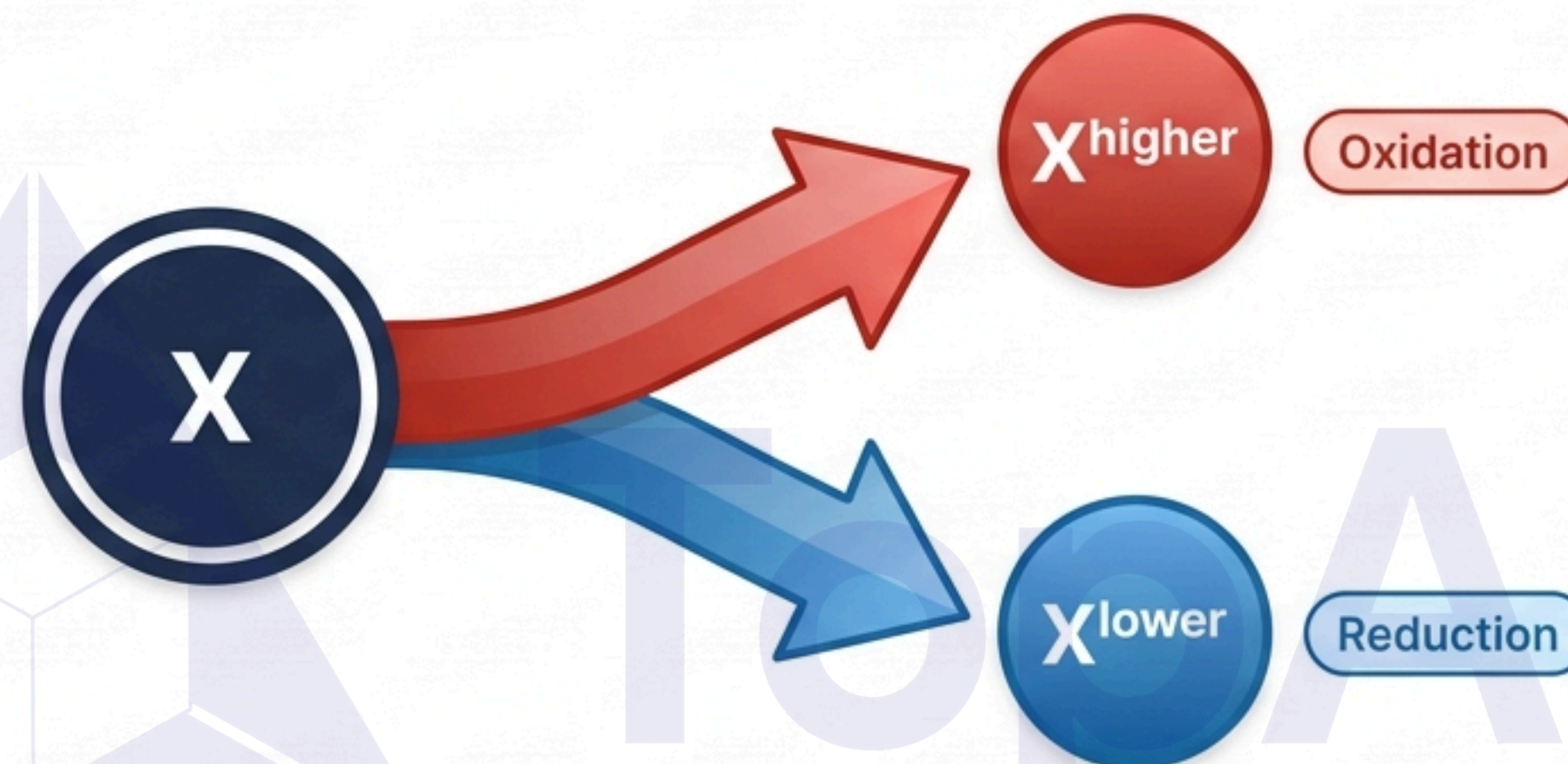


Disproportionation Reactions

One Element Oxidised and Reduced Together.



