

JEE Ksp Application



Who Precipitates First?

Selective Precipitation
Applications & Equilibrium
Dynamics

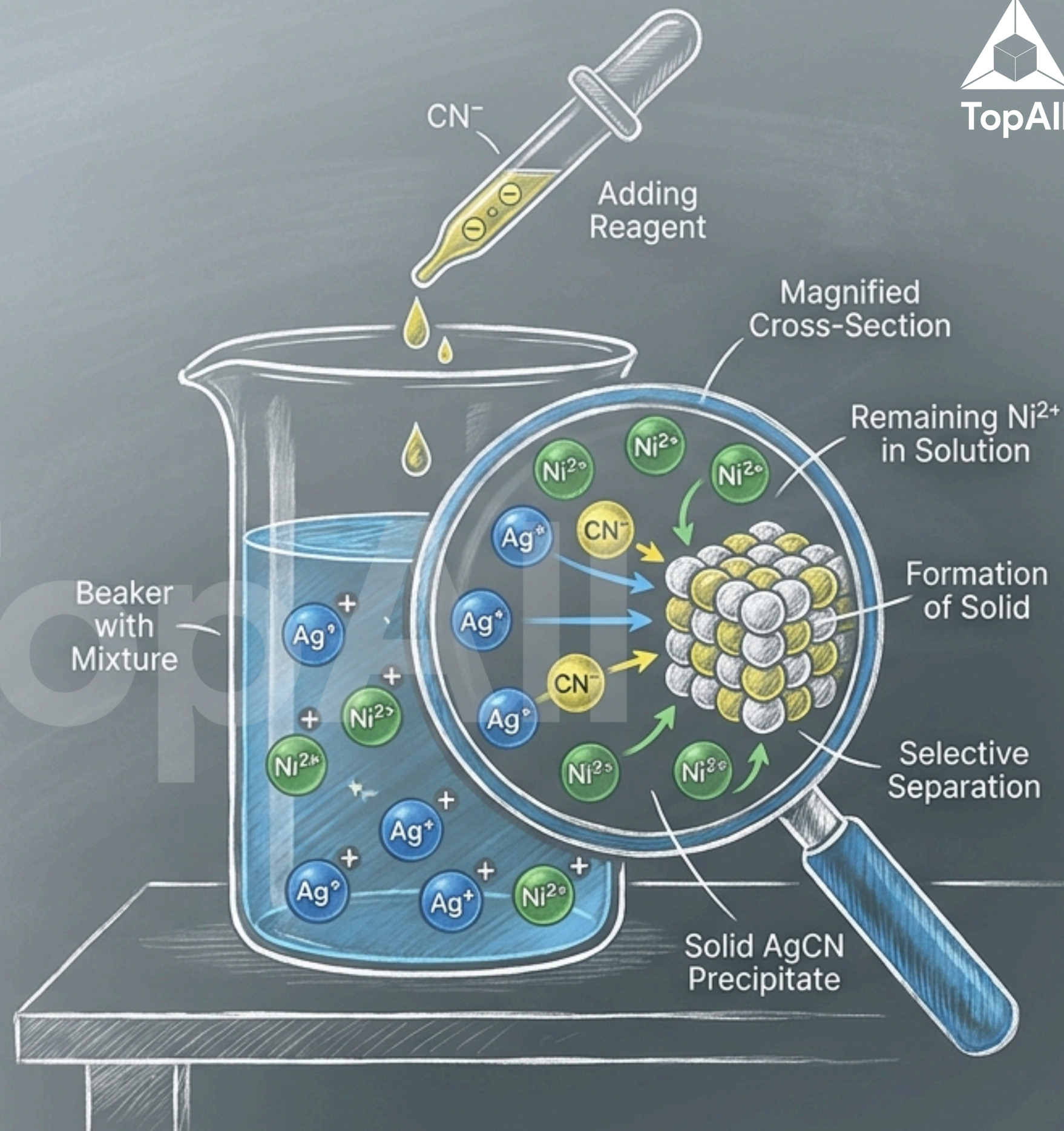


Theory

The Concept of Selective Separation

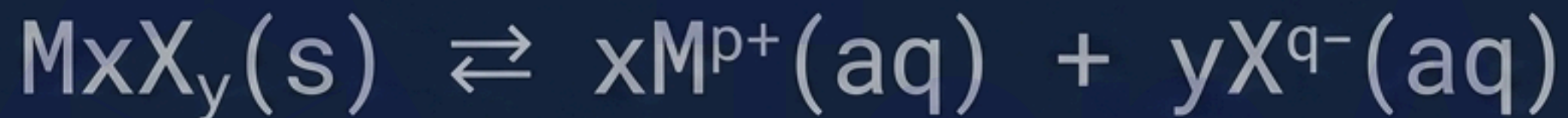
Selective precipitation is the separation of ions from a mixture based on their distinct solubility behaviors and K_{sp} limits.

- Reagents are added carefully to a mixture of ions.
- Different ions possess different Solubility Product Constants (K_{sp}).
- The Ionic Product (Q_{sp}) dictates the exact moment a specific ion drops out of the solution as a solid crystal.



Quantifying the Ionic Product (Q_{sp})

Q_{sp} is calculated exactly like K_{sp} , but using concentrations **at any given time t**, not necessarily at equilibrium.



$$Q_{sp} = [M^{p+}]^x [X^{q-}]^y$$

Where $[M^{p+}]$ and $[X^{q-}]$ are the actual molar concentrations of the ions in the mixture at that exact moment.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

Practice Now



At prep.topall.app

Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



The Precipitation Matrix



$$Q_{sp} < K_{sp}$$

Unsaturated

No precipitation occurs. The solution can still dissolve more solute.



$$Q_{sp} = K_{sp}$$

Saturation

Dynamic equilibrium is reached. The solution holds the maximum possible dissolved solute.



$$Q_{sp} > K_{sp}$$

Precipitation

Supersaturated state. The excess solid precipitates out until Q_{sp} drops back to equal K_{sp} .

The Mechanism in Action

Mixture of Target Ions (e.g., A^+ and B^+) exist in solution.



Precipitating Reagent (X^-) is slowly added drop-by-drop.



The Ionic Product (Q_{sp}) increases for both potential salts (AX and BX).



**One ion hits $Q_{sp} > K_{sp}$ first and precipitates!
The other remains dissolved.**

Common Conceptual Pitfall



JEE Trap Alert



**A small K_{sp}
directly means
that ion will
precipitate first.**



**Concentration
also matters!**

You cannot just compare K_{sp} values if the stoichiometries are different (e.g., AB vs A_2B). You must calculate the exact concentration of the precipitating reagent required for each ion. The ion requiring the lower reagent concentration precipitates first.

The Action Plan

- 1 Calculate:** Determine the required concentration of the common precipitating ion for both targets by setting $Q_{sp} = K_{sp}$.
- 2 Compare:** Evaluate which target requires a lower concentration of the added reagent.
- 3 Predict:** The target requiring the lower concentration will reach $Q_{sp} > K_{sp}$ first and precipitate.

Selective precipitation is a race to exceed K_{sp} . Math beats intuition—always calculate the required concentrations to secure your rank.



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis