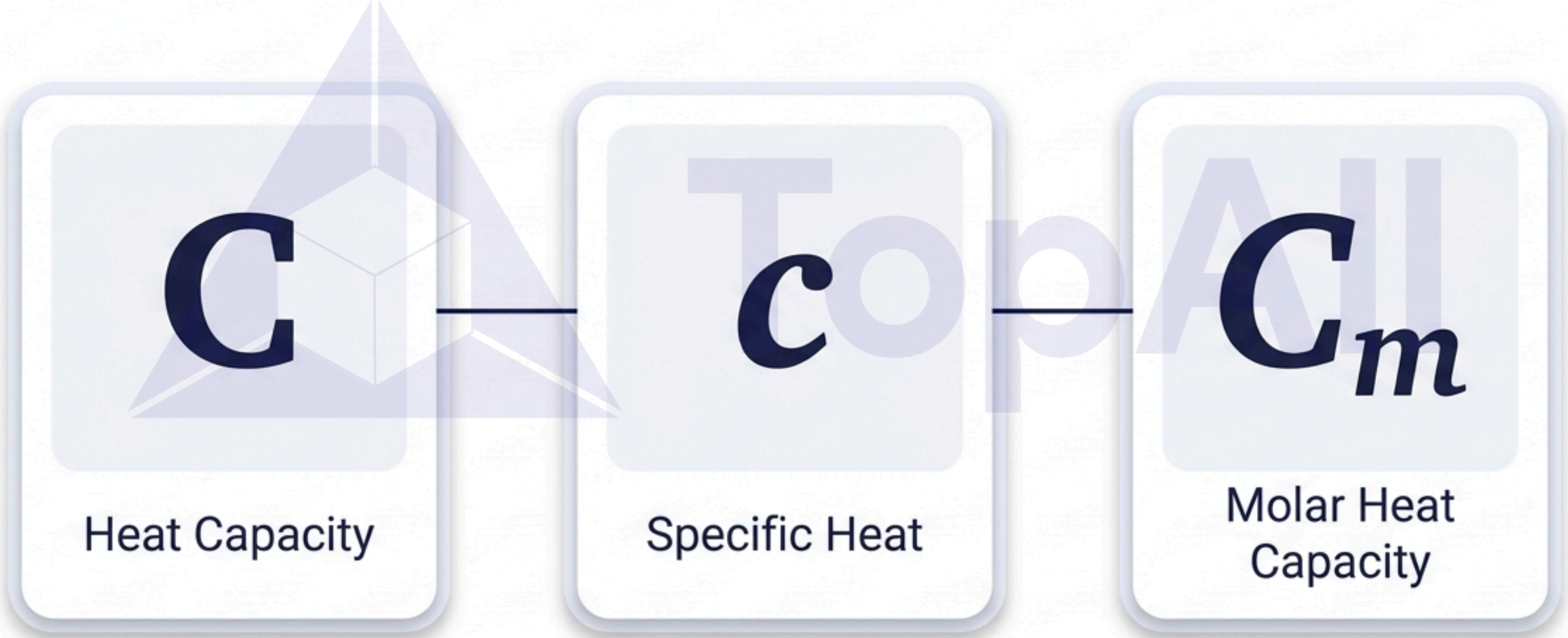


Heat Capacity, Specific Heat & Molar Heat Capacity

Three Symbols. Three Different Meanings.