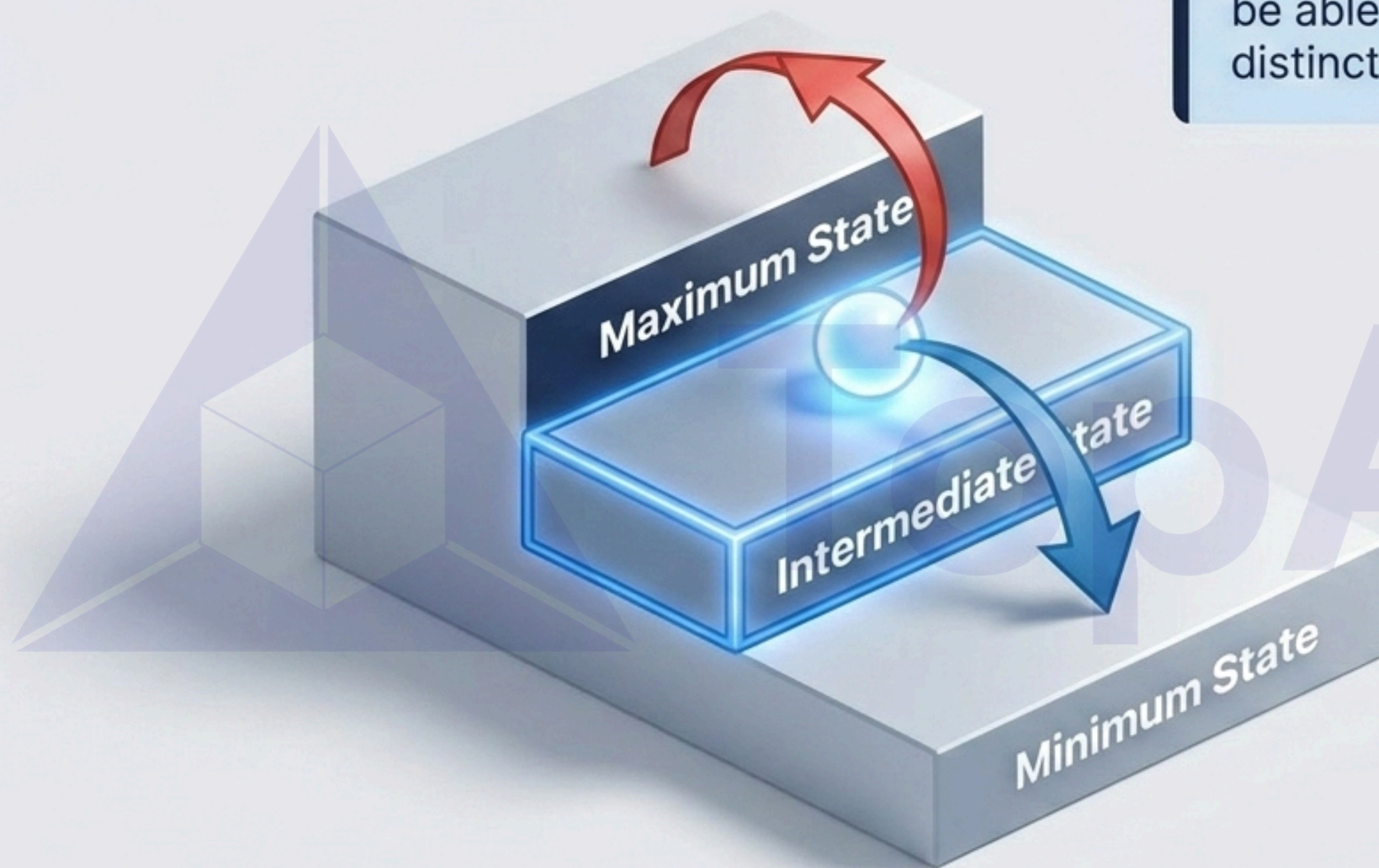


Key Takeaways

A special type of redox reaction where the exact same element in a single reactant acts as both the oxidising and reducing agent.

