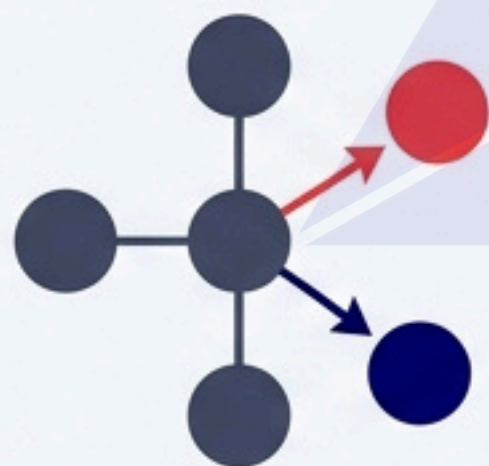


The Four Pillars of Organic Transformations

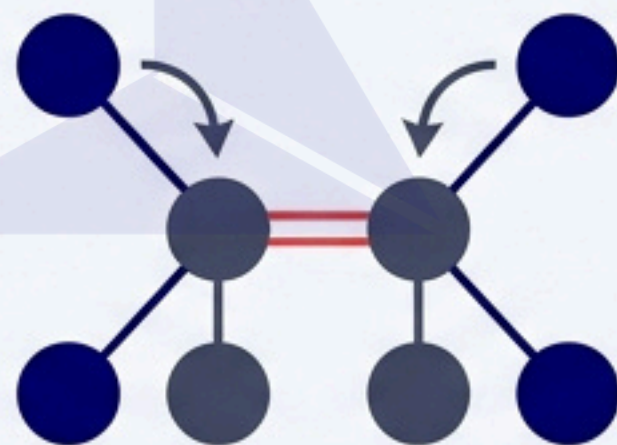
All organic reactions can be categorized into four fundamental geometric rearrangements of atoms and electrons.

Substitution (The Swap)



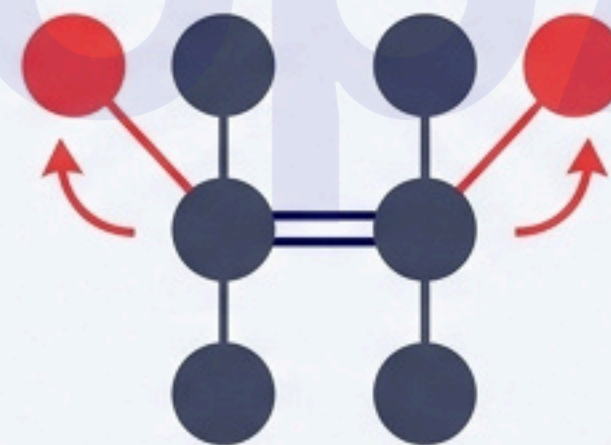
1 Leaves, 1 Enters

Addition (The Saturated Merge)



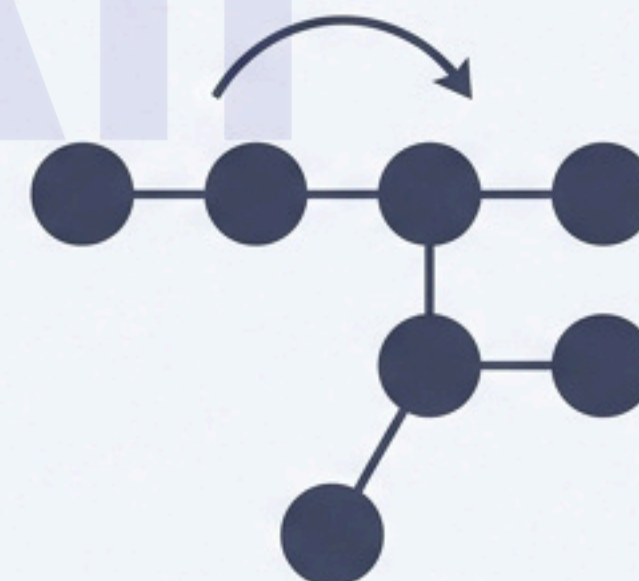
Pi Breaks, Sigma Forms

Elimination (The Unsaturated Split)



Sigma Breaks, Pi Forms

Rearrangement (The Shuffle)



Skeleton Reorganized

Substitution: The Swap

Core Definition

An atom or group attached to a carbon is cleanly replaced by a new incoming group, without altering the overall saturation of the molecule.

