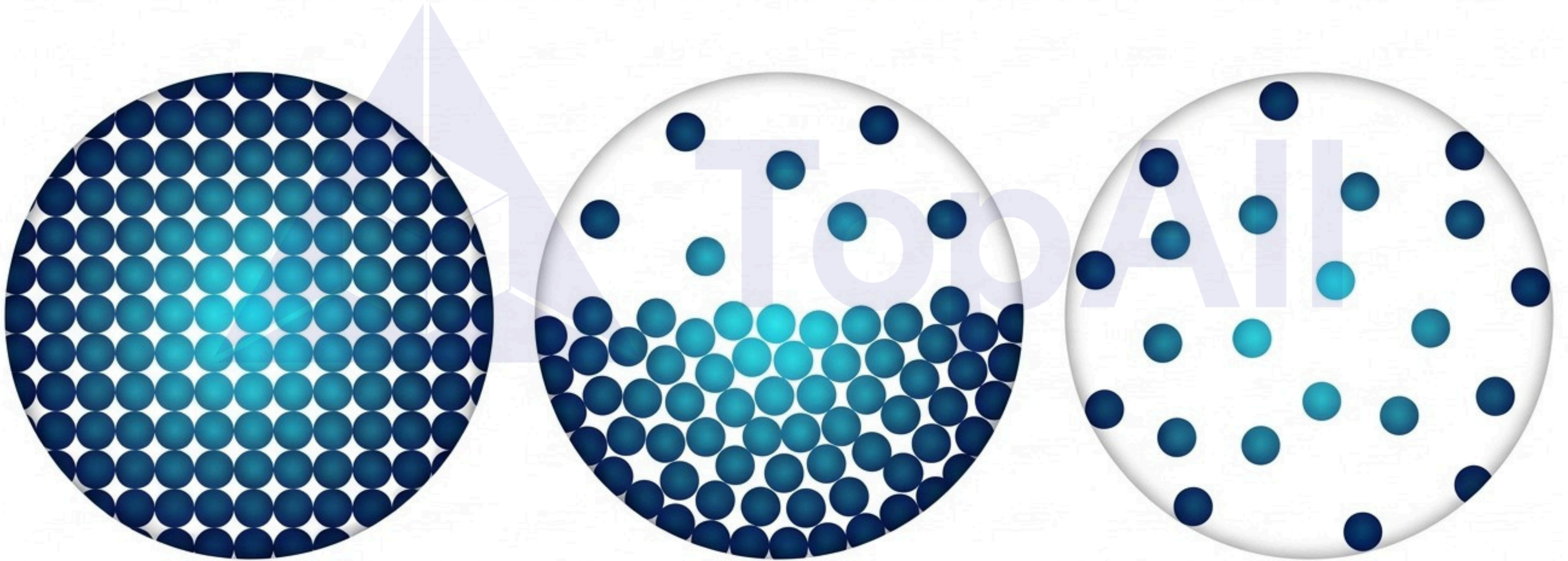
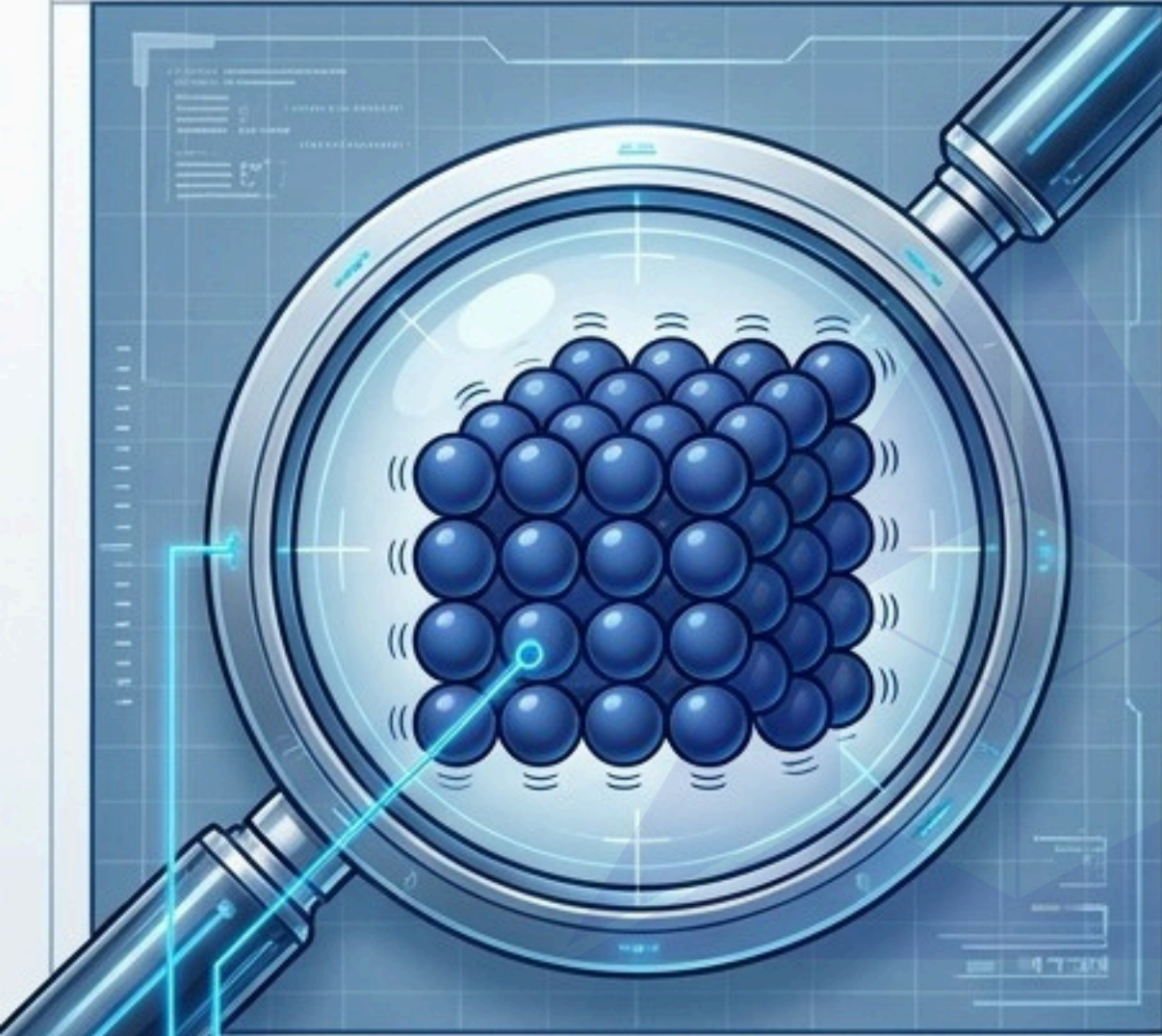