Formula Bank

Rule: The reacting element **MUST** be able to exist in at least **THREE** distinct oxidation states.



The element starts in the intermediate oxidation state and splits into higher and lower oxidation states in the products.



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$$E=mc^2$$



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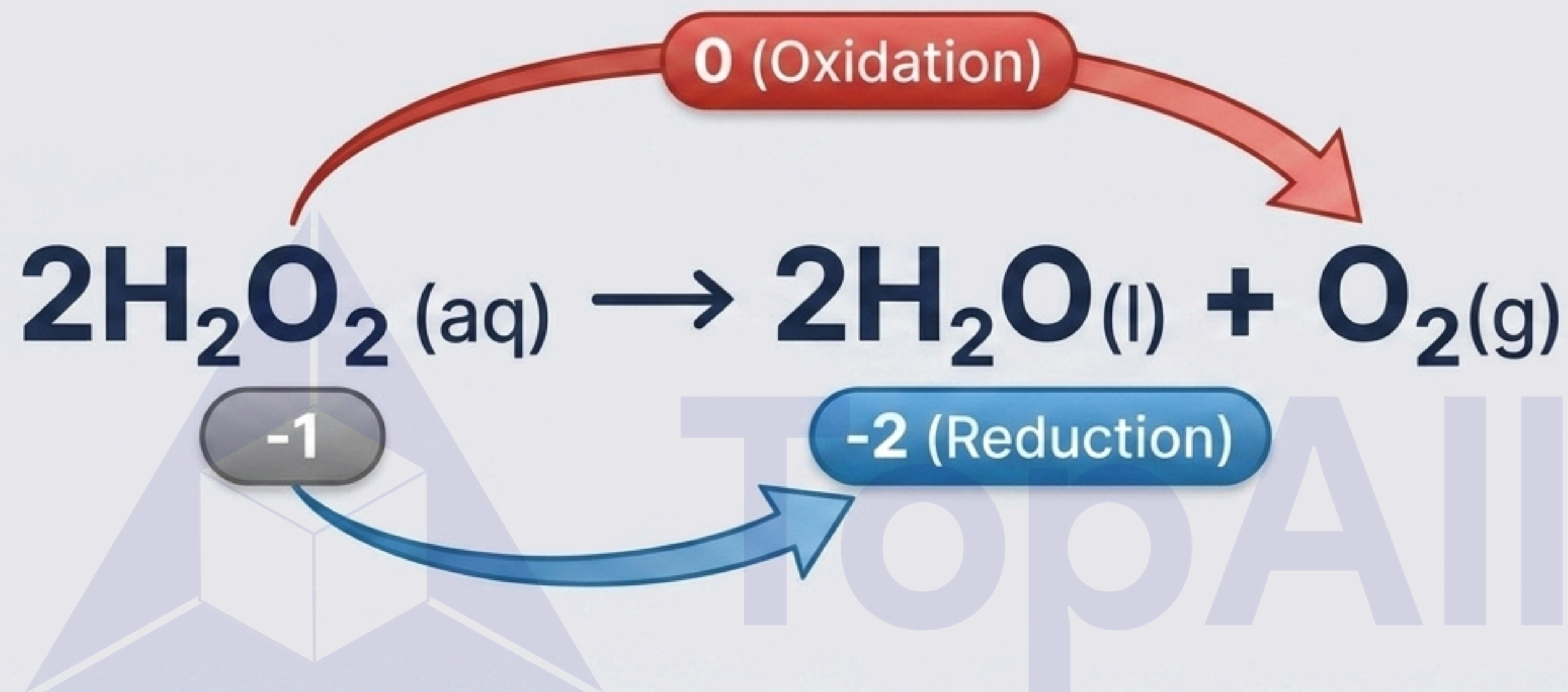


