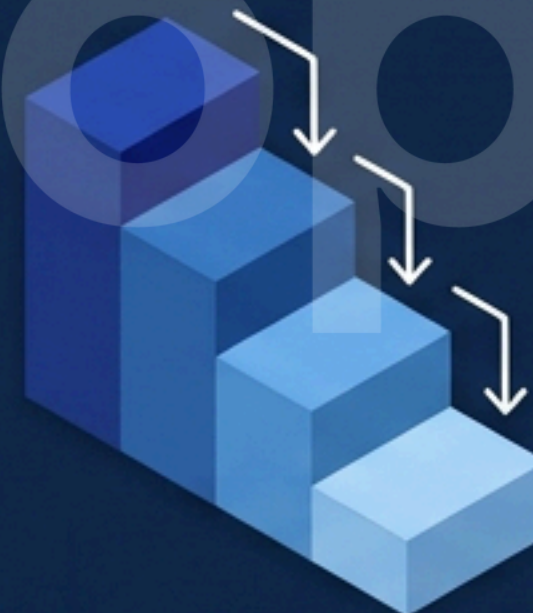


REDOX REACTIONS • NON-METAL DISPLACEMENT

The Chemical Hierarchy: Hydrogen & Halogens

Understanding electron competition and minimalist displacement rules for high-yield NEET revision.



Displacing Hydrogen: The Attack on Cold Water

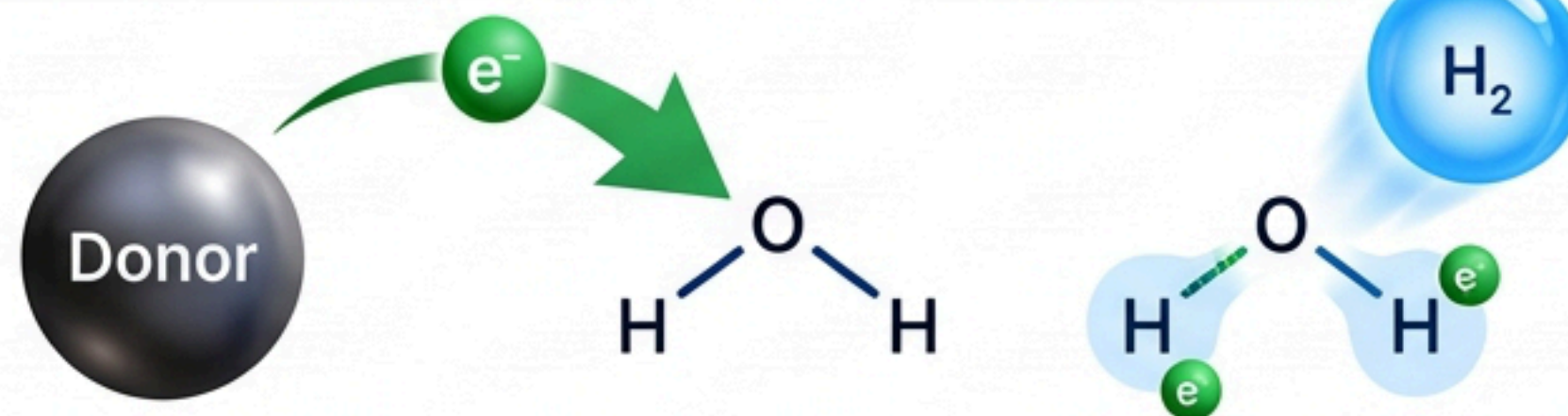
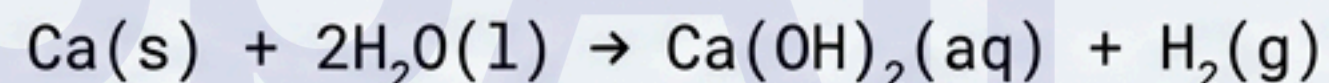
[EXTREME REACTIVITY]

Alkali metals act as aggressive reductants, instantly **displacing hydrogen** from cold water.



