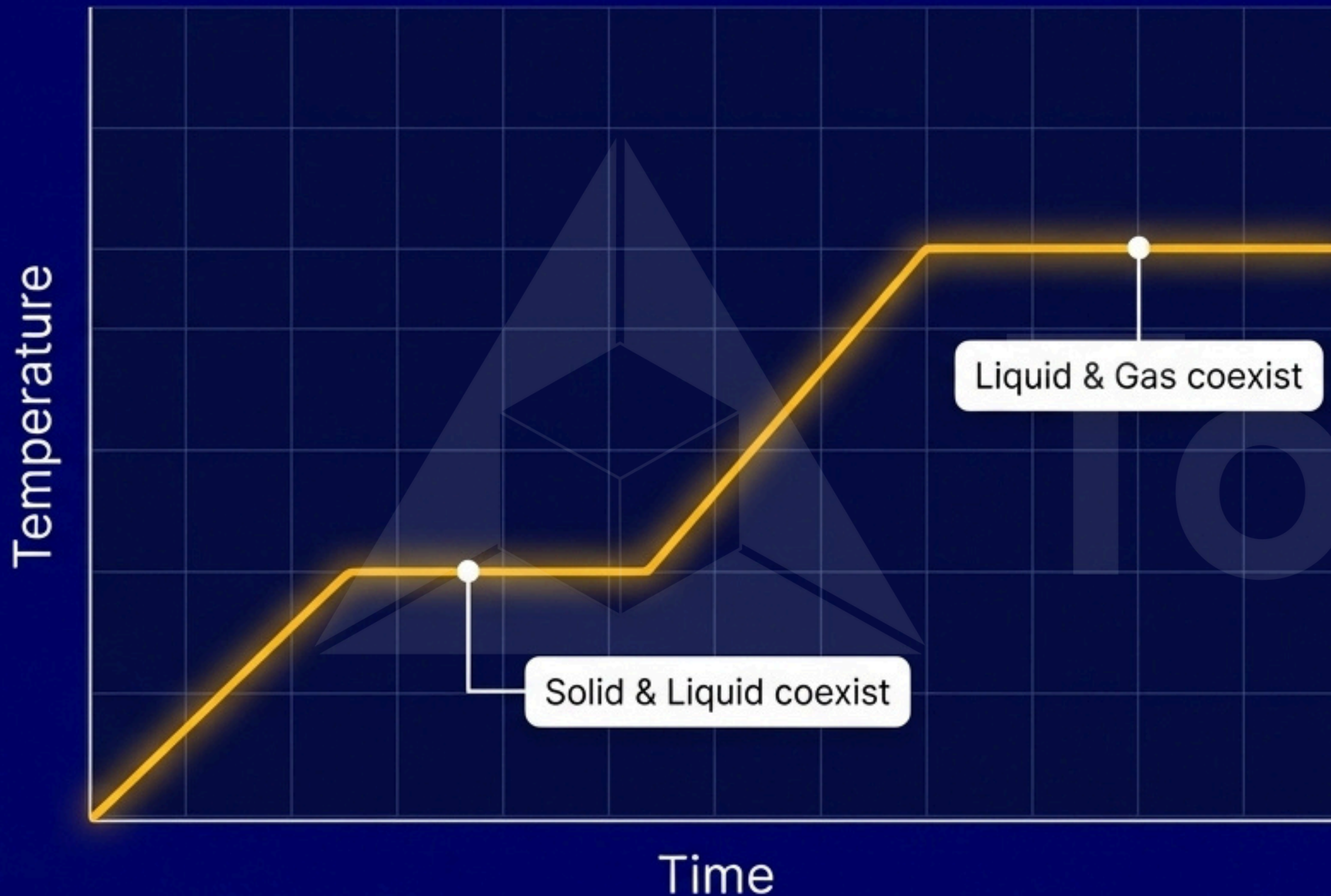
Practice more, score more

The Physics of Transformation



During a change of state, the two states coexist in thermal equilibrium.