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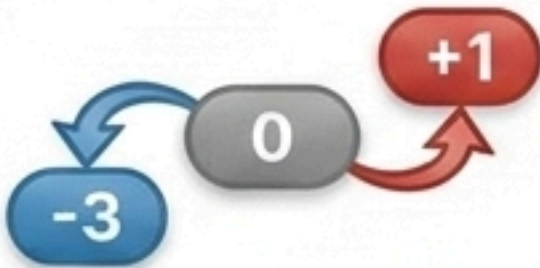
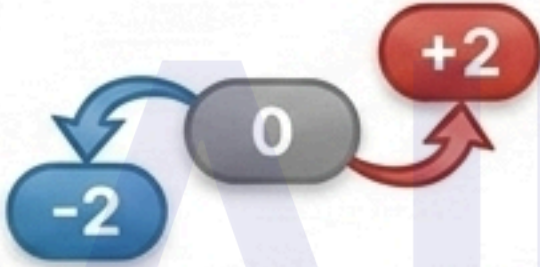
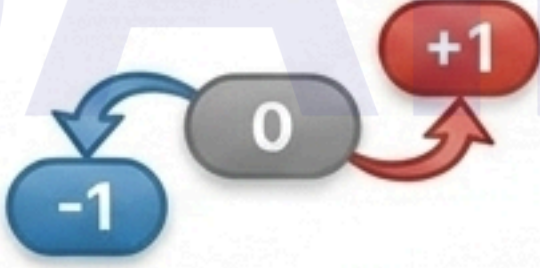




