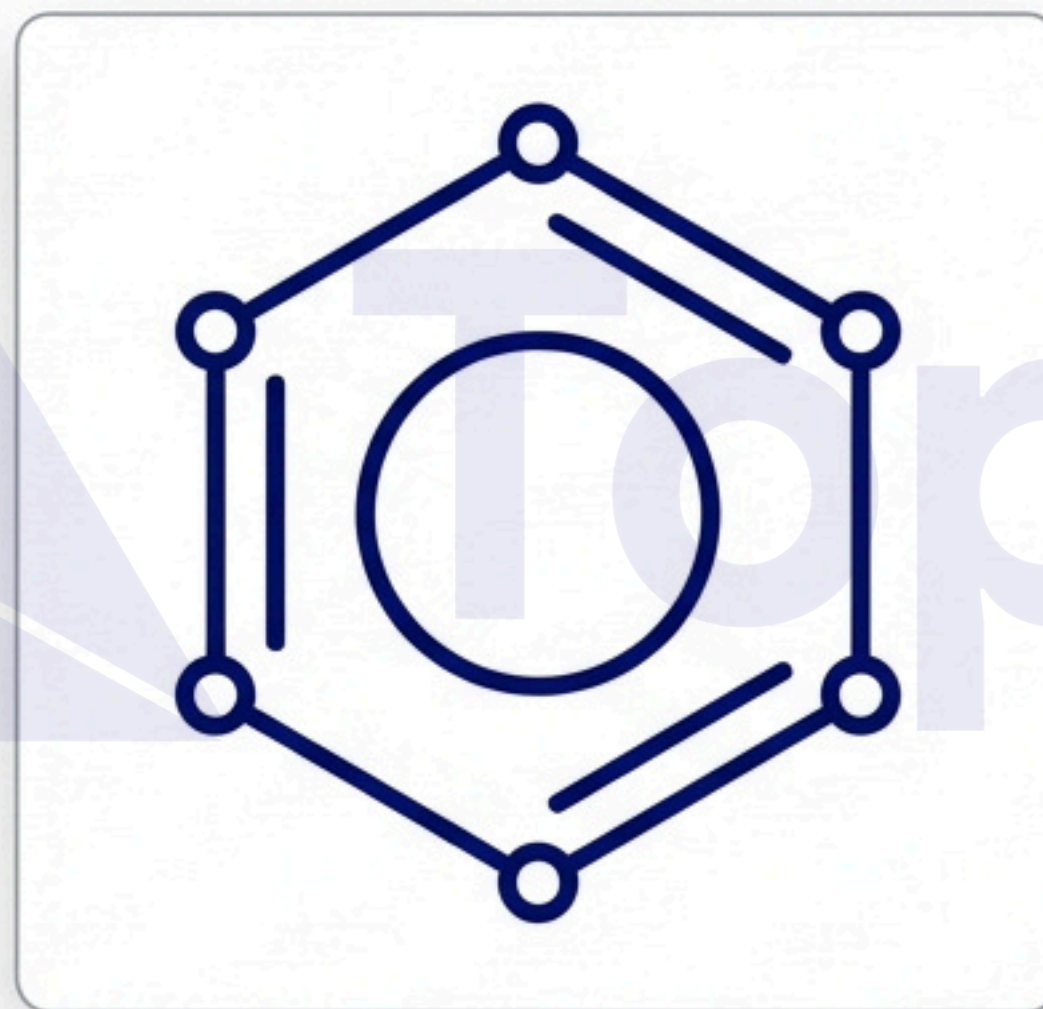
