



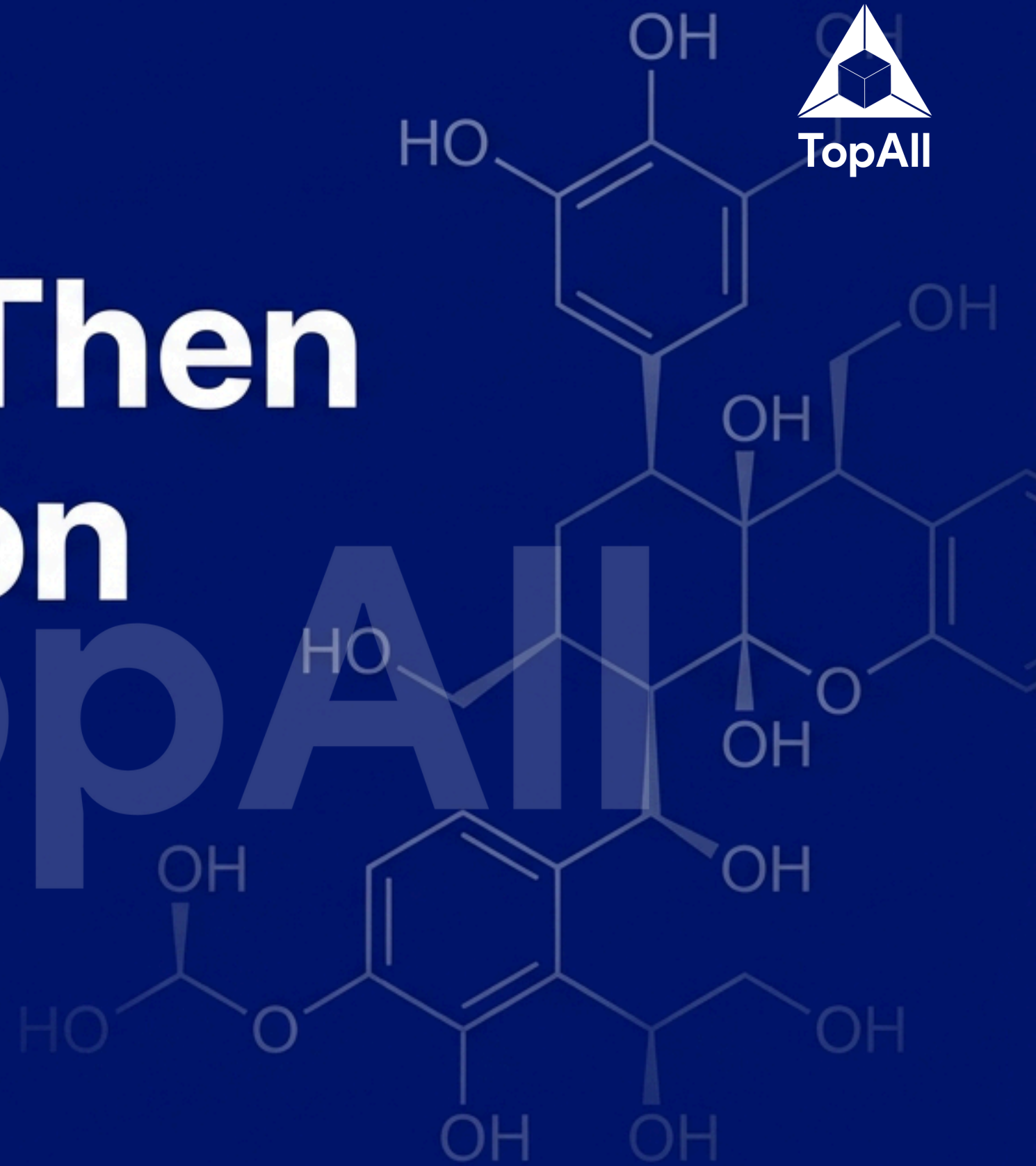
Count the -OH , Then Check the Carbon

The Systematic Guide to
Alcohol Classification

Class 12 Chemistry

Unit 7

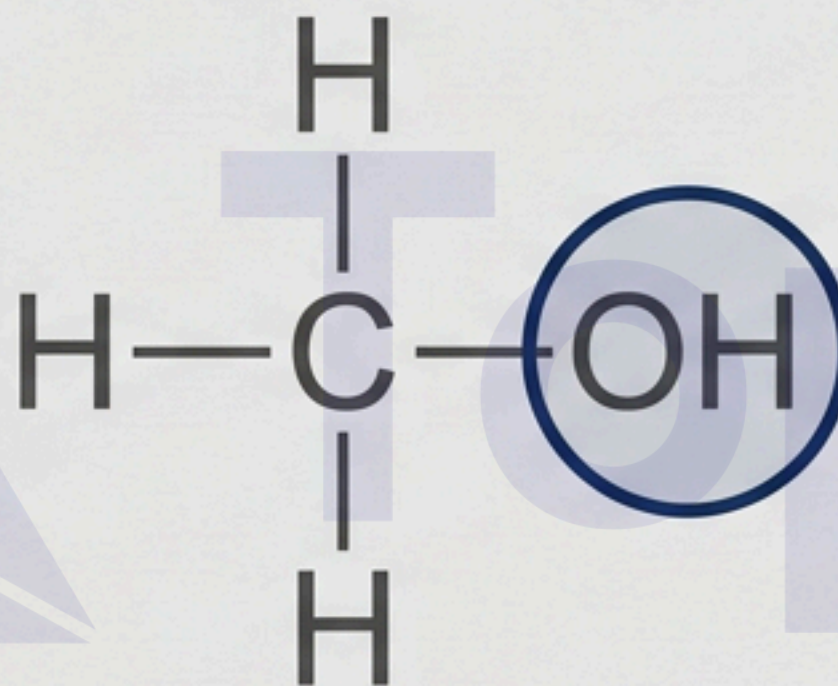
Nomenclature & Structure



Monohydric Alcohols: The Baseline



