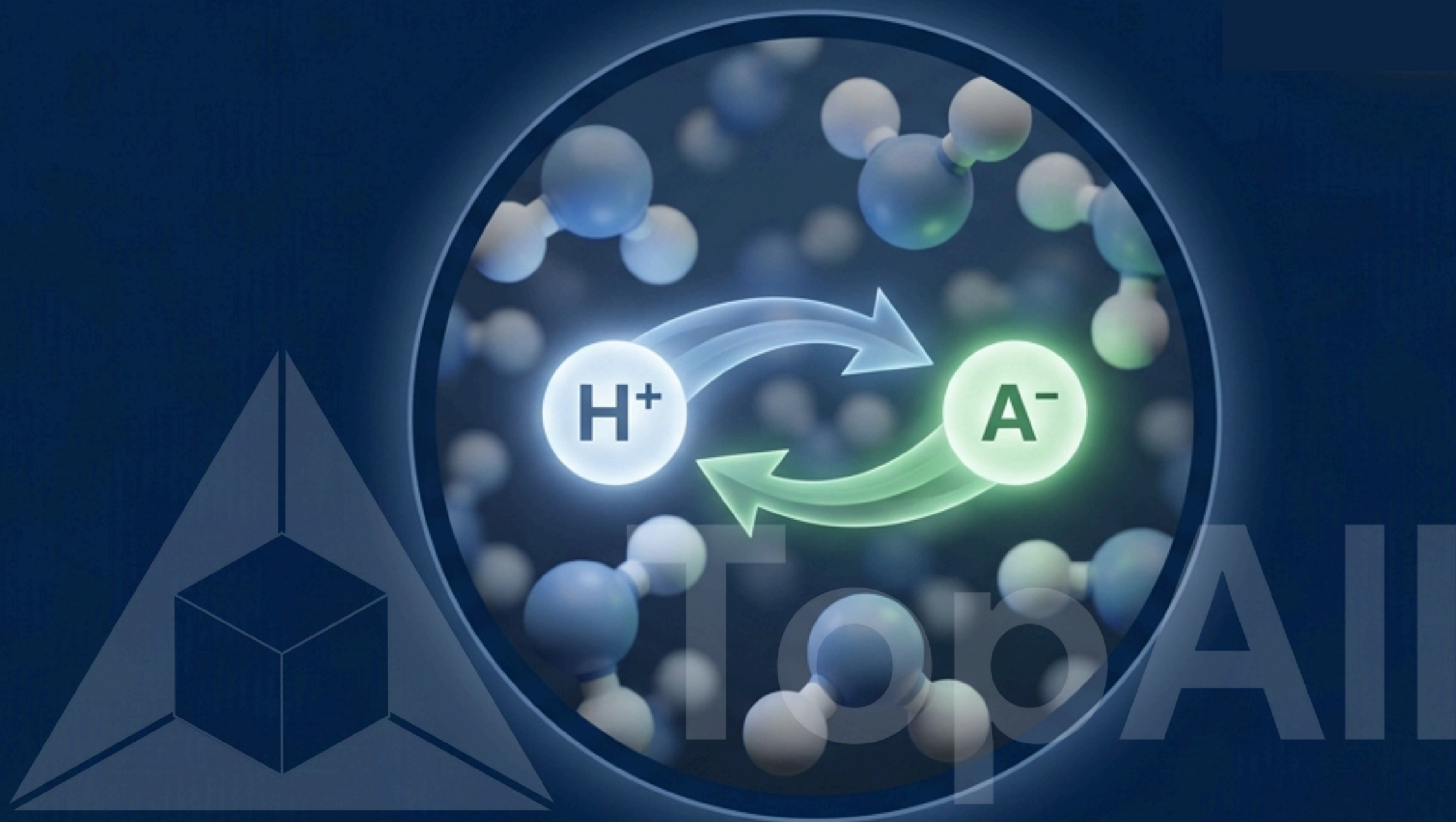
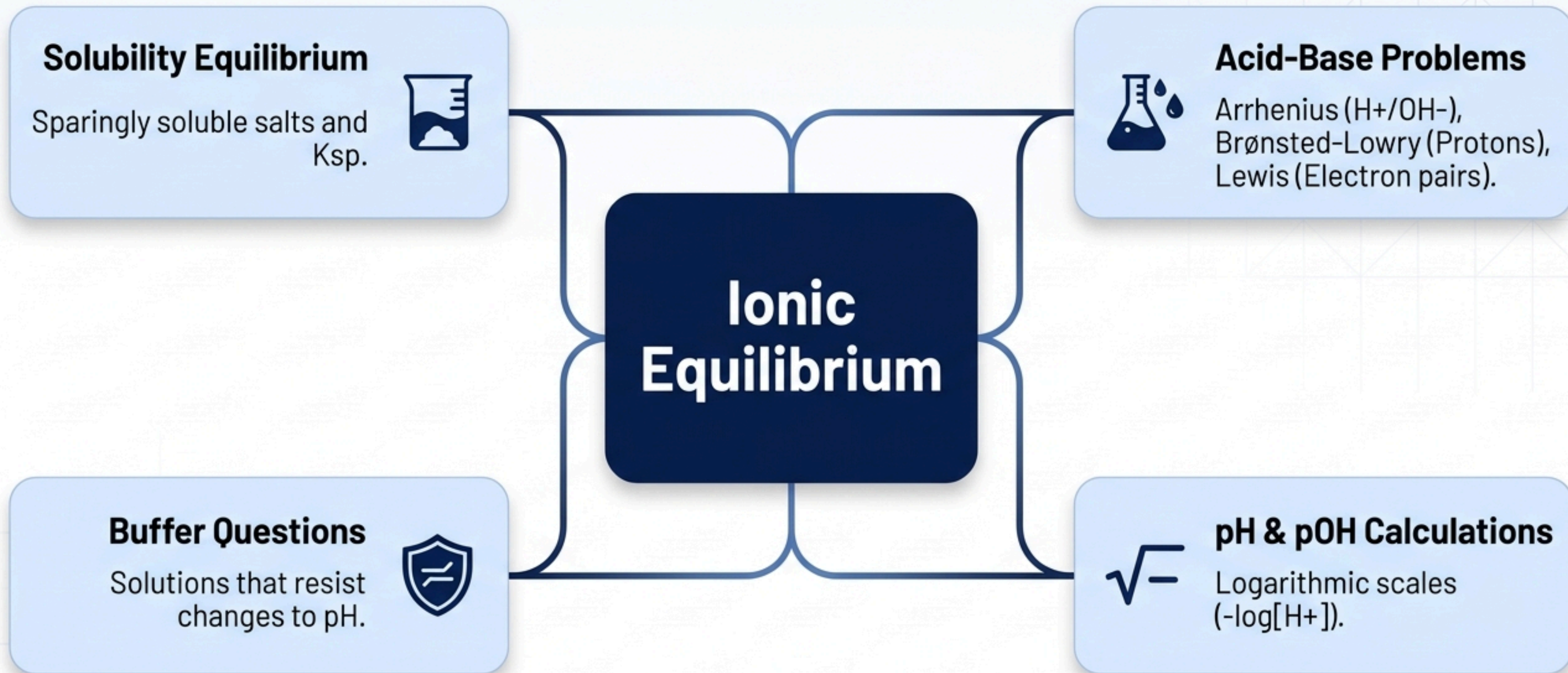