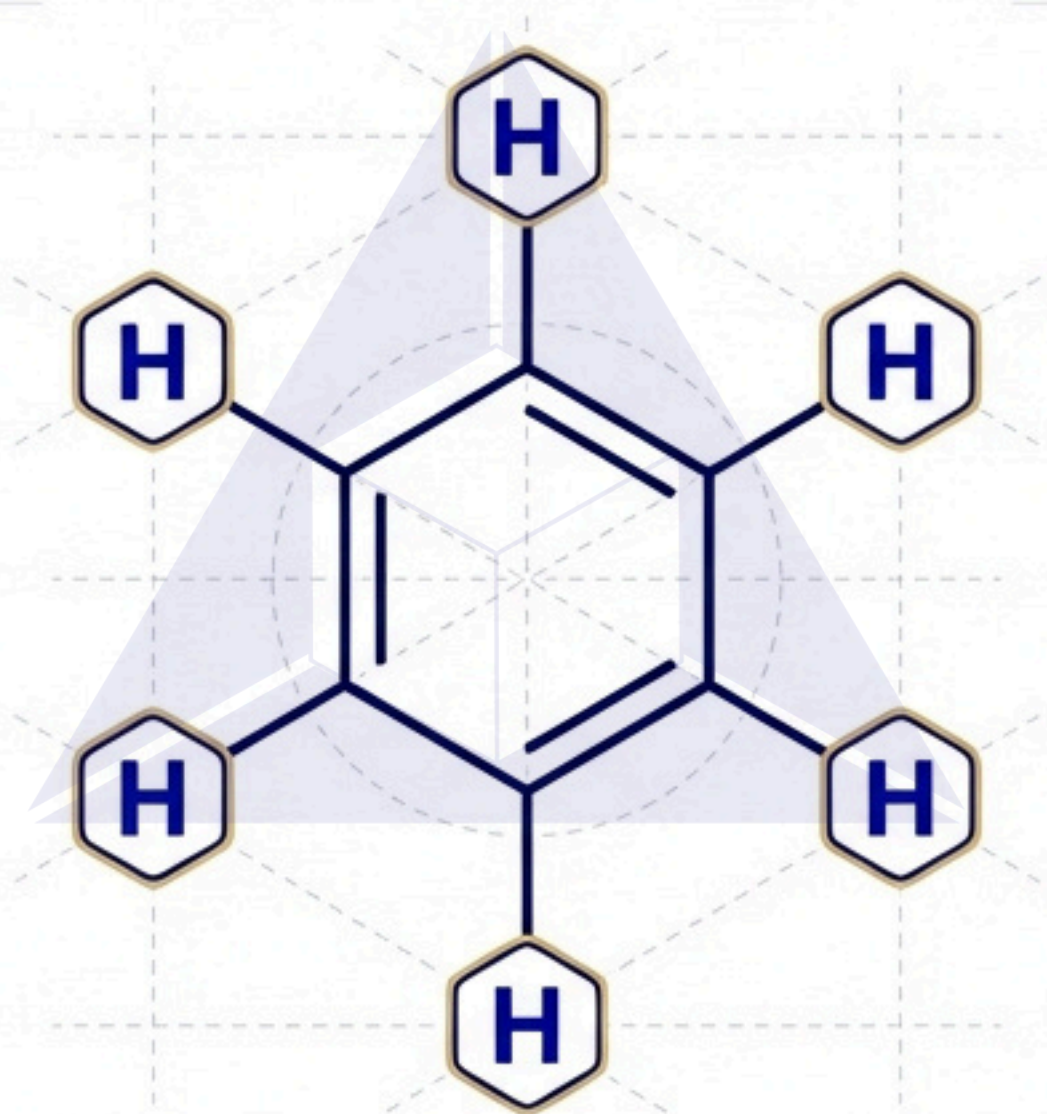