Alcohols are classified first by the sheer quantity of hydroxyl (-OH) groups attached to the aliphatic system.



Data Spec Block

Formula: R-OH

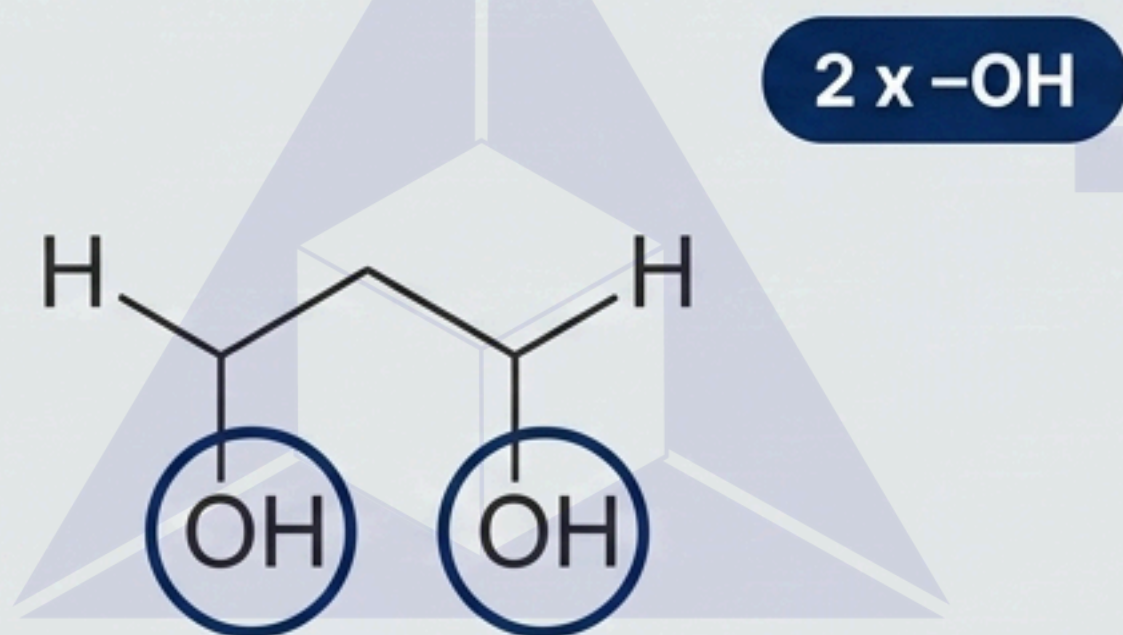
Definition: Contains exactly one hydroxyl group.