Solids, Liquids and Gases

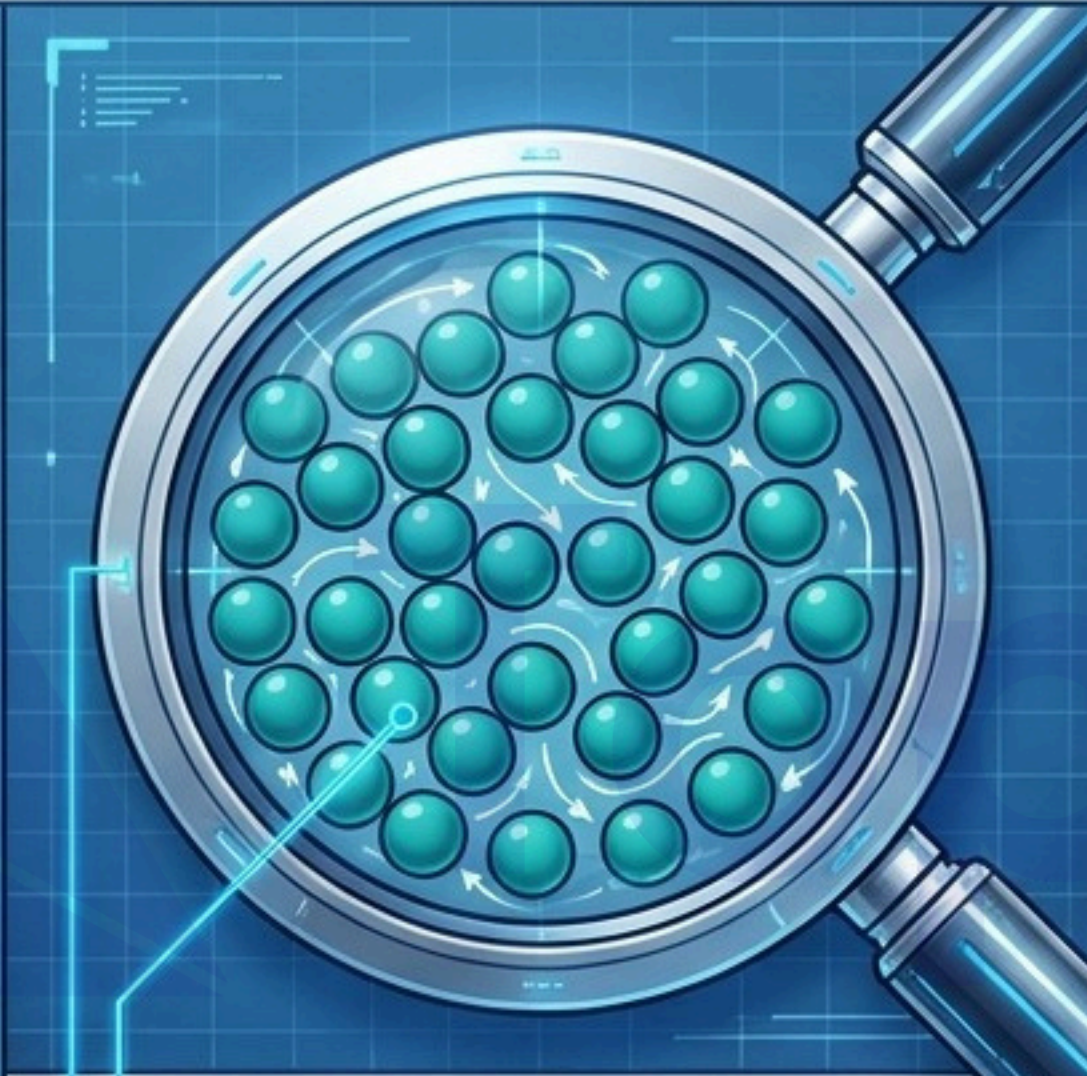
The Microscopic Blueprint of Matter



The Microscopic Distinction



- Spacing:** Particles held very close together.
- Arrangement:** Orderly fashion.
- Movement:** Negligible freedom (particles vibrate in place).

