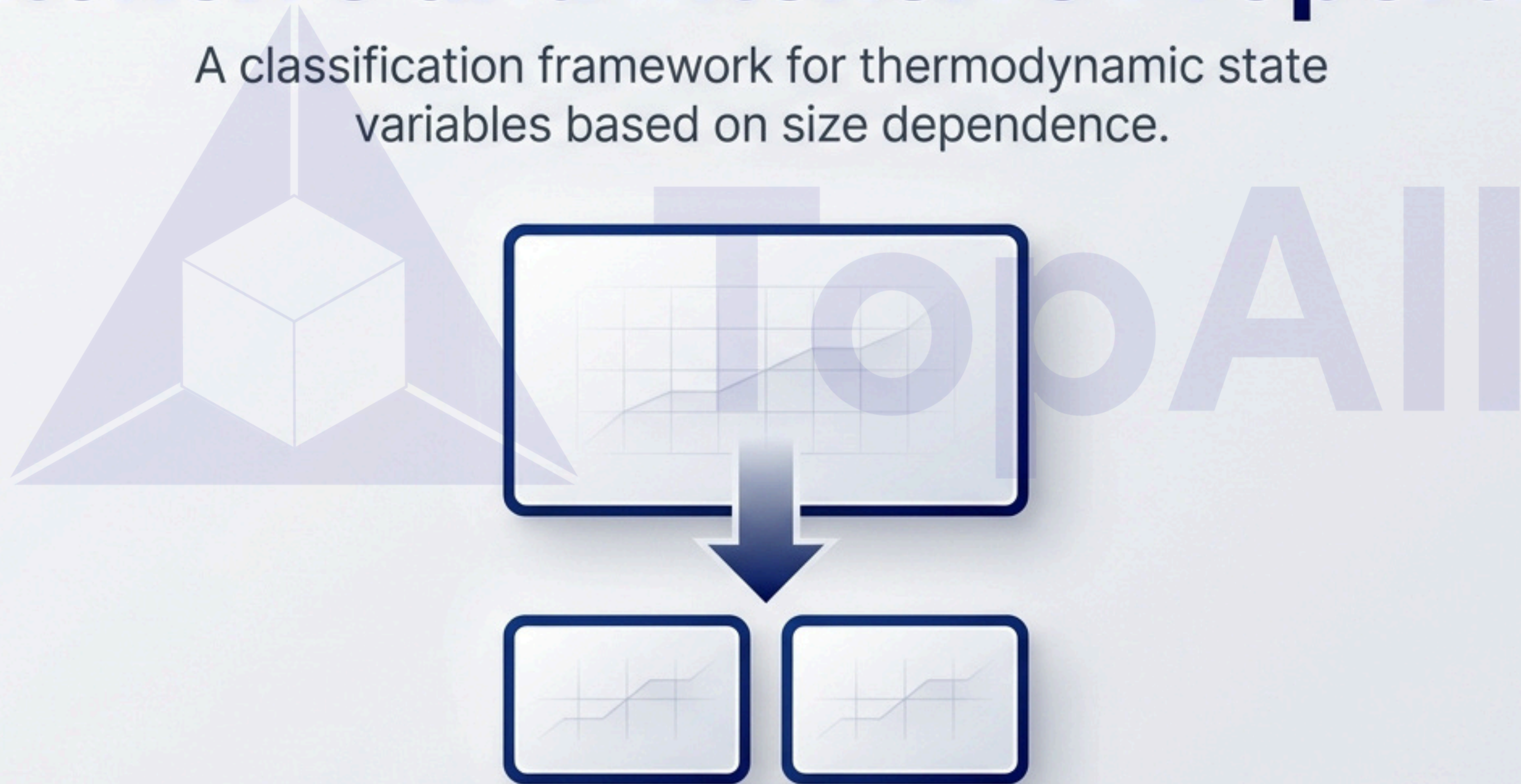


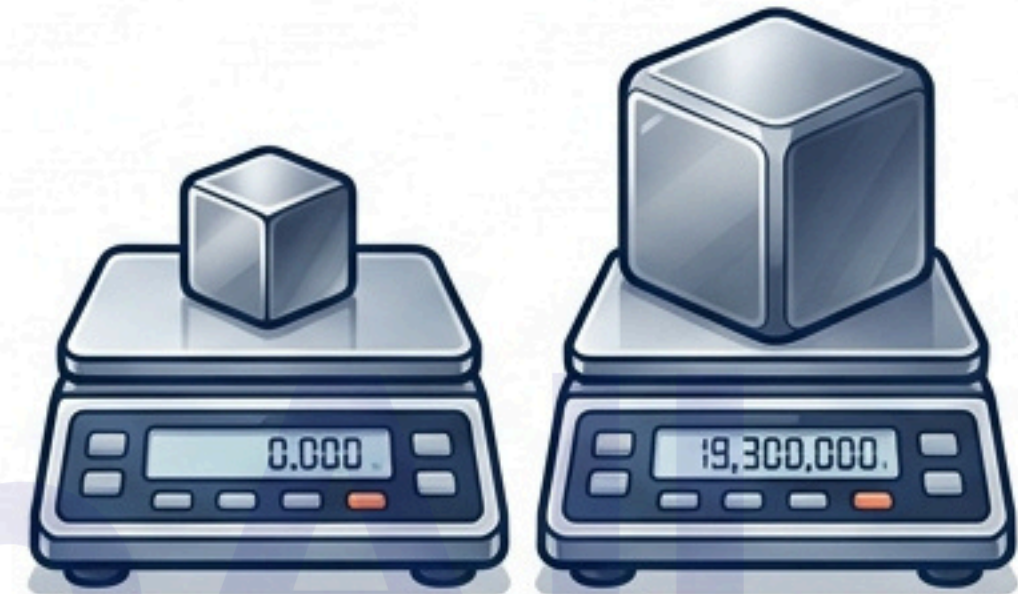
Extensive and Intensive Properties

A classification framework for thermodynamic state variables based on size dependence.