The Bond Math

Net Change: $\Delta\pi = 0$

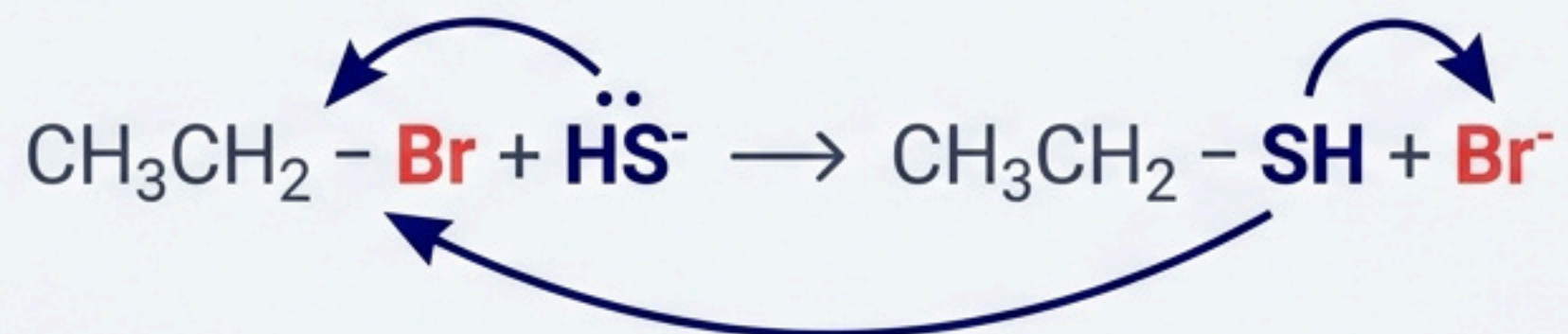
Number of π bonds remains strictly unchanged.

Generic Equation



Concrete Example (NCERT Exercise)

Reaction of a haloalkane with a hydrosulfide ion





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$$E=mc^2$$



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Addition: The Saturated Merge



Core Definition

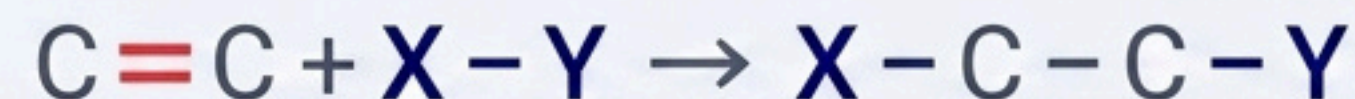
Reagents add across multiple bonds (alkenes or alkynes), snapping open the unsaturation to form a single, fully saturated product.

The Bond Math

Net Change: -1π , $+2\sigma$

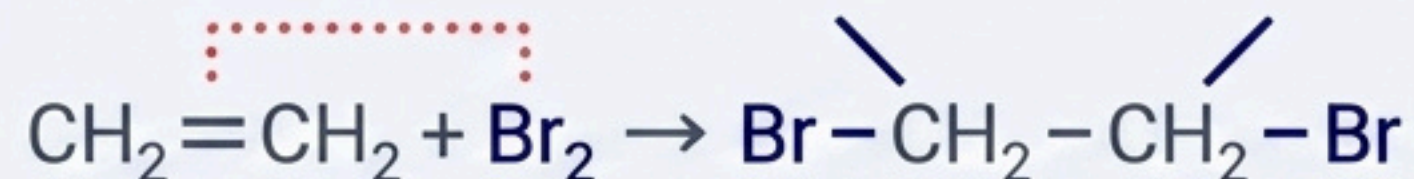
Exactly 1 π bond breaks to allow 2 new σ bonds to form.

Generic Equation



Concrete Example

Bromination of an alkene



Elimination: The Unsaturated Split



Core Definition

Atoms or groups are forcibly removed from adjacent carbon atoms, collapsing inward to form a new multiple bond (increasing unsaturation).