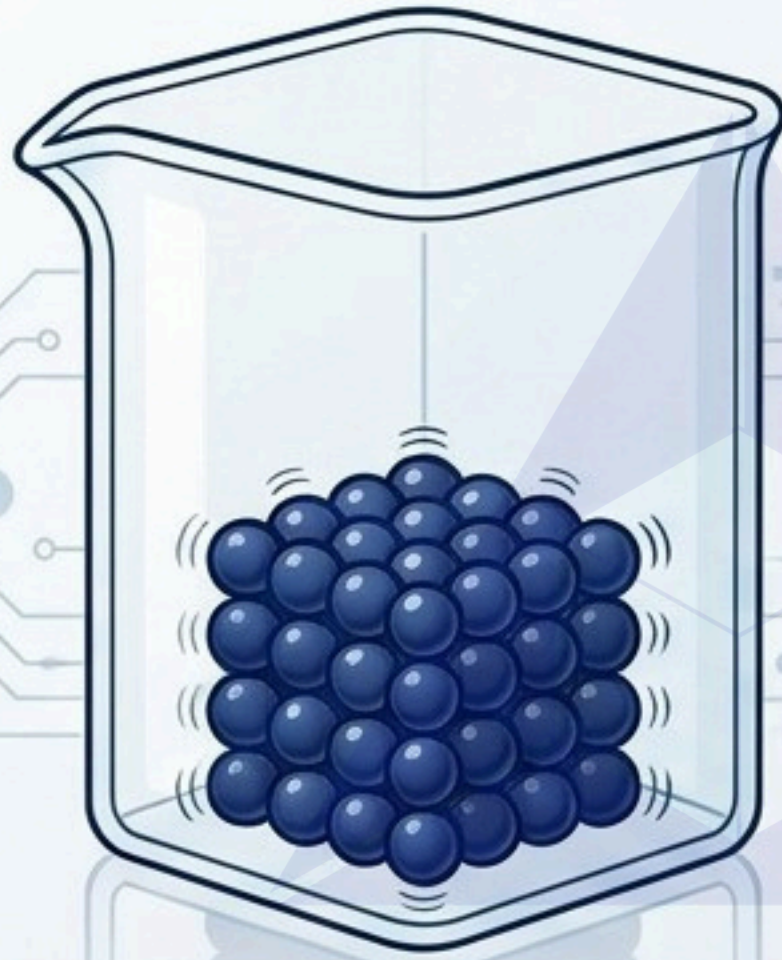


- Spacing:** Particles close to each other.
- Arrangement:** Disordered.
- Movement:** Can move around and slip past each other.



- Spacing:** Particles far apart.
- Arrangement:** Random.
- Movement:** Easy and fast chaotic movement.