Nomenclature and Isomerism of Aromatic Hydrocarbons



A Spatial Map for Naming Benzene Derivatives .

THE EQUIVALENCE OF SIX HYDROGENS



BENZENE RING STRUCTURE: Explicit C-H Bonds

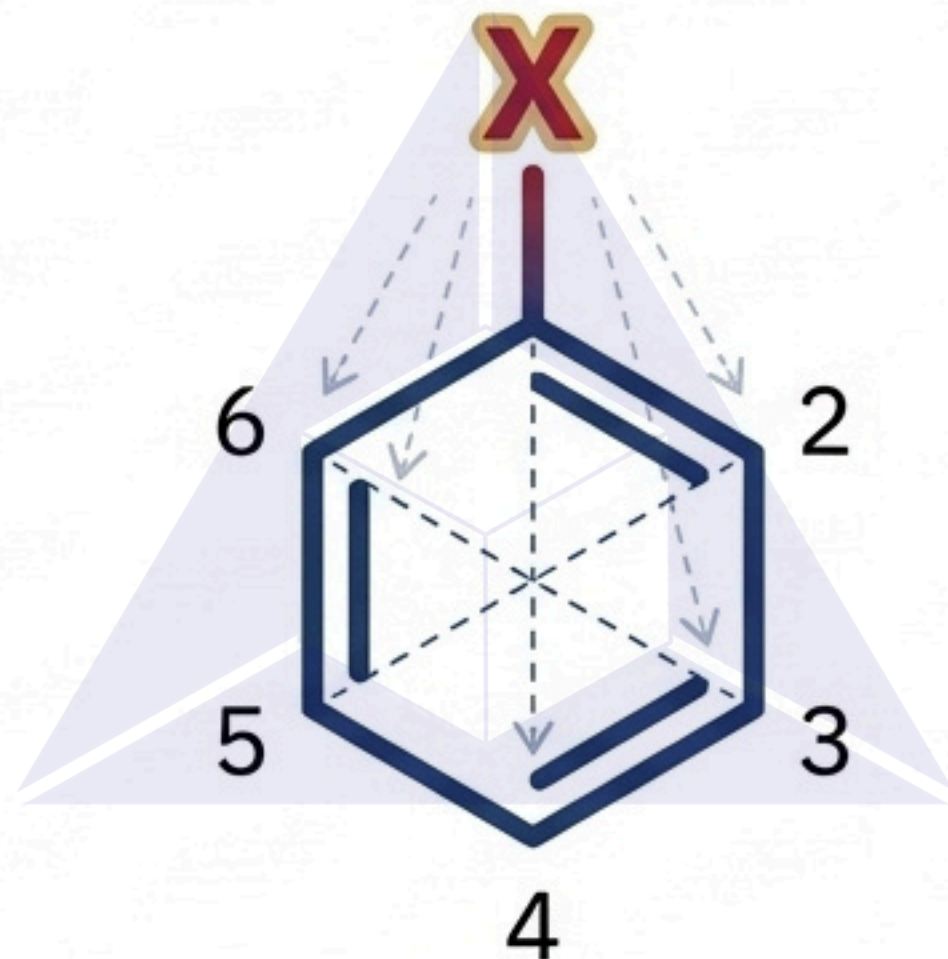
SYMMETRY & RESONANCE

Due to the hexagonal planar structure and resonance delocalization of pi electrons, all six carbons are perfectly identical.

Replacing any single hydrogen yields the exact same molecule.

**KEY RULE: MONOSUBSTITUTION
= 1 UNIQUE PRODUCT.**

INTRODUCING POSITION ISOMERISM



ANCHOR SUBSTITUENT BREAKS SYMMETRY

THE ANCHOR EFFECT

Once a **primary substituent** attaches to the ring, the perfect symmetry breaks. The remaining five positions are now defined solely by their **spatial distance** from the anchor.

[Monosubstituted Ring + 1 New Group = 3 Possible Isomers]



