

THE GOLDEN RULE: Curved arrows represent the flow of electron pairs, never the movement of atoms. Arrows point from where electrons are to where they are going.



The Source

Where is the electron density originating? The tail must start precisely at a π bond or a lone pair.

The Destination

Where are the electrons going?
The head points directly to an adjacent atom or a specific bond.

Movement I: π Bond to Adjacent Bond

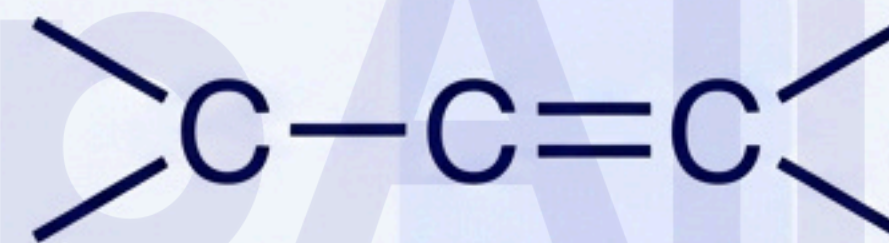
Shifting electron density across a conjugated framework.

Source & Action



Tail starts on the π bond. Head points to the adjacent single bond.

Destination & Consequence



Result: The original π bond is consumed, and a new π bond is formed **adjacent** to its original position. (Common in resonance structures)

Movement II: π Bond to Atom

Localizing shared electrons onto an electronegative center.

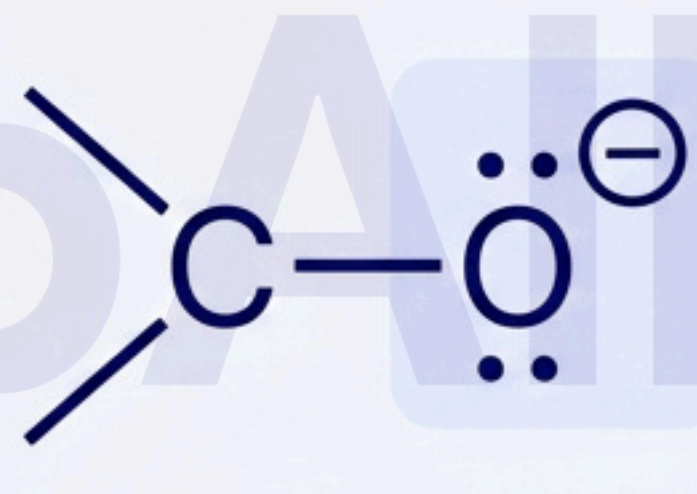


Source & Action



Tail starts on the π bond.
Head lands directly on the atom.

Destination & Consequence



Result: The π bond breaks. The destination atom gains a lone pair of electrons and negative character/formal charge.



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$$E=mc^2$$



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Key Highlights

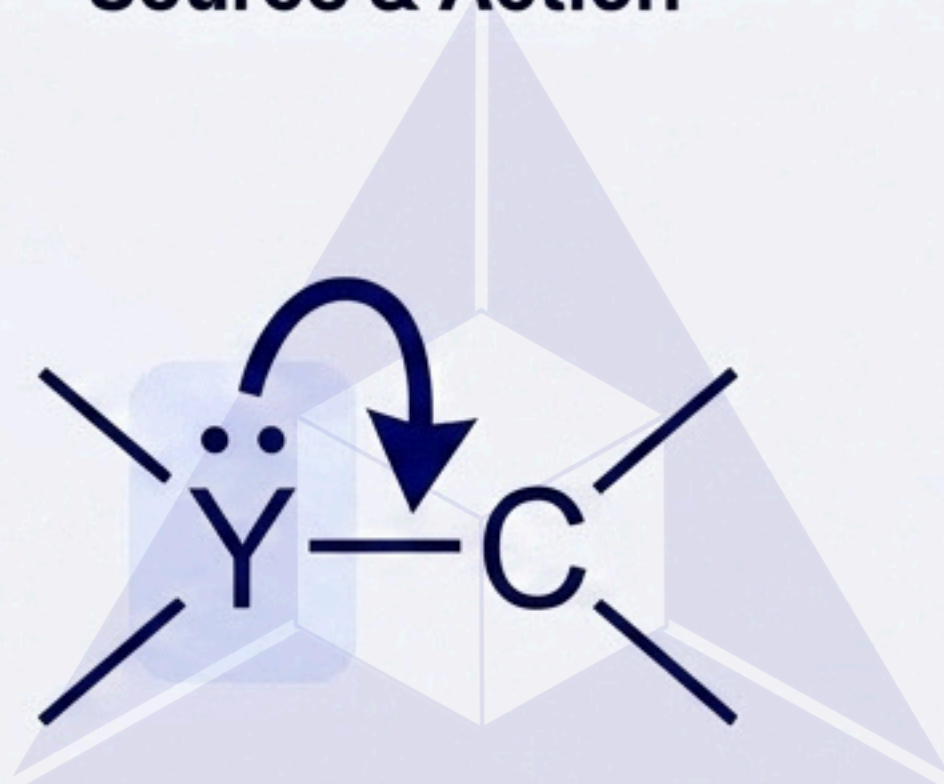
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Movement III: Lone Pair to Bond