Toxicity Check: Methanol (the simplest monohydric alcohol) is highly poisonous; biological oxidation in the body produces methanal, causing blindness or death.

Takeaway: Monohydric alcohols are the foundation. To classify them further, we must look closely at the specific carbon atom bonded to the -OH .

Scaling Up: Polyhydric Alcohols

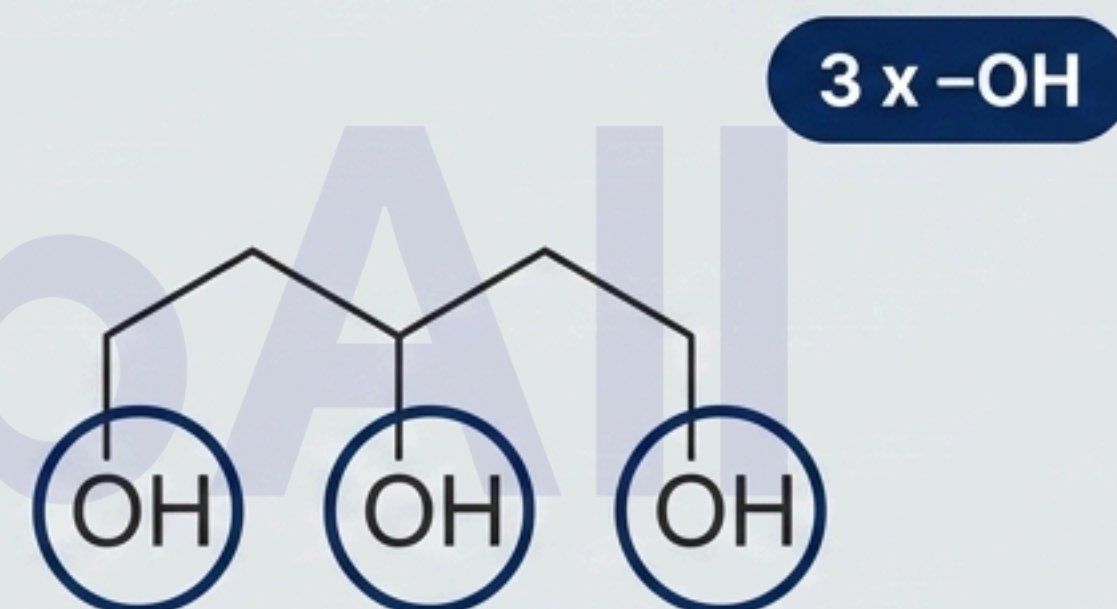
When a molecule contains two or more -OH groups, IUPAC naming conventions retain the 'e' of the parent alkane and add multipliers (di, tri, etc.).