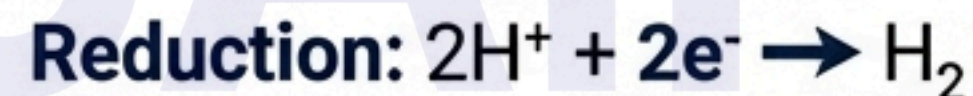
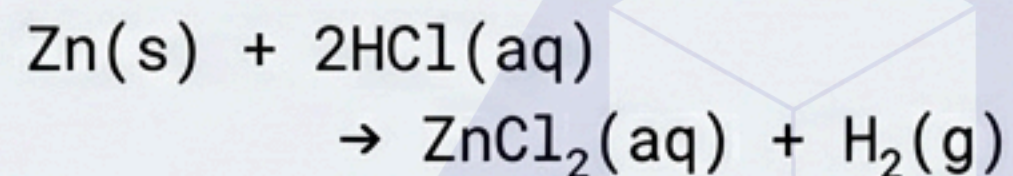
[HIGH REACTIVITY]

Alkaline **earth** metals also strip hydrogen from cold water, forming hydroxides.



Displacing Hydrogen: The Acid Requirement

Less active metals cannot break water, but successfully **displace hydrogen** from acids.



Rate of H_2 evolution maps to reactivity: $\text{Mg} > \text{Zn} > \text{Fe}$

Very less active metals like Ag and Au do not react with HCl.



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Let's Test Them Now.**

$$E=mc^2$$



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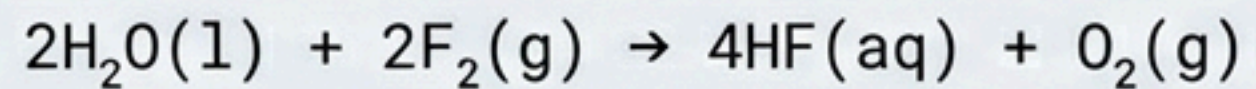
The Halogen Ladder: Non-Metal Hierarchy

In non-metal displacement, the power of elements as oxidizing agents decreases down Group 17.

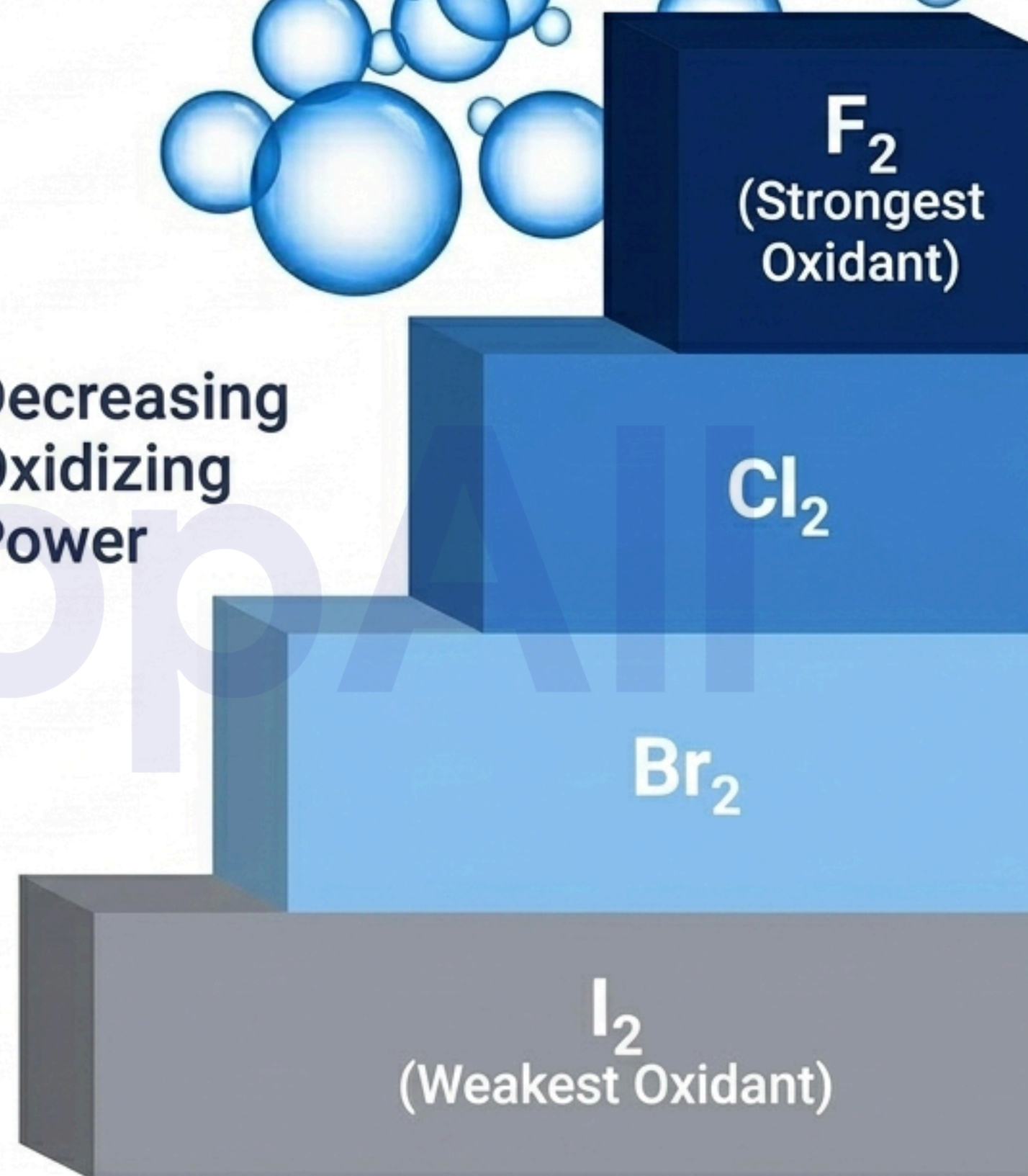
A lighter, more electronegative halogen displaces a **heavier halide ion** from its solution.