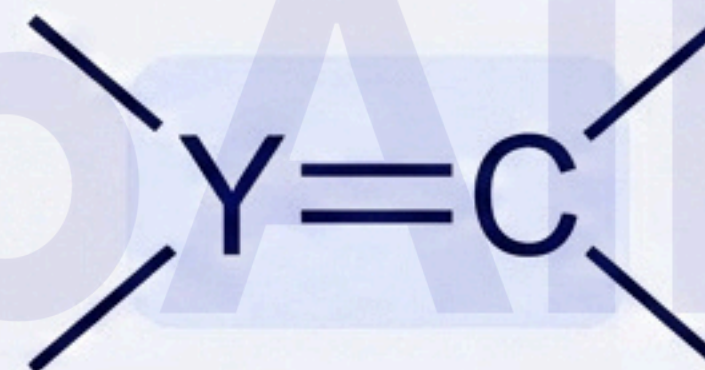
Converting localized non-bonding electrons into a shared π bond.

Source & Action



Tail originates directly on the lone pair.
Head points to the adjacent single bond.

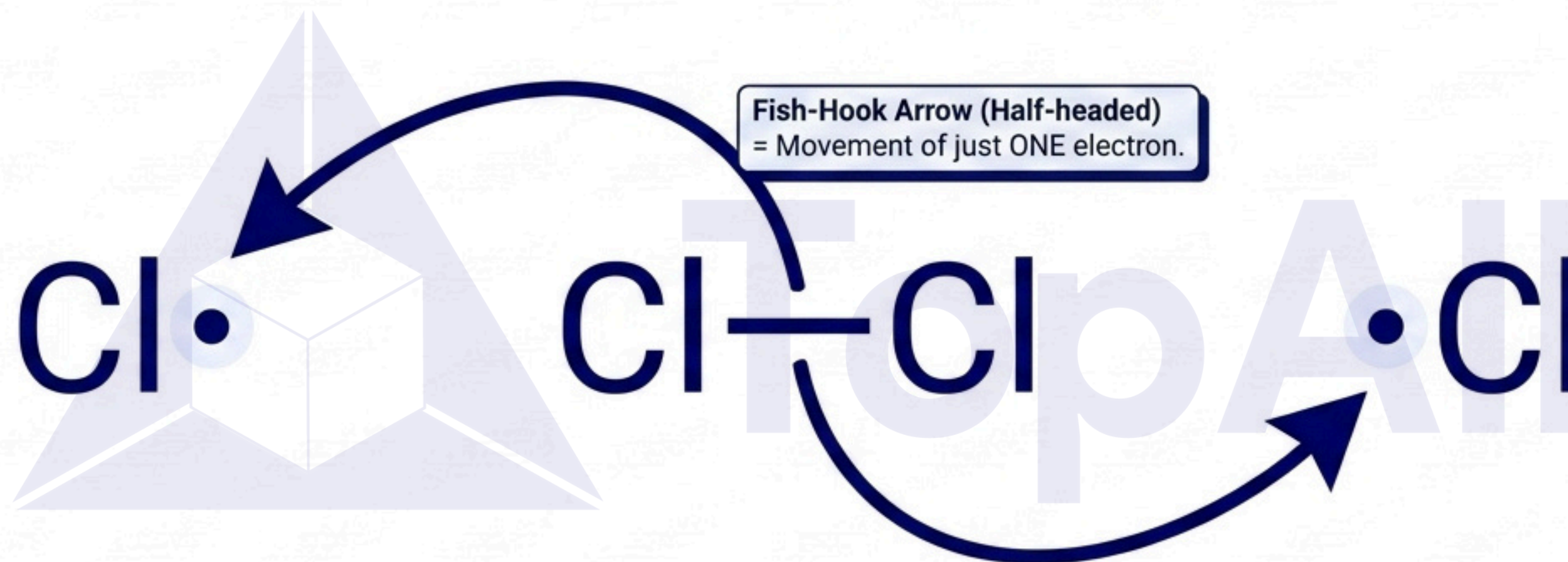
Destination & Consequence



Result: The lone pair is consumed. A new π bond is formed, and the source atom loses its negative character.

The Exception: Single Electron Movement

Homolytic cleavage and the formation of free radicals.



Fish-Hook Arrow (Half-headed)
= Movement of just ONE electron.

- **Double-Headed Arrow:** Moves 2 electrons (Heterolytic).
- **Half-Headed Arrow:** Moves 1 electron (Homolytic).

The Mechanics of Electron Flow

The Universal Grammar of Organic Chemistry



Movement Type	Arrow Symbol	Source (Tail)	Destination (Head)	Structural Consequence
$\pi \rightarrow \text{Bond}$		π Bond	Adjacent Single Bond	New adjacent double bond forms.
$\pi \rightarrow \text{Atom}$		π Bond	Specific Atom	Bond order reduces; atom gains a lone pair & (-\$) charge.
Lone Pair $\rightarrow$ Bond		Lone Pair ($\cdot\cdot$)	Adjacent Single Bond	Lone pair consumed; new double bond forms.
Single Electron		Single Bond	Respective Atoms	Homolytic cleavage; two free radicals form ($\cdot$).



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