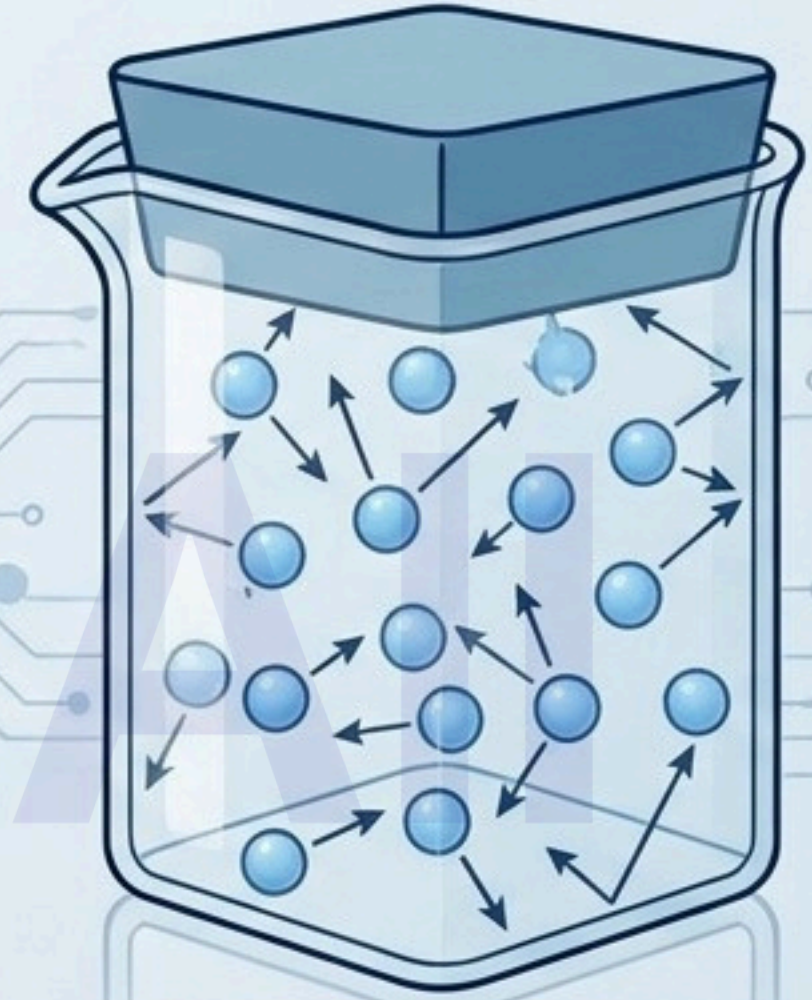
Visualizing the Three States



Solid State



Liquid State



Gaseous State

KEY TAKEAWAY: The macroscopic properties of a substance are entirely dictated by how its microscopic constituent particles are arranged and how they move.



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$$E=mc^2$$



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Macroscopic Properties Rulebook

STATE	SHAPE	VOLUME
SOLID	DEFINITE	DEFINITE
LIQUID	INDEFINITE (Takes container shape)	DEFINITE
GAS	INDEFINITE (Takes container shape)	INDEFINITE (Completely occupies container space)