C

Heat Capacity

c

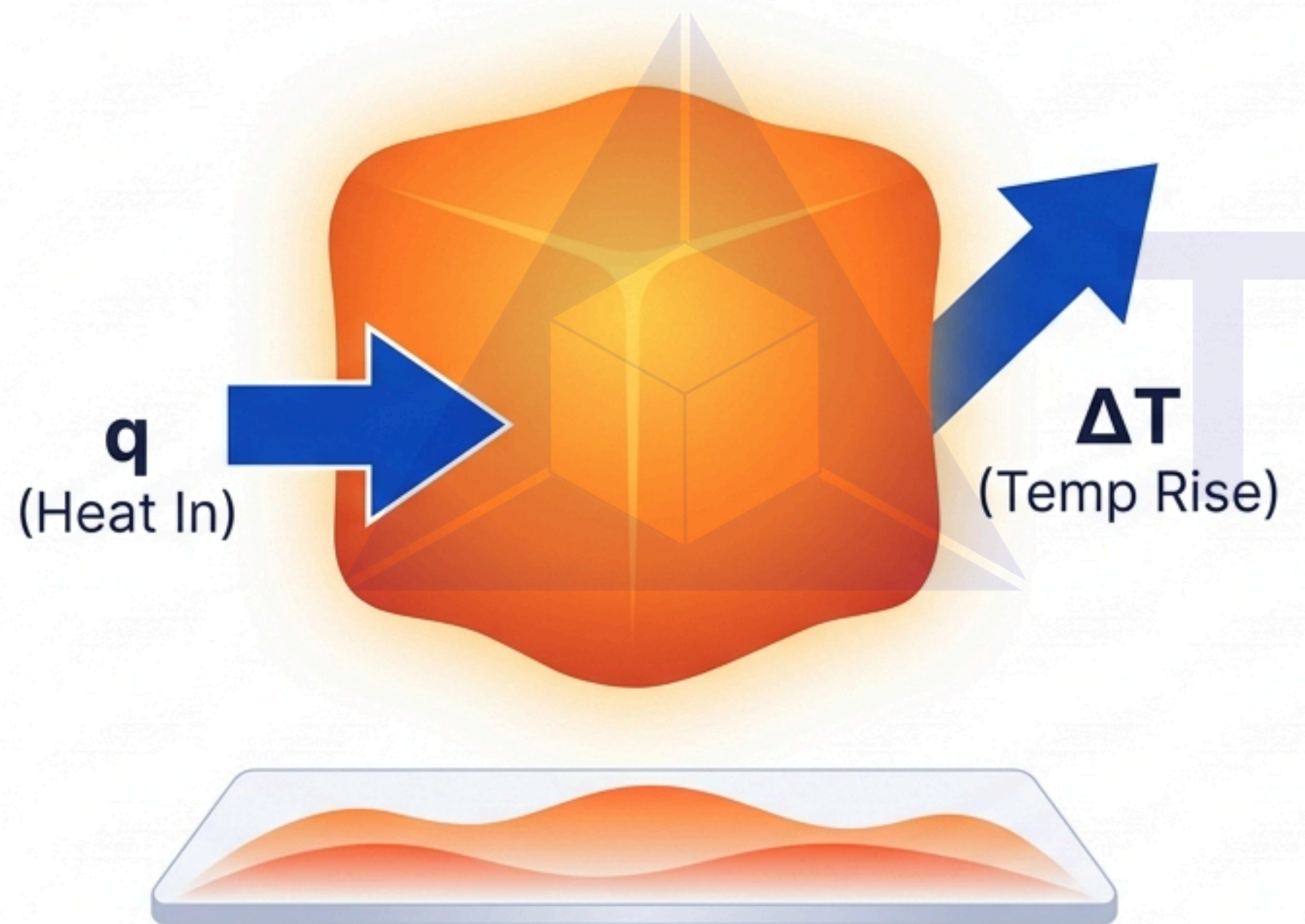
Specific Heat

C_m

Molar Heat
Capacity

Heat Capacity (C): The Complete Object

Property Type: Extensive (Depends on total size/mass)