The Phase Change Plateau (Fig. 10.9)



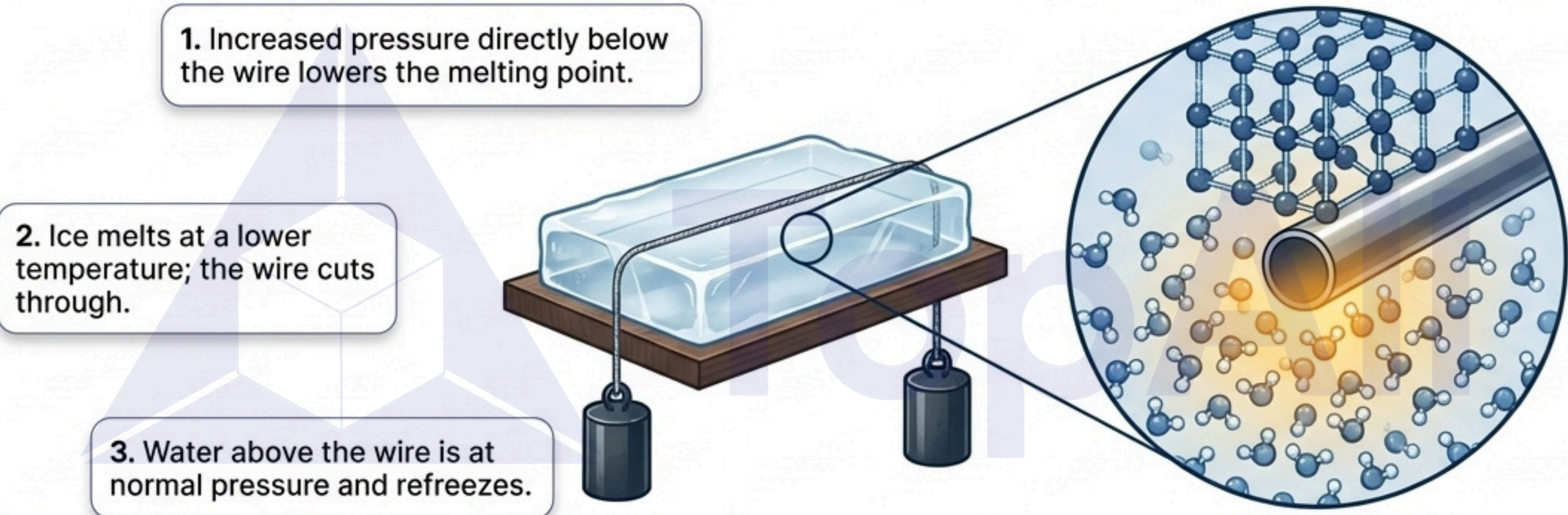
The temperature of a system does not change during a phase transition, even though heat is continuously supplied.

Plateau 1 (Melting Point): Heat is utilized entirely to change the state from Solid (ice) to Liquid (water). Both states coexist in thermal equilibrium.

Plateau 2 (Boiling Point): Heat is utilized to change Liquid to Vapour. Both states coexist.

Practice more, score more

Regelation: When Pressure Melts Ice



Real-world Application: Ice skating is possible because the high pressure of the skate blade melts the snow, creating water that acts as a lubricant.

Boiling Point is Dictated by Pressure



High Altitudes (Hills)

Lower atmospheric pressure
= Lower boiling point.

Cooking is difficult.

↓ Pressure = ↓ BP

Pressure Cooker

Higher internal pressure =
Higher boiling point.

Cooking is faster.