IUPAC Name: Ethane-1,2-diol

Common Name: Ethylene glycol

Structure: $\text{HO-CH}_2\text{-CH}_2\text{-OH}$



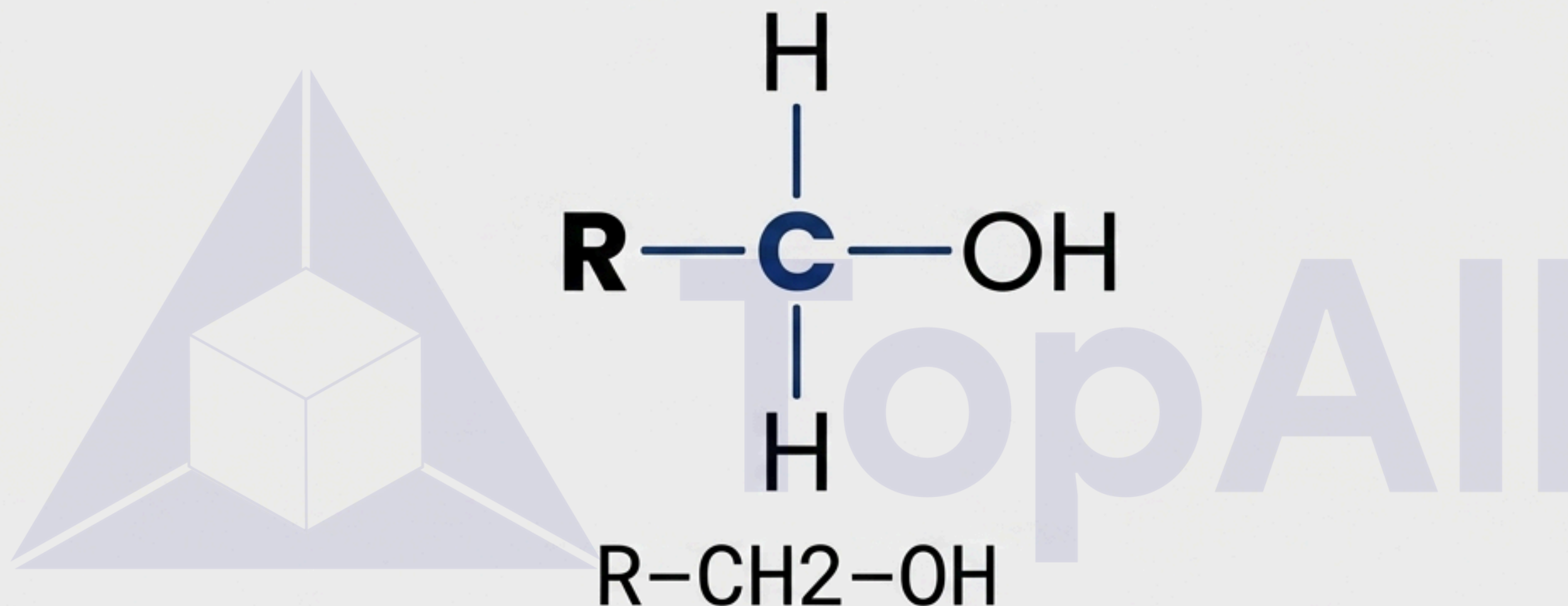
IUPAC Name: Propane-1,2,3-triol

Common Name: Glycerol

Structure: $\text{HO-CH}_2\text{-CH(OH)-CH}_2\text{-OH}$

Primary (1°) Alcohols

The sp³ Classification (Part 1/3)



The Rule: The $-\text{OH}$ group is attached to a primary carbon atom (a carbon bonded to only one other carbon atom).

Example:
Ethanol ($\text{CH}_3-\text{CH}_2-\text{OH}$)

Chemical Trait: Produces aldehydes upon mild oxidation (e.g., using PCC).