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

$$E=mc^2$$



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Practice Now



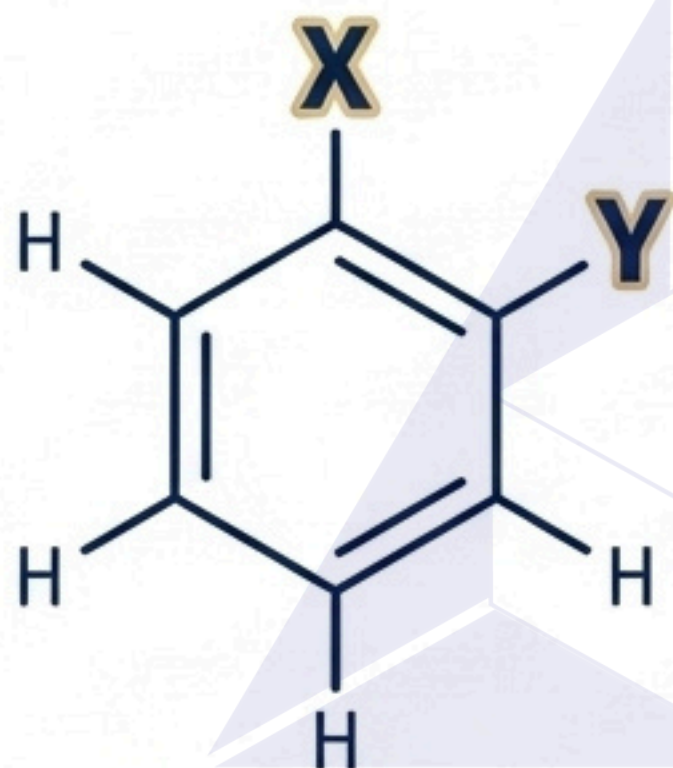
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- » Track Your Performance Smarter



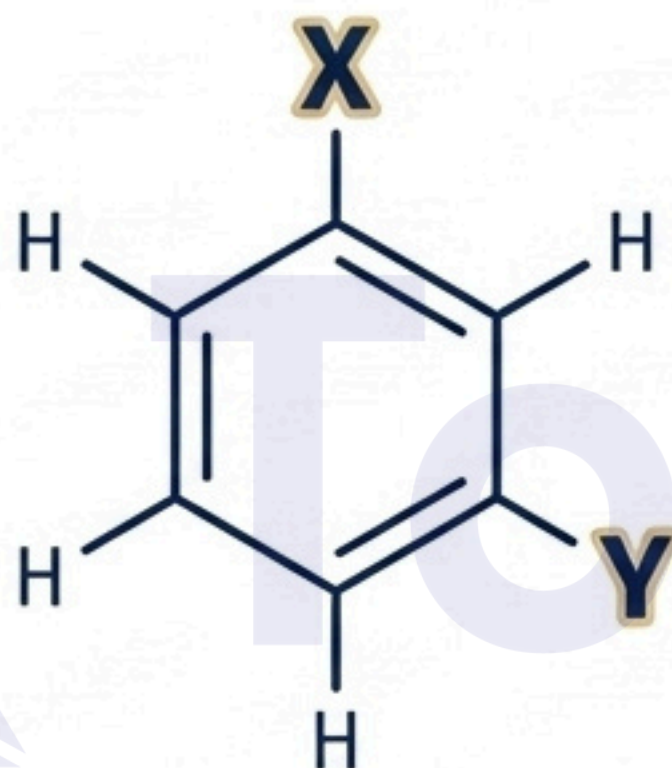
ORTHO, META, AND PARA POSITIONS



[1, 2]

Ortho (o-)

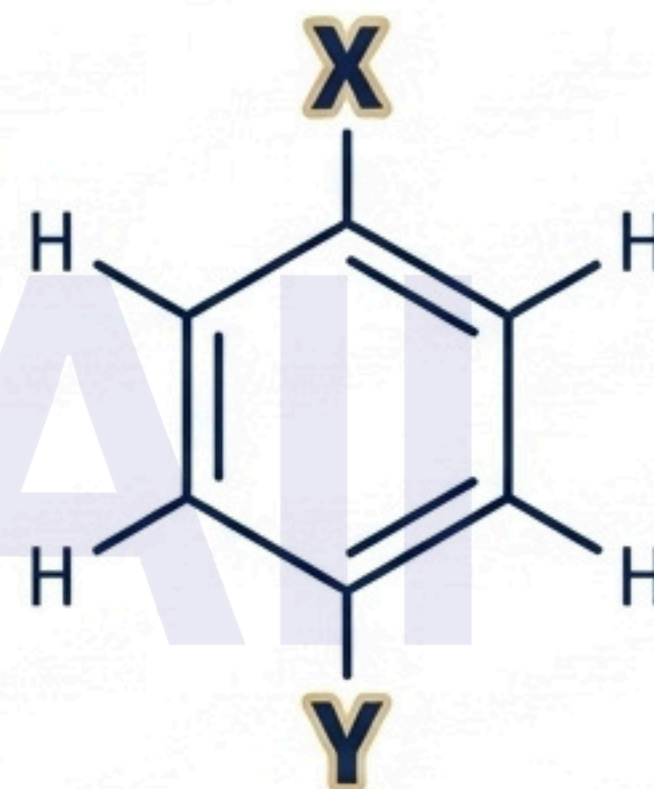
Adjacent positions.



