

Redox = Electron Transfer

A Modern Paradigm for Oxidation & Reduction

- Moving beyond the classical addition of oxygen or hydrogen.
- Understanding chemical reactions as the fundamental exchange of electrons.
- Key Principle: Where there is oxidation, there is always reduction.



The Dual Nature of Redox

LOSS

OXIDATION

An atom, ion, or molecule loses one or more electrons.

OIL

(Oxidation Is Loss)

GAIN

REDUCTION

An atom, ion, or molecule gains one or more electrons.

RIG

(Reduction Is Gain)

The Classic Example

Sodium and Chlorine Reaction

When electropositive sodium meets electronegative chlorine, a complete transfer of electrons occurs to form an ionic lattice.



Reactants: Neutral
elemental states.

Products: Ionic compound
formed of Na^+ and Cl^- ions.

Note: To map the electron transfer, we must split this macroscopic process in two.



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

$$E=mc^2$$



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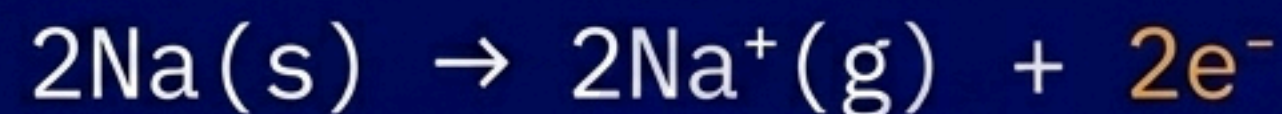
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Deconstructing Oxidation

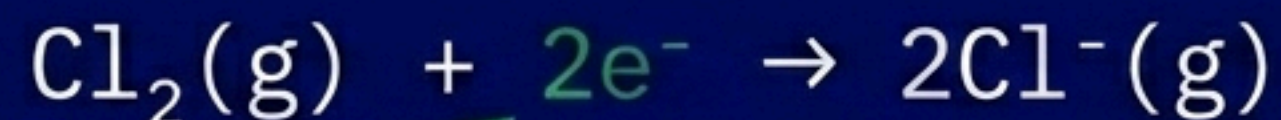
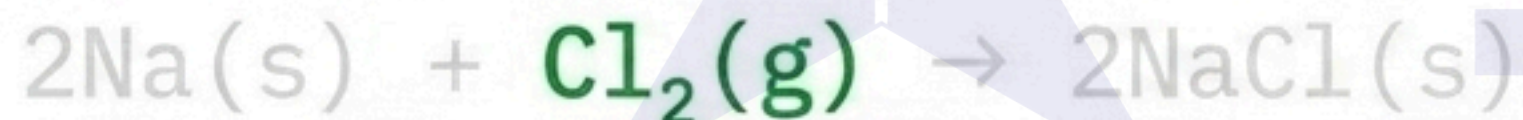
LOSS OF ELECTRONS



- **The Process:** Two neutral Sodium atoms each lose one valence electron.
- **The Result:** Formation of two positively charged Sodium cations (Na^+).
- **Electron Flow:** Electrons act as products (released into the system).

Deconstructing Reduction

GAIN OF ELECTRONS



- **The Process:** One diatomic Chlorine molecule accepts the two freed electrons.
- **The Result:** Formation of two negatively charged Chloride anions (Cl^-).
- **Electron Flow:** Electrons act as reactants (absorbed from the system).

Oxidising vs. Reducing Agents

Reducing Agent



Role: The Electron Donor.

Example: Sodium (Na).

The Paradox: Because it gives away electrons to reduce another species, the agent itself is **oxidised**.

Oxidising Agent



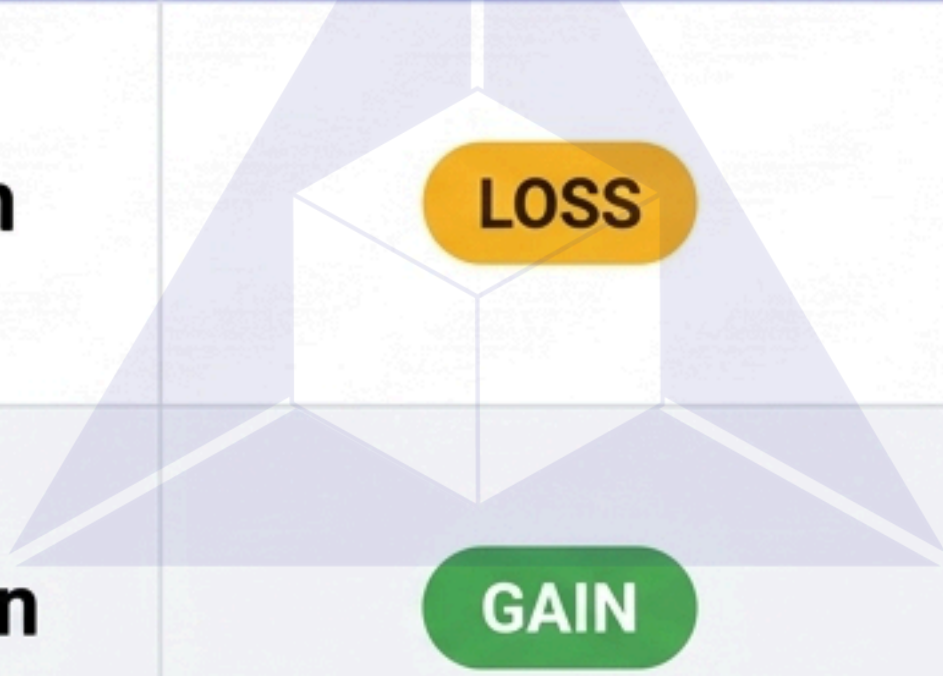
Role: The Electron Acceptor.

Example: Chlorine (Cl_2).

The Paradox: Because it takes electrons to oxidise another species, the agent itself is **reduced**.

NEET Concept Mastery

Redox Electron Transfer Summary

Concept	Electron Transfer	Role as an Agent	Oxidation State Change
Oxidation		Acts as Reducing Agent (Donor)	Increases (becomes more positive)
Reduction		Acts as Oxidising Agent (Acceptor)	Decreases (becomes more negative)

Pro Tip: Oxidation and reduction always occur simultaneously. You cannot have an electron donor without an electron acceptor.



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