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$$E=mc^2$$



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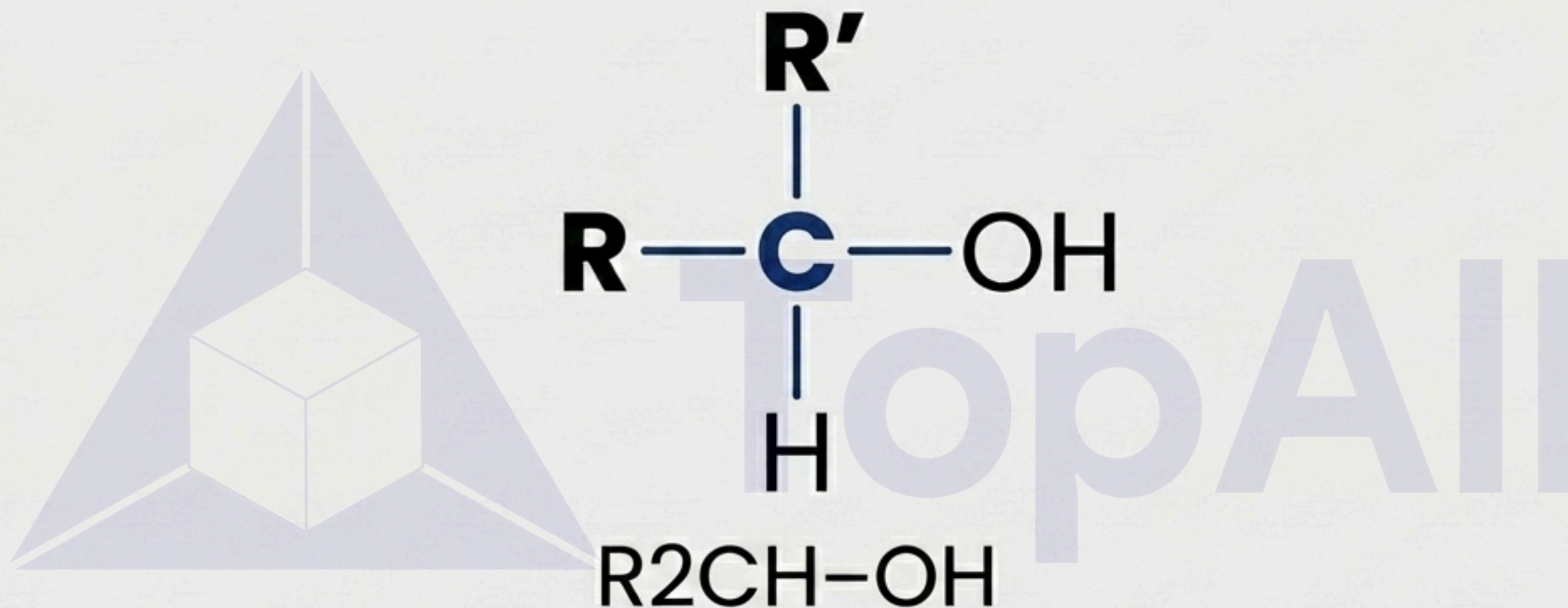
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Secondary (2°) Alcohols

The sp^3 Classification (Part 2/3)



The Rule: The $-\text{OH}$ group is attached to a secondary carbon atom (a carbon bonded to two other carbon atoms).

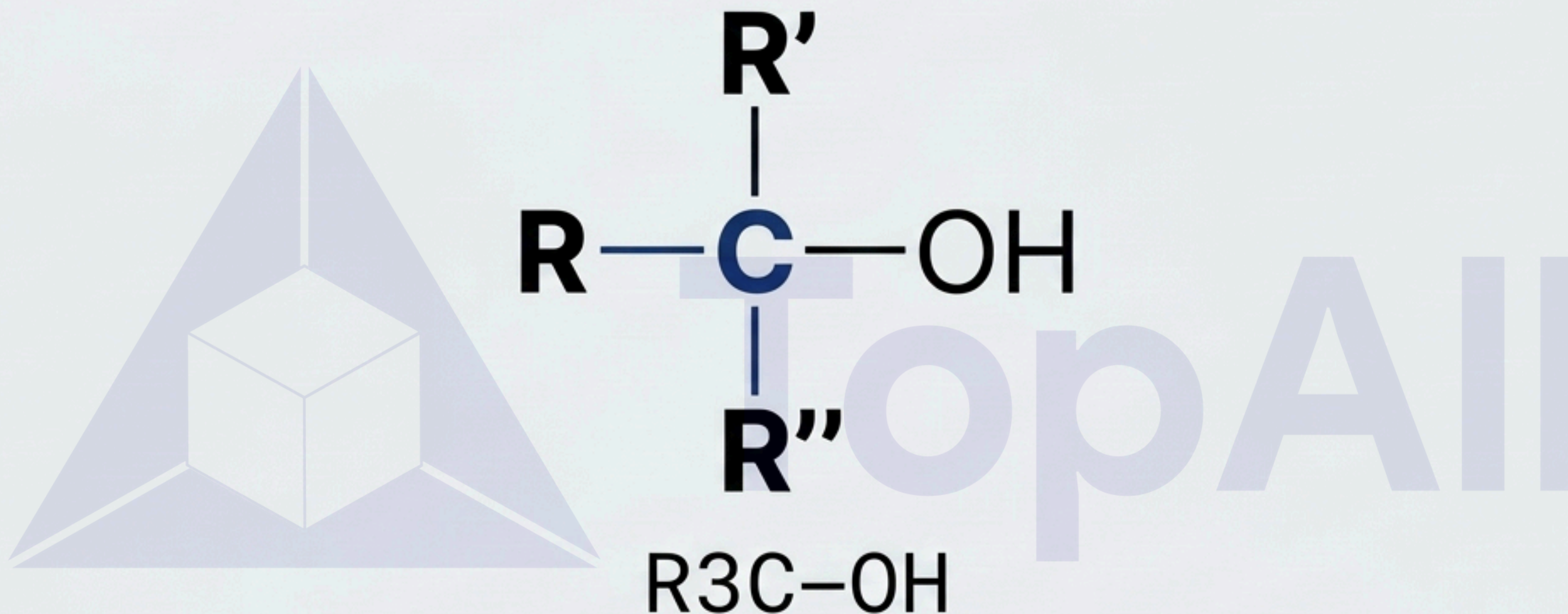
Example:

Propan-2-ol ($\text{CH}_3-\text{CH}(\text{OH})-\text{CH}_3$)

Chemical Trait: Produces ketones upon oxidation (using CrO_3).

Tertiary (3°) Alcohols

The sp^3 Classification (Part 3/3)



The Rule: The $-OH$ group is attached to a tertiary carbon atom (a carbon bonded to three other carbon atoms).

Example: 2-Methylpropan-2-ol

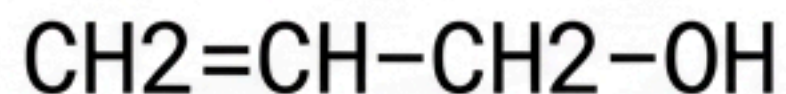
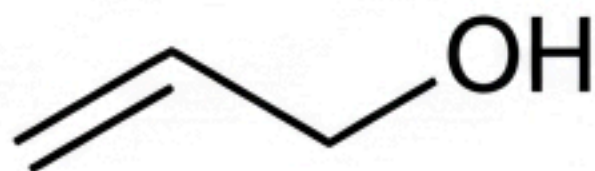
Chemical Trait: Because 3° carbocations are highly stable, tertiary alcohols are the easiest to dehydrate but are highly resistant to oxidation.

The Neighborhood: Double Bonds & Rings

Allylic

sp^3 Carbon

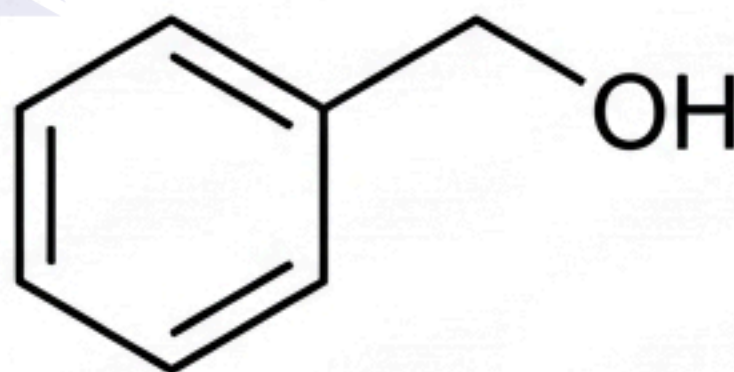
-OH is on an sp^3 carbon adjacent to a C=C double bond. (Note: Can be 1° , 2° , or 3°).



Benzylic

sp^3 Carbon

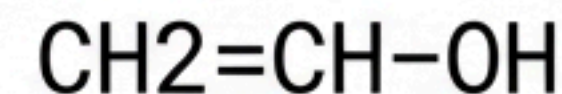
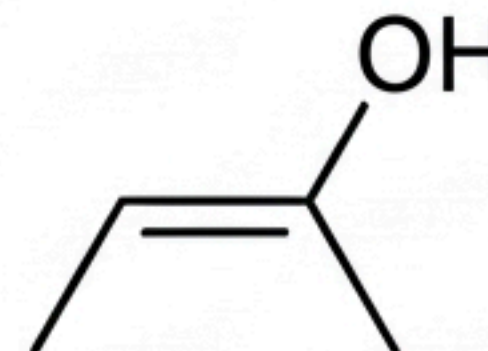
-OH is on an sp^3 carbon next to an aromatic benzene ring. (Note: Can be 1° , 2° , or 3°).