The Bond Math

Net Change: -2σ , $+1\pi$

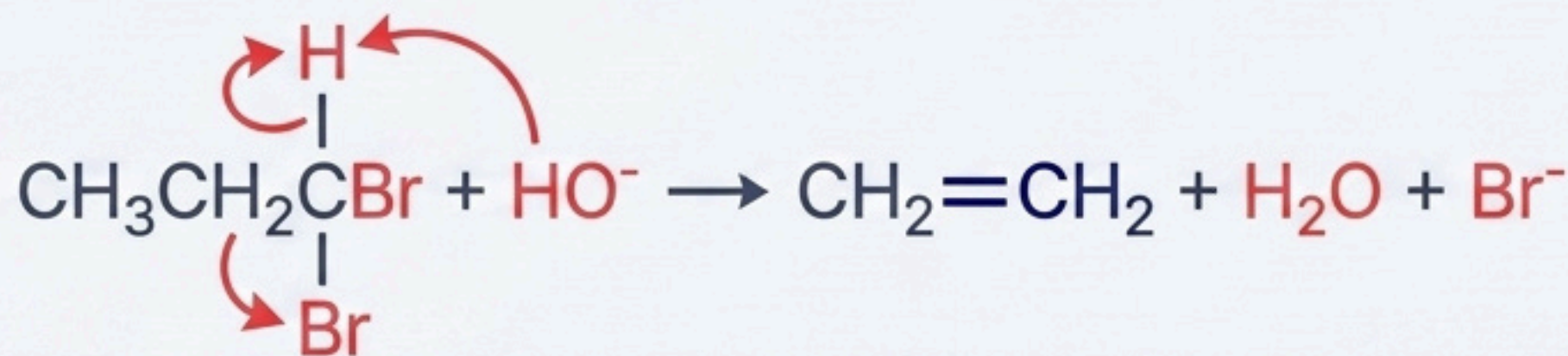
Exactly 2 σ bonds break to snap
1 new π bond into existence.

Generic Equation



Concrete Example

Dehydrohalogenation

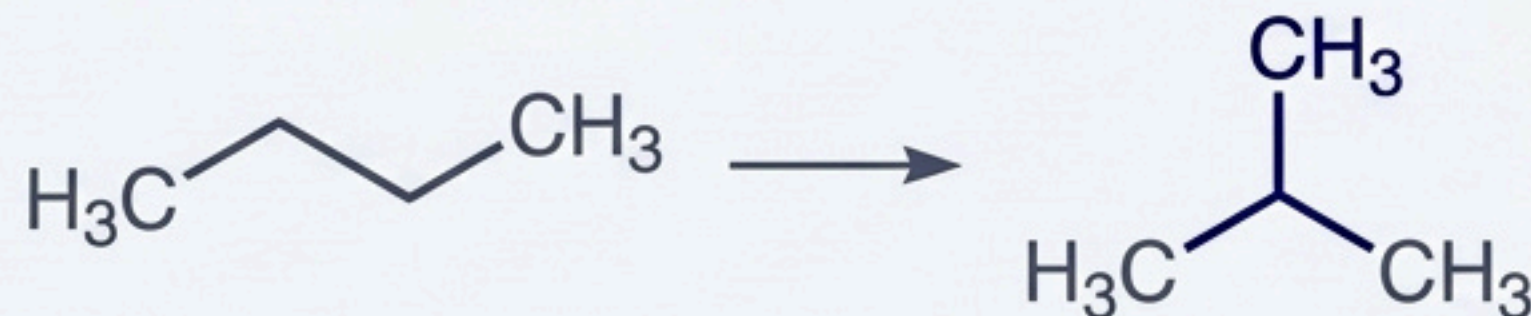


Rearrangement & The Revision Matrix



Rearrangement

Reorganizing the molecular skeleton without adding or losing atoms (Isomerization).



Reaction Type	Core Mechanism	Bond Math	Saturation Change
Substitution	Nucleophile swaps with Leaving Group	$\Delta\pi = 0$	No Change
Addition	Reagents added across multiple bonds	$-1\pi \rightarrow +2\sigma$	Decreases (More saturated)
Elimination	Adjacent groups leave, bond collapses	$-2\sigma \rightarrow +1\pi$	Increases (Less saturated)
Rearrangement	Internal skeletal shuffle (Isomers)	$\Delta\pi = 0$	No Change