$$q = C \Delta T$$

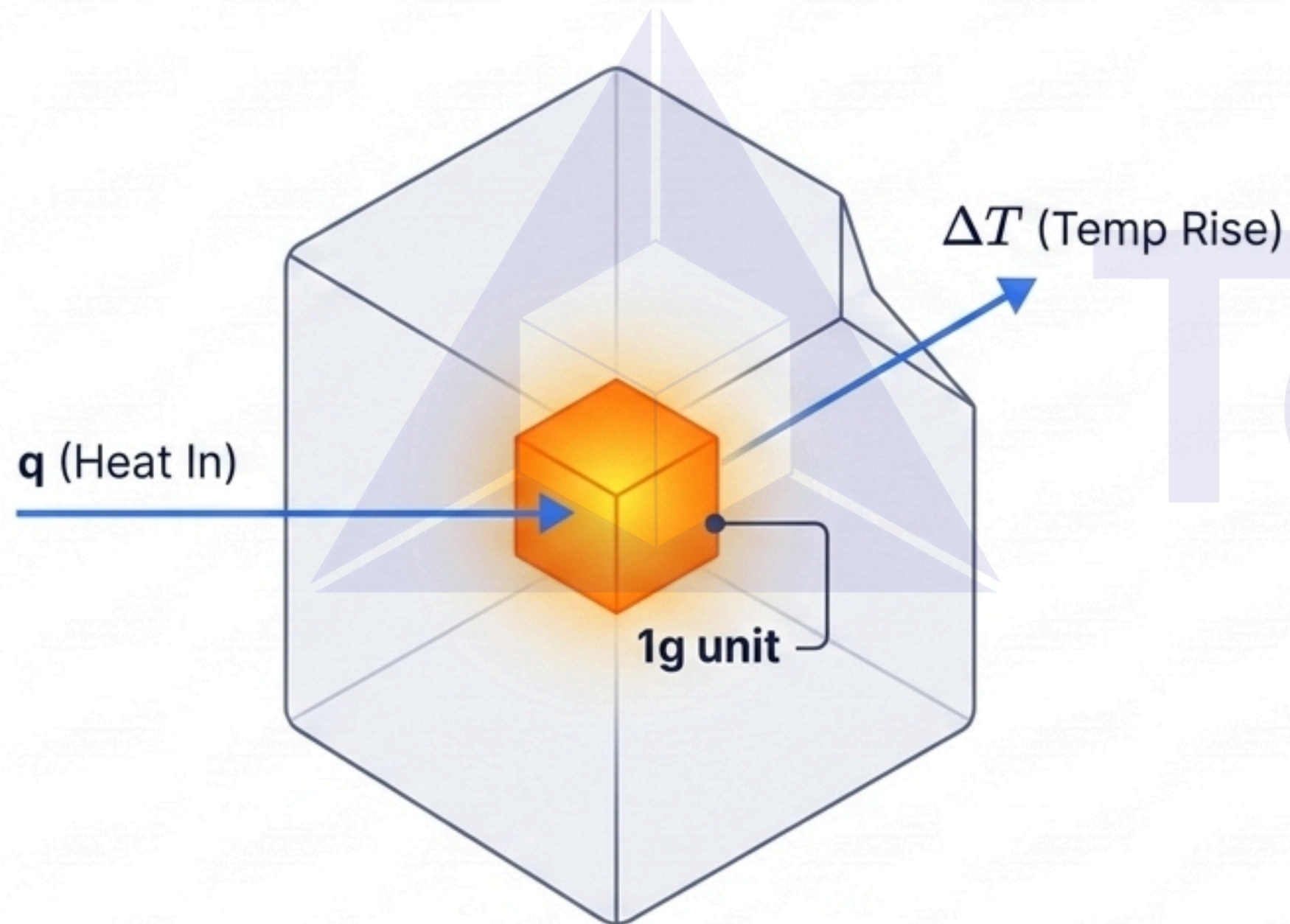
q = Total heat supplied

ΔT = Change in temperature
(1°C or 1K)

C = Heat capacity of the complete sample

Specific Heat Capacity (c): The Unit Mass

Property Type: Intensive (Independent of total size)



$$c = \frac{C}{m}$$

$$q = m c \Delta T$$

m = mass of the sample

c = specific heat
(Heat per unit mass)