Extensive Properties

Properties whose values depend strictly on the quantity or size of **matter** present in the system. They are additive.



[Mass] [m]

[Volume] [V]

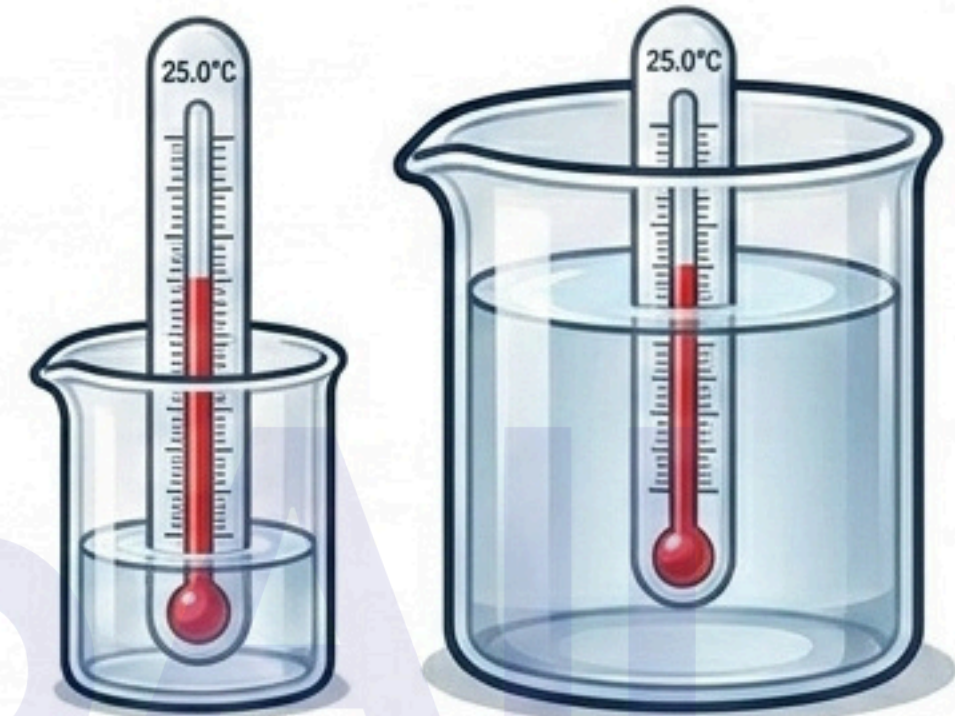
[Internal Energy] [U]

[Enthalpy] [H]

[Heat Capacity] [C]

Intensive Properties

Properties whose values do not depend on the quantity or size of **matter** present. They are scale-independent.



[Temperature] [T]

[Eviden Grid] [H]

[Pressure] [p]

[Density] [ρ]



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$$E=mc^2$$



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The Partitioned Gas Experiment

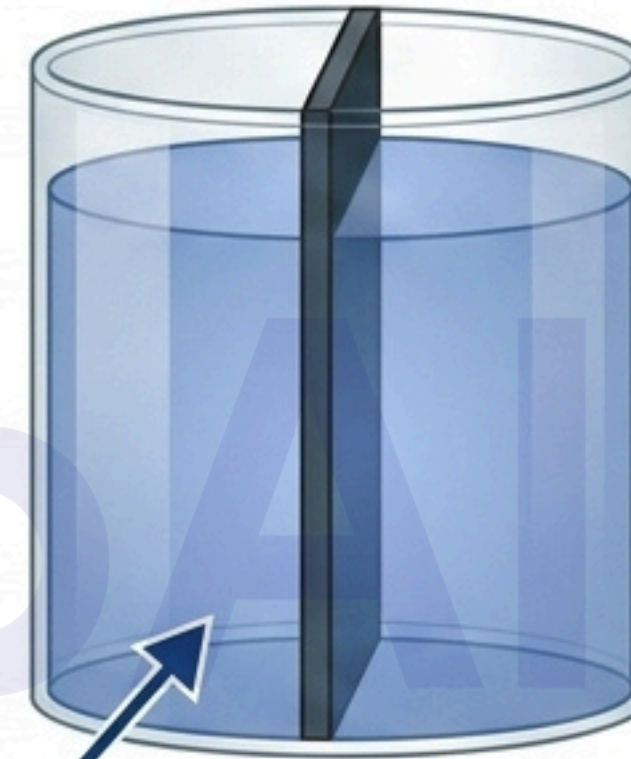
State 1 Card



Volume = [V]

Temperature = [T]

State 2 Card



Volume = [$V/2$]

Temperature = [T]

Because **Volume** halves, it is **Extensive**.
Because **Temperature** remains unchanged, it is **Intensive**.

Molar Normalization

A molar property is the value of an extensive property for 1 mole of a substance. Normalizing an extensive property by the amount of matter transforms it into an intensive property.

[Extensive
Property (χ)]

[$\div$ Amount of matter (n)]

[Intensive
Property (χ_m)]

$$\chi_m = \chi / n$$

Volume (V) $\rightarrow$ Molar Volume (V_m)

Heat Capacity (C) $\rightarrow$ Molar Heat Capacity (C_m)

Exam Note:
Molar properties are
always Intensive.



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