Exam Watch

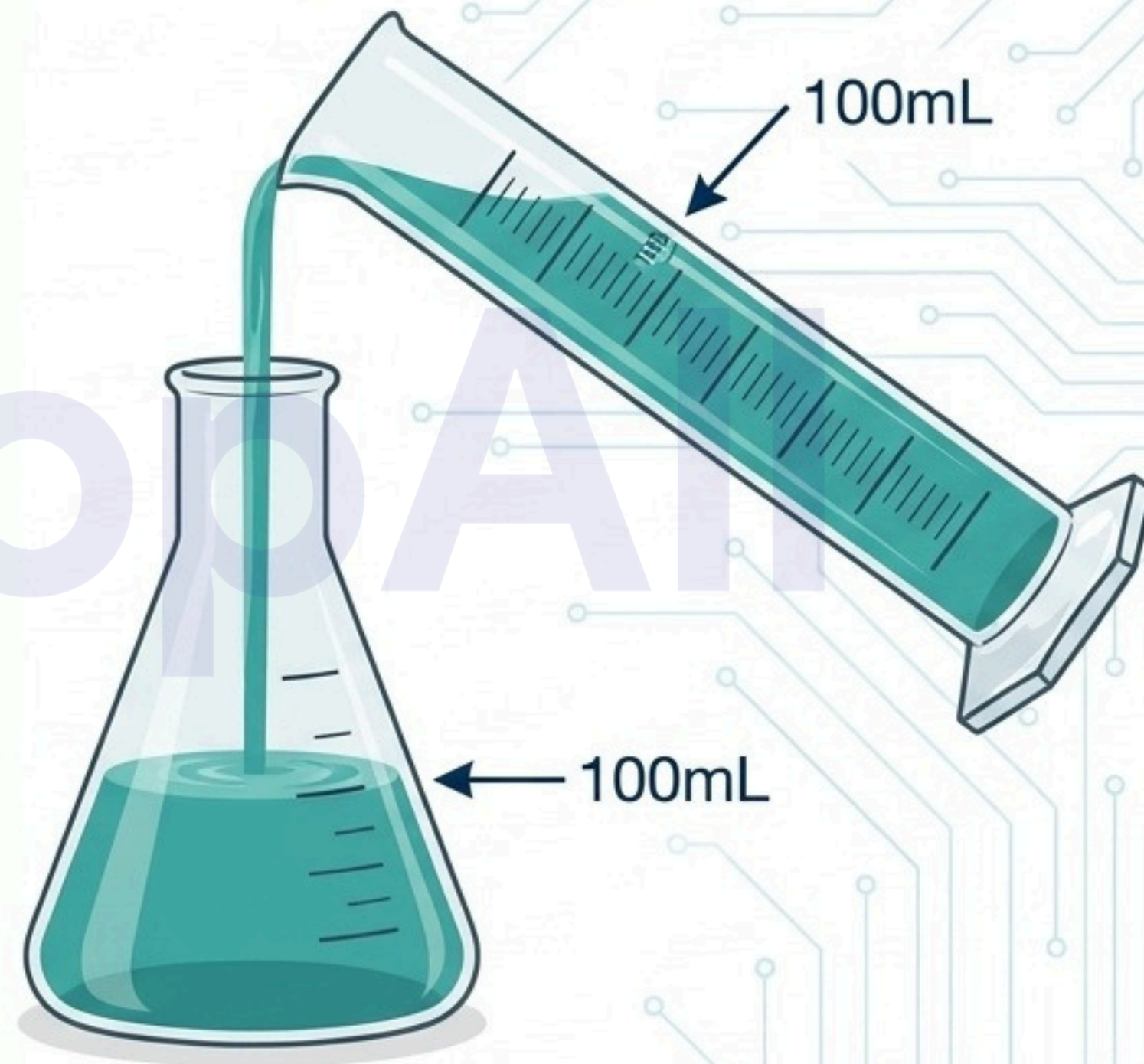


JEE TRAP ALERT

A substance takes the shape of its container. Therefore, it must be a gas.