Exam Snapshot

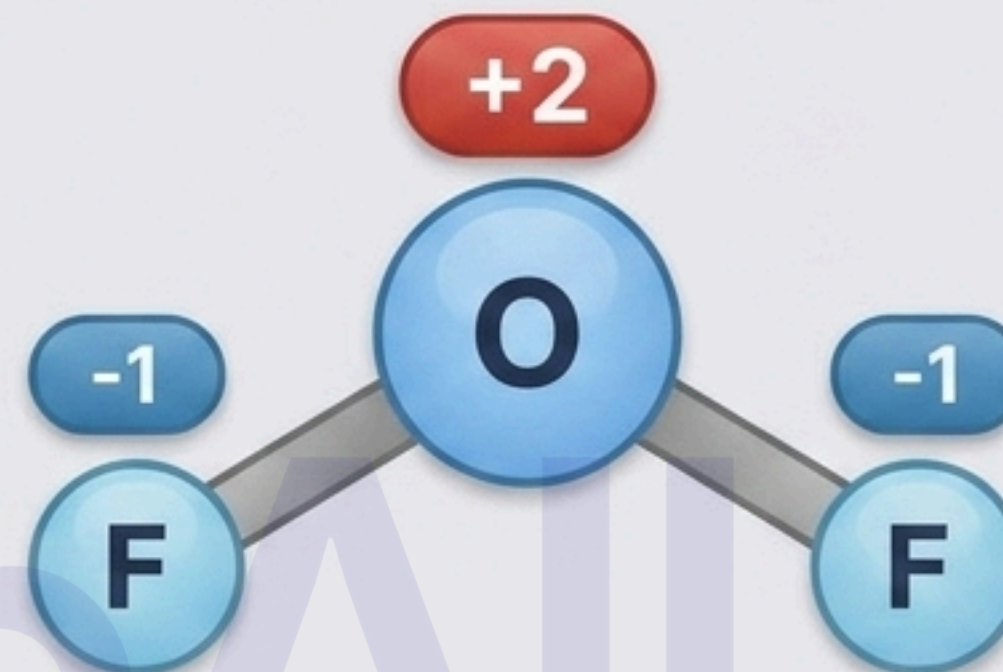
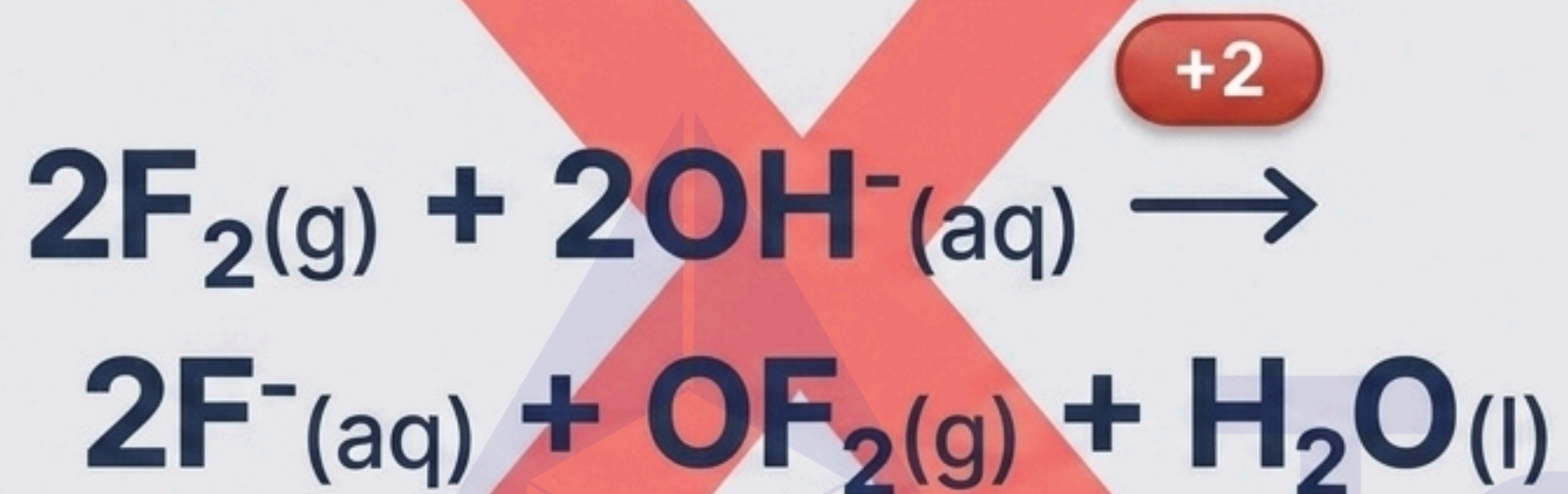
Oxygen sits in a -1 intermediate peroxide state, allowing it to easily fall to -2 (a stable oxide) or rise to 0 (elemental gas).

The Alkaline Trio

Phosphorus	$\text{P}_4 \rightarrow \text{PH}_3 + \text{H}_2\text{PO}_2^-$	
Sulphur	$\text{S}_8 \rightarrow \text{S}^{2-} + \text{S}_2\text{O}_3^{2-}$	
Chlorine	$\text{Cl}_2 \rightarrow \text{Cl}^- + \text{ClO}^-$ (Formation of household bleaching agents)	

Key Takeaways

All three non-metals start at Oxidation State = 0. When exposed to an alkaline medium (OH^-), they split into one negative ion and one positive ion.



JEE Trap Alert

- Fluorine reacts with alkalis but DOES NOT disproportionate.
- Because Fluorine is the most electronegative element on the periodic table, it can **ONLY** exhibit **0 and -1 oxidation states**. It is mathematically impossible for it to reach a positive state.

The Ceiling



The Floor



JEE Trap Alert

Elements in their HIGHEST or LOWEST possible oxidation states cannot disproportionate. They can only travel in one direction.

Exam Snapshot

When asked to find the non-disproportionating species, instantly look for the central atom hitting its Group Maximum. (ClO_4^- is a guaranteed trap).



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