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$$E=mc^2$$



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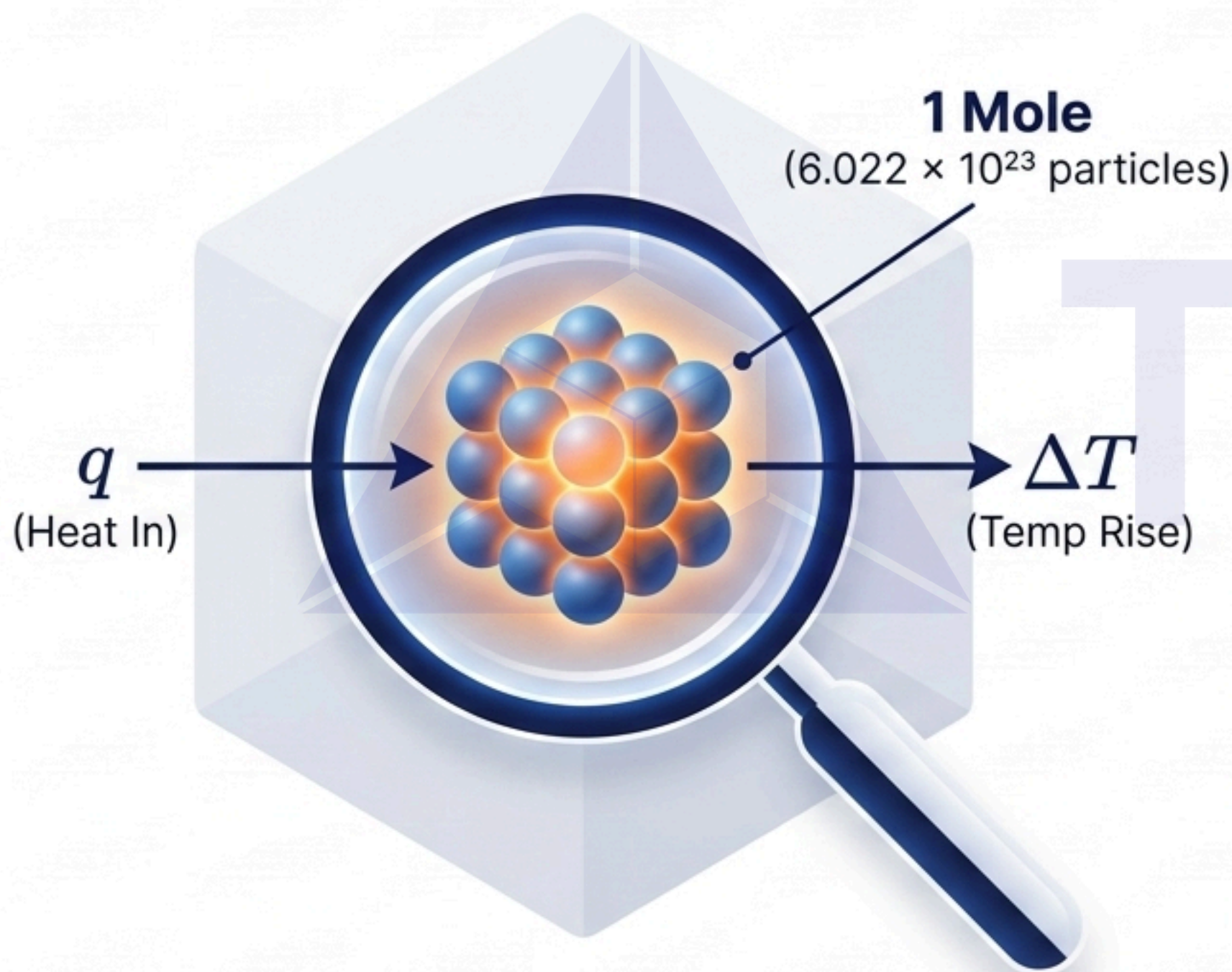
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Molar Heat Capacity (C_m): The Chemical Unit

Property Type: Intensive (Independent of total size)



$$C_m = \frac{C}{n}$$

$$q = n C_m \Delta T$$

n = Number of moles

C_m = Molar heat capacity
(Heat per one mole)

Diagnostic Comparison & The Unit Trap

Heat Capacity (C)	Specific Heat (c)	Molar Heat Capacity (C _m)
Target: Complete Object Formula: $q = C \Delta T$ Units: J K ⁻¹ Type: Extensive	Target: Unit Mass (1g) Formula: $q = m c \Delta T$ Units: J g ⁻¹ K ⁻¹ Type: Intensive	Target: One Mole Formula: $q = n C_m \Delta T$ Units: J mol ⁻¹ K ⁻¹ Type: Intensive



JEE Trap Alert: The Unit Mismatch

Always check units before substitution! Examiners routinely provide specific heat (J g⁻¹ K⁻¹) in problems that require molar calculations (J mol⁻¹ K⁻¹). Ensure m or n strictly matches your heat capacity constant.

The Master Equation

Key Takeaway

$$C = m \cdot c = n \cdot C_m$$

- ✓ • To get total capacity (C) from specific heat (c) → Multiply by mass (m)
- ✓ • To get total capacity (C) from molar heat (C_m) → Multiply by moles (n)
- ✓ • **Self-Correction Check:** Dimensional analysis across this equation will always reveal if you are using the correct inputs.



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