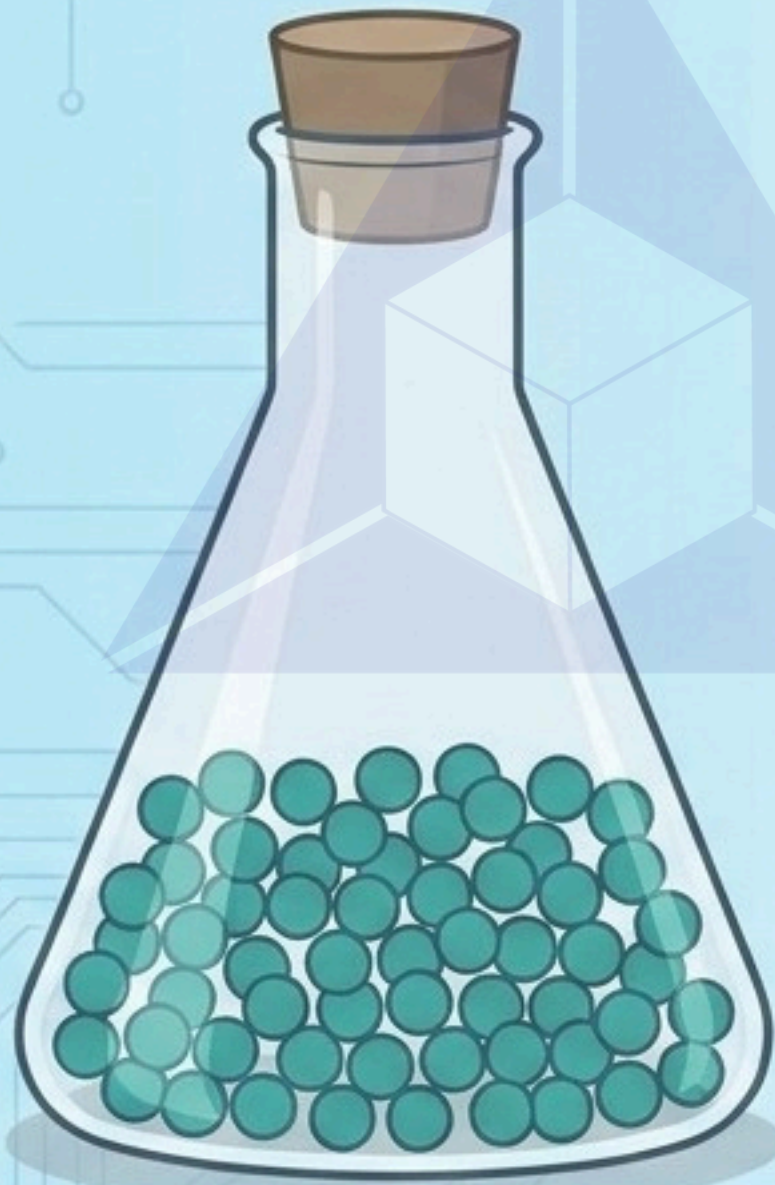
FALSE. Liquids also take the shape of their container. The primary differentiating factor here is **VOLUME**.