↑ Pressure = ↑ BP

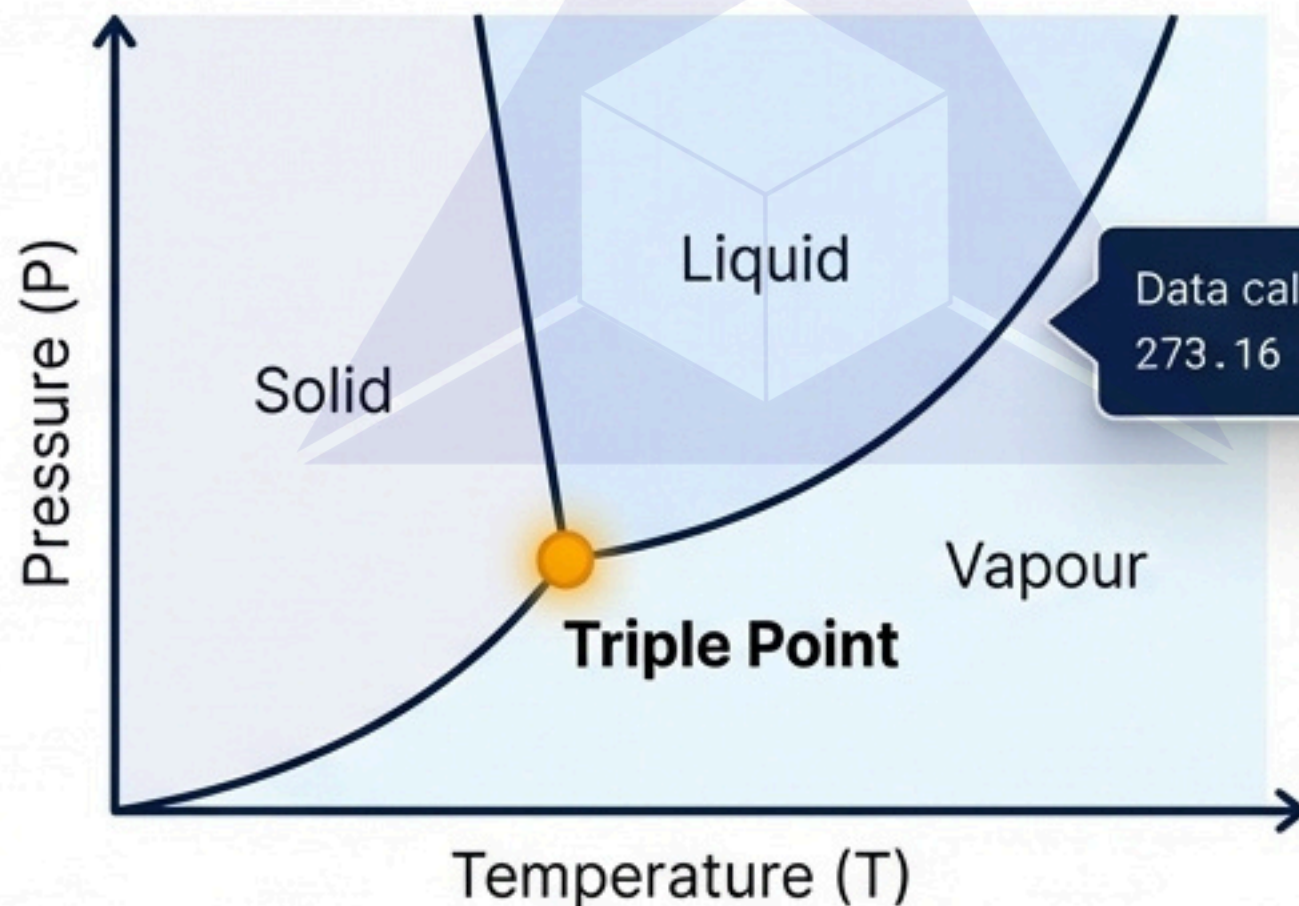
Exam Trap: Boiling point is
always 100°C → FALSE.