[THE FLUORINE ANOMALY]

Fluorine is too reactive for aqueous displacement. It attacks water directly:



Decreasing
Oxidizing
Power



Halogen Battle 1: Chlorine Displaces Bromide

Cl_2 is positioned higher on the halogen ladder, making it a **stronger electron acceptor (oxidant)** than Br_2 .

The Standard Reaction

[AQUEOUS REACTION]



The Visual
Mechanism



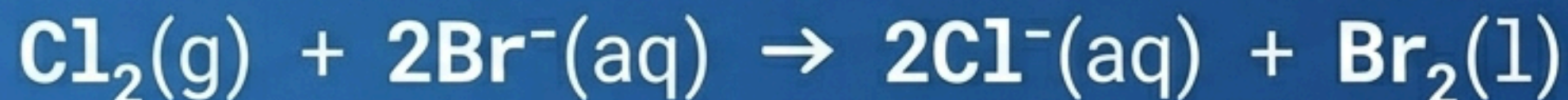
Br^- (Donor)



Cl_2 (Acceptor)

The Proof

[NET IONIC PROOF]



Halogen Battle 2: Displacing Iodide

Iodide sits at the bottom of the ladder. Both Chlorine and Bromine can **strip electrons** from it.

Chlorine vs Iodide



Standard Eq:



Net Ionic Eq:



Bromine vs Iodide

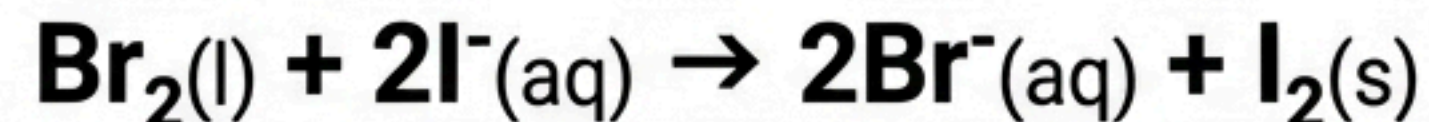


Downward
Displacement
Rule

Standard Eq:

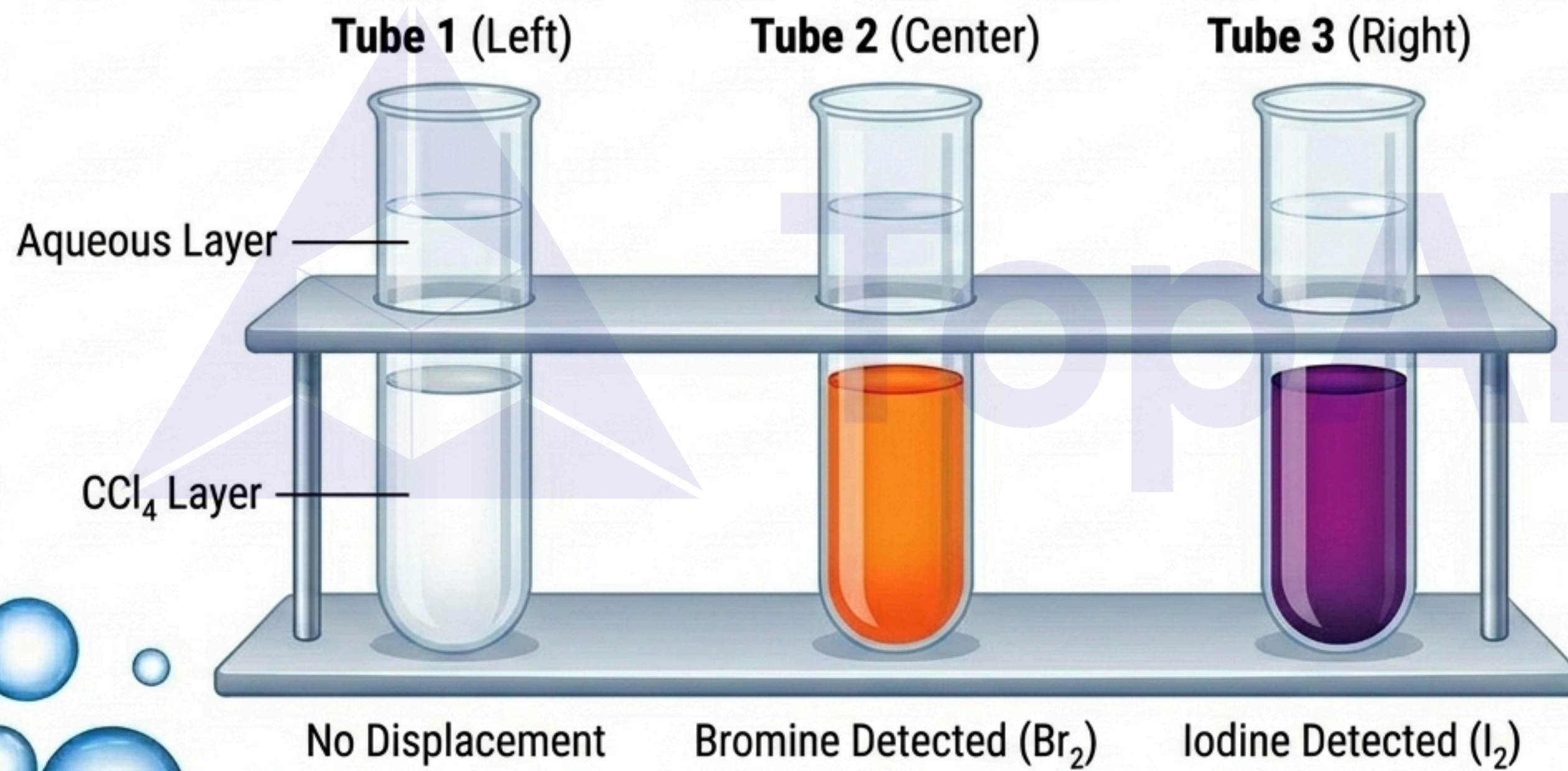


Net Ionic Eq:



Laboratory Proof: The Layer Test

Because Br_2 and I_2 are distinctly colored and dissolve in non-polar solvents, heavy CCl_4 (Carbon tetrachloride) is used to extract and identify them in the lab.



[OBSERVATION ANCHOR]

Memorize these specific extraction layer colors for lab-based exam questions.

Synthesis Matrix: Non-Metal Displacement

Hydrogen Displacement	Halogen Displacement
Active metals lose electrons (Reductants)	Lighter halogens gain electrons (Oxidants)
Reactivity varies by metal strength (Alkali > Alkaline Earth > Transition)	Strict Periodic Group 17 hierarchy ($F_2 > Cl_2 > Br_2 > I_2$)
Reagents: Cold Water, Steam, Acids	Reagents: Aqueous Halide salt solutions
Observation: Colorless, odorless gas bubbles (H_2)	Observation: Layer Test (CCl_4 extraction: Orange for Br_2 , Violet for I_2)

Displacement is always a competition for electrons. The stronger species forces the weaker species out of the compound.



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