A liquid will settle at the bottom and retain its fixed volume (100mL stays 100mL regardless of flask size). A gas will expand to fill the entire volume of the closed container.



Concept Check

Based on the particle arrangement, identify the **state of matter** inside the sealed flask.



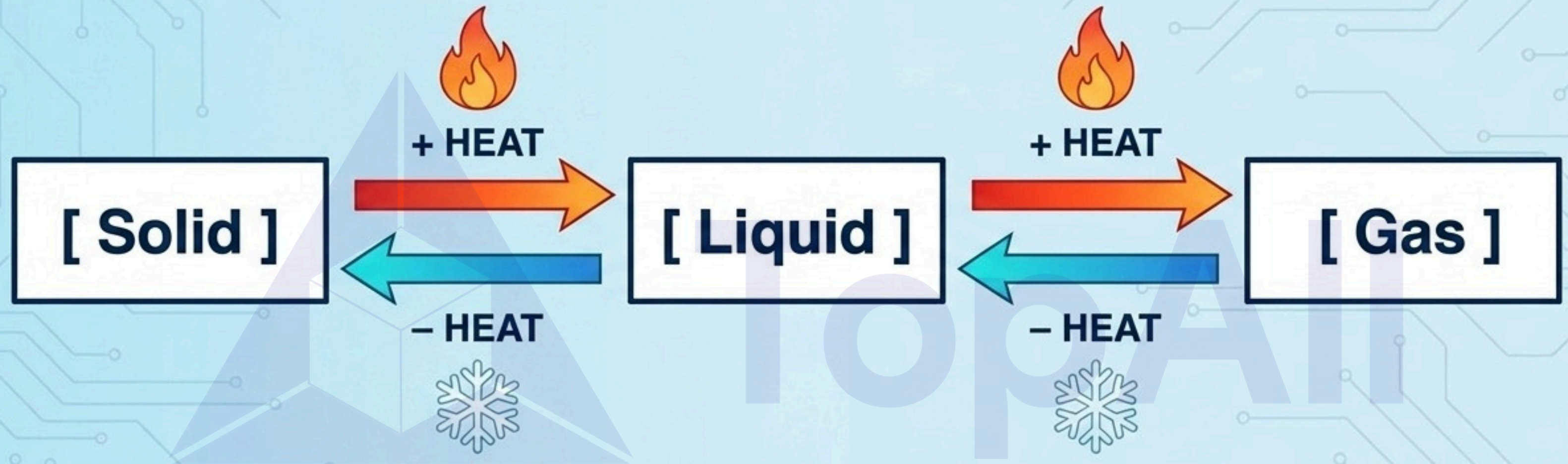
[✗] Are particles in a fixed, orderly lattice?
(No → Not a Solid)

[✗] Do particles fill the entire sealed volume?
(No → Not a Gas)

[✓] Are particles close together but taking the shape of the bottom of the container? (Yes)

STATE: LIQUID

Interconvertibility of States



These three states of matter are interconvertible by changing the conditions of temperature and pressure.

SUMMARY: Heating increases particle kinetic energy and spacing (Solid → Gas). Cooling decreases kinetic energy, pulling particles closer together (Gas → Solid).



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