Practice more, score more

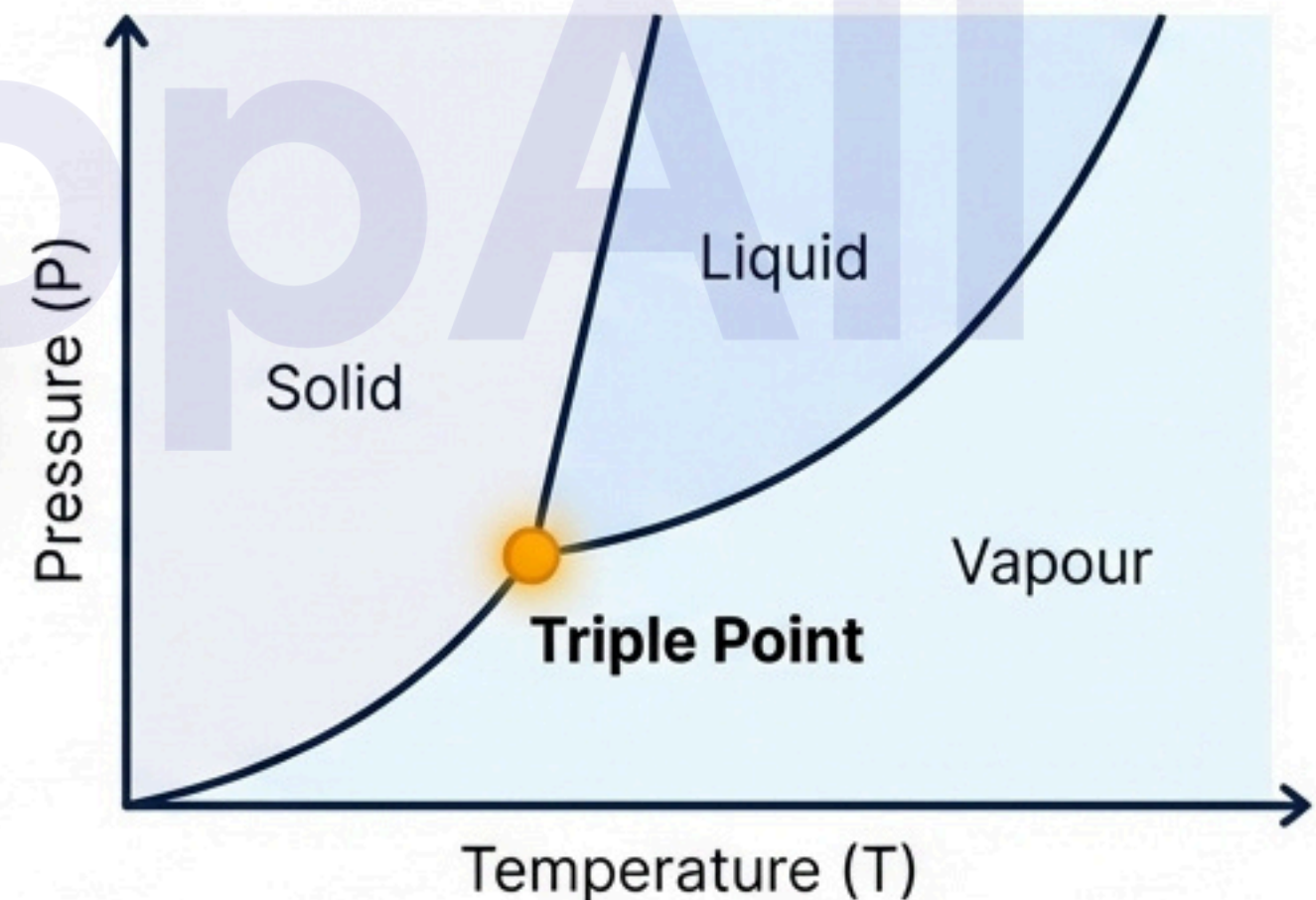
Phase Diagrams & The Triple Point

Sublimation: Solid to Vapour directly (e.g., Dry ice / Solid CO_2 , Iodine).

Phase Diagram for Water



Phase Diagram for CO_2



Key Takeaways: Change of State

- ✓ 1. ****Constant Temperature****: During phase changes (melting, boiling), heat changes the state, not the temperature. The states coexist in thermal equilibrium.
- ✓ 2. ****Pressure Effects****: Increasing pressure lowers the melting point of ice (**Regelation**) but raises the boiling point of water (***Pressure Cookers***).
- ✓ 3. ****Direct Transitions****: ****Sublimation**** is the direct transition from Solid to Gas (e.g., Dry ice).
- ✓ 4. ****The Triple Point****: The specific P and T where solid, liquid, and gas phases coexist.