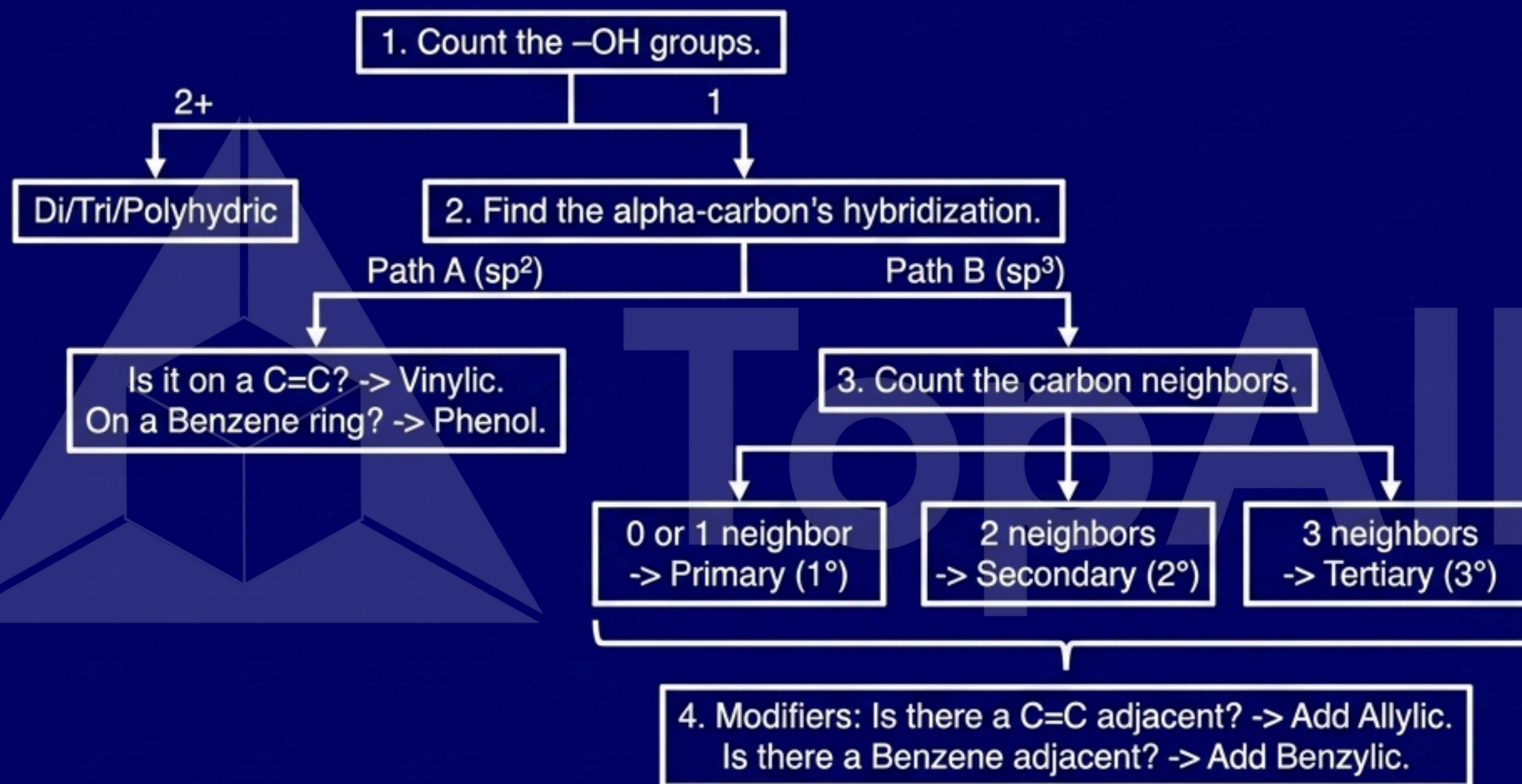
Vinylic

sp^2 Carbon

-OH is attached directly to a carbon of a C=C double bond.



The Classification Algorithm



Save this blueprint. Following this exact sequence prevents 90% of common nomenclature errors on exams.



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