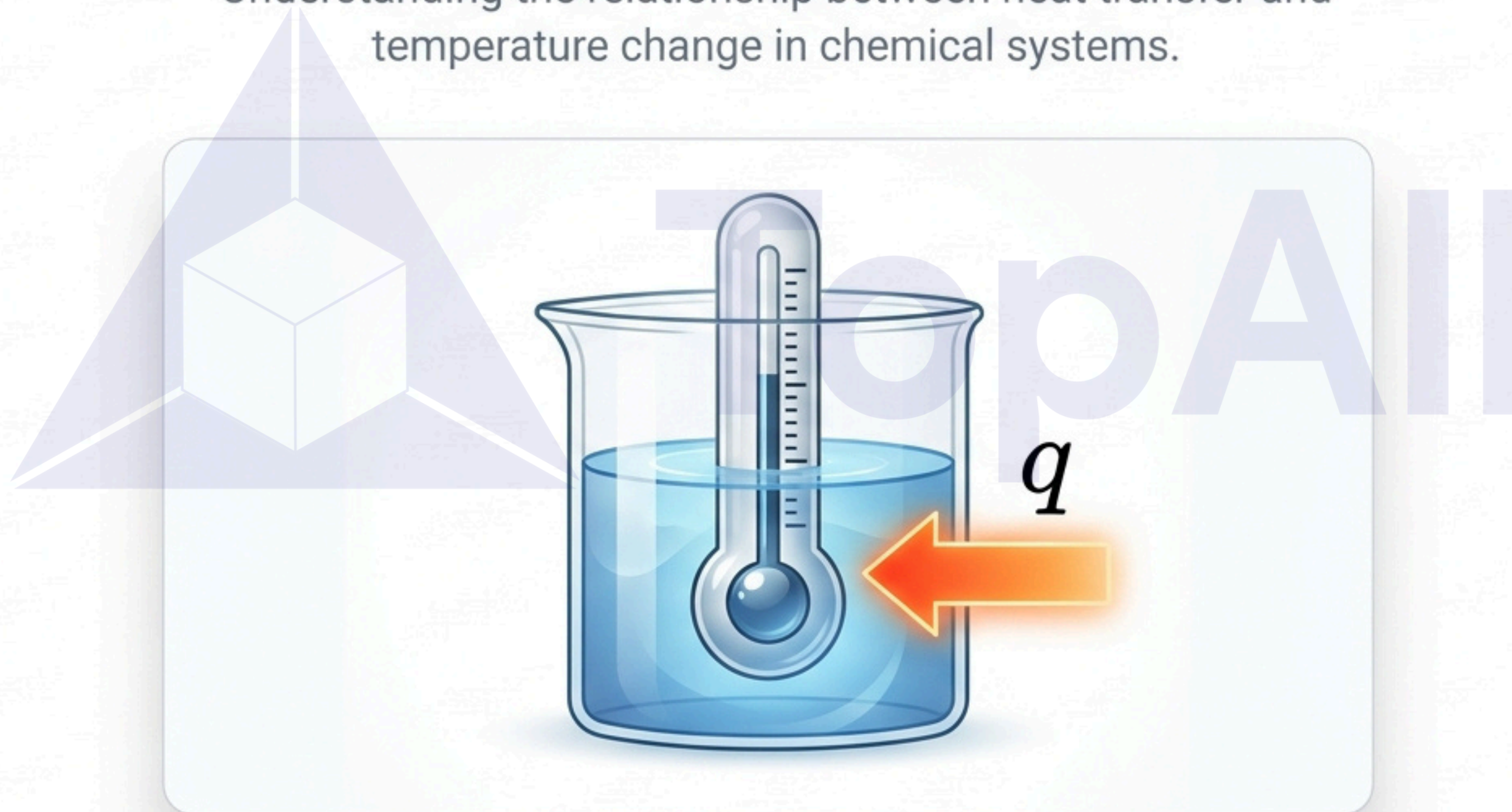


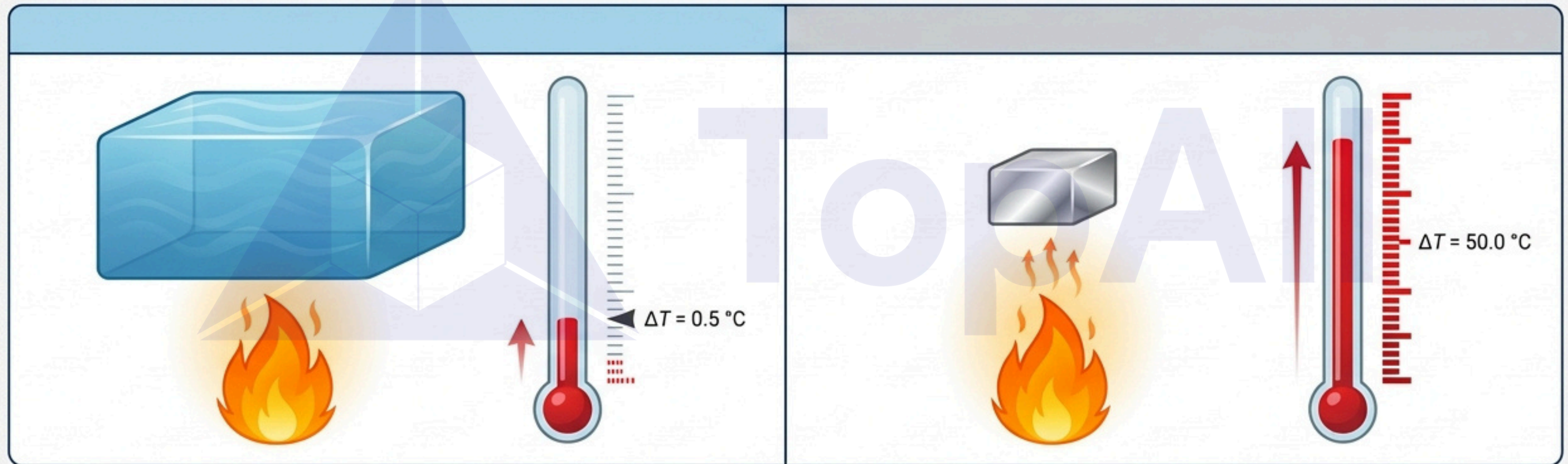
Heat Capacity

Understanding the relationship between heat transfer and temperature change in chemical systems.



What Is Heat Capacity?

When heat is transferred to a system, it appears as a rise in temperature. Heat capacity is the measure of how much heat energy is required to produce that temperature change.



The increase of temperature is proportional to the heat transferred.

**The magnitude of heat capacity depends on three fundamental factors:
Size, Composition, and Nature of the system.**

The Mathematical Relationship

$$q = c\Delta T$$

q

The amount of heat supplied to or absorbed by the system.

Joules (J)

c

The coefficient proportionality constant to the entire system.

J/K or J/°C

ΔT

The rise in temperature calculated as
 $T_{\text{final}} - T_{\text{initial}}$

Kelvin (K) or °C



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Molar Heat Capacity (C_m)

Because general heat capacity (C) is an extensive property dependent on the amount of substance, chemists standardize it. Molar heat capacity measures the heat required to raise the temperature of exactly one mole of a substance by one degree.

$$C_m = C / n$$

n = number of moles

Unlike general Heat Capacity (C), Molar Heat Capacity (C_m) is an Intensive Property. It does not change based on how much substance you have; it is fixed for a given material.

Specific Heat Capacity (c)

In practical laboratory applications, it is often easier to measure mass than moles. Specific heat capacity is the heat required to raise the temperature of one unit mass (e.g., 1g., 1g or 1kg) of a substance by one degree.

$$c = C / m$$

c = Specific heat capacity

$$q = cm\Delta T$$

m = Mass of the substance

Water has a very large specific heat capacity. A massive amount of energy is required to raise its temperature compared to most metals.

The Core Principle

High Heat Capacity



Absorbs massive amounts of heat with barely any change in temperature.

e.g., Water

Low Heat Capacity



Absorbs heat and experiences immediate, drastic temperature spikes.

e.g., Copper pan

RULE: A larger heat capacity results in a smaller temperature rise for the exact same amount of heat transferred.



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