The Hidden Battle of Ions in Solution

Equilibrium doesn't stop — ions keep moving.

Exam Snapshot: The Backbone of Physical Chemistry



The Dynamic Balance



Macroscopic: Constant & Stable.



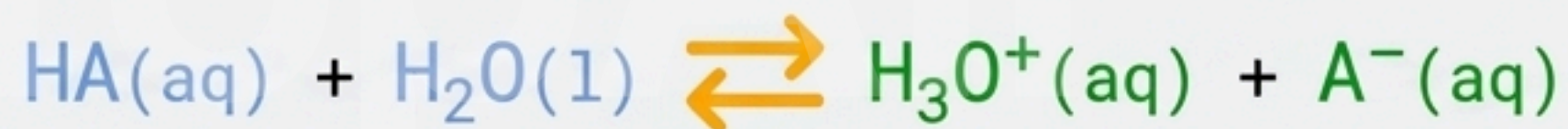
Microscopic: The Dynamic Balance.

In weak electrolytes, a continuous tug-of-war exists between two opposing rates:

1. **Ionisation:** Molecules breaking apart into separate ions.
2. **Recombination:** Ions colliding to reform molecules.

Formula Bank

General Weak Acid Equilibrium



(Simplified)





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$$E=mc^2$$



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The Great Divide: Electrolyte Strength

Strong Electrolytes

-  **Ionisation:** ~100% Complete
- **Equilibrium:** Lies extremely far to the right (essentially a one-way street).
- **Examples:** HCl, NaOH, NaCl



Weak Electrolytes

-  **Ionisation:** Partial (often < 5%)
- **Equilibrium:** True dynamic balance between ions and unionised molecules.
- **Examples:** CH₃COOH, NH₄OH



Shifting the Balance (Le Chatelier's Applied)



Concentration

Adding reactant shifts equilibrium forward. Removing ions (via precipitation) drives further ionisation to relieve stress.



[High Yield]

Common Ion Effect

Adding a strong electrolyte with a shared ion suppresses the ionisation of the weak electrolyte (e.g., adding acetate to acetic acid lowers $[H^+]$).



Temperature

Ionisation is generally endothermic. Increasing temperature usually increases dissociation (shifts right).



Nature of Electrolyte

The inherent strength of the substance dictates its equilibrium constant (K_a , K_b , K_{sp}).

Exam Snapshot: Conceptual Pitfalls



THE TRAP

"Equilibrium is a static state. Once reached, the ions stop moving and concentrations are locked forever."

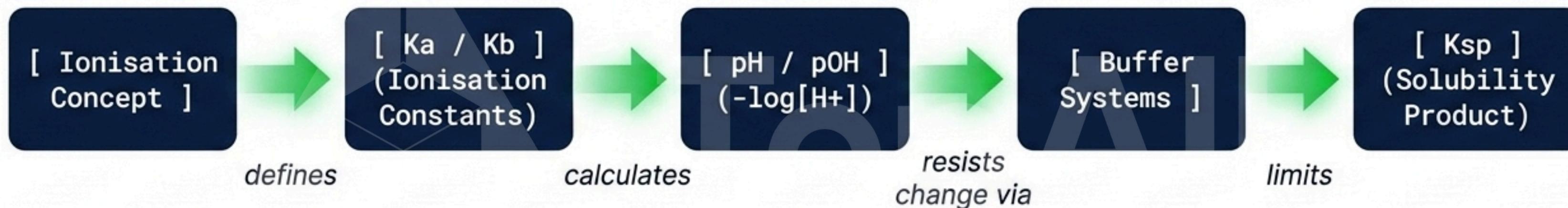


THE TRUTH

"Equilibrium is fiercely dynamic. The ions never stop moving. It simply means the rate of forward ionisation equals the rate of backward recombination."

Result: Macroscopic properties (color, concentration) become constant, but microscopic collisions continue infinitely!

Revision Card: The Ionic Equilibrium Master Map



[Master the sequence. Master the chapter.]



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