[1, 3]

Meta (m-)

Separated by one carbon.

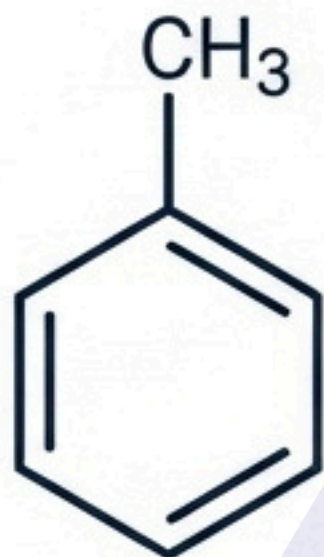


[1, 4]

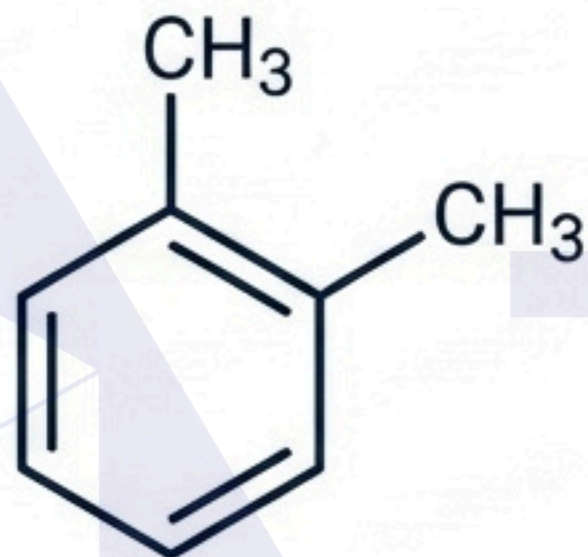
Para (p-)

Directly opposite.

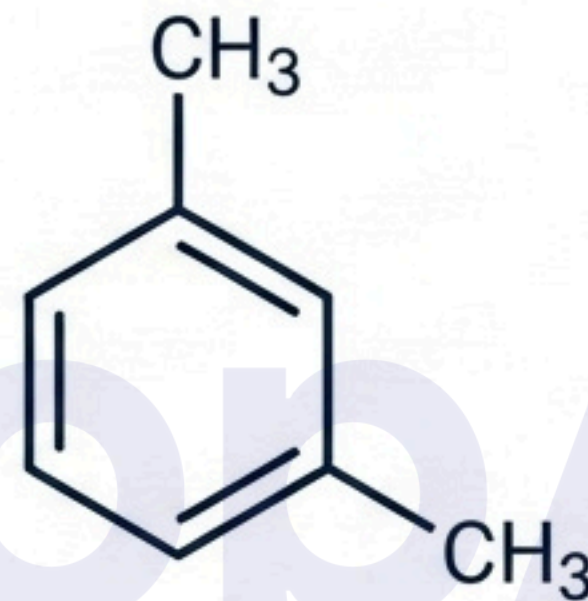
Toluene and the Xylene Isomers



Toluene
Methylbenzene



o-Xylene
1,2-Dimethylbenzene



m-Xylene
1,3-Dimethylbenzene



p-Xylene
1,4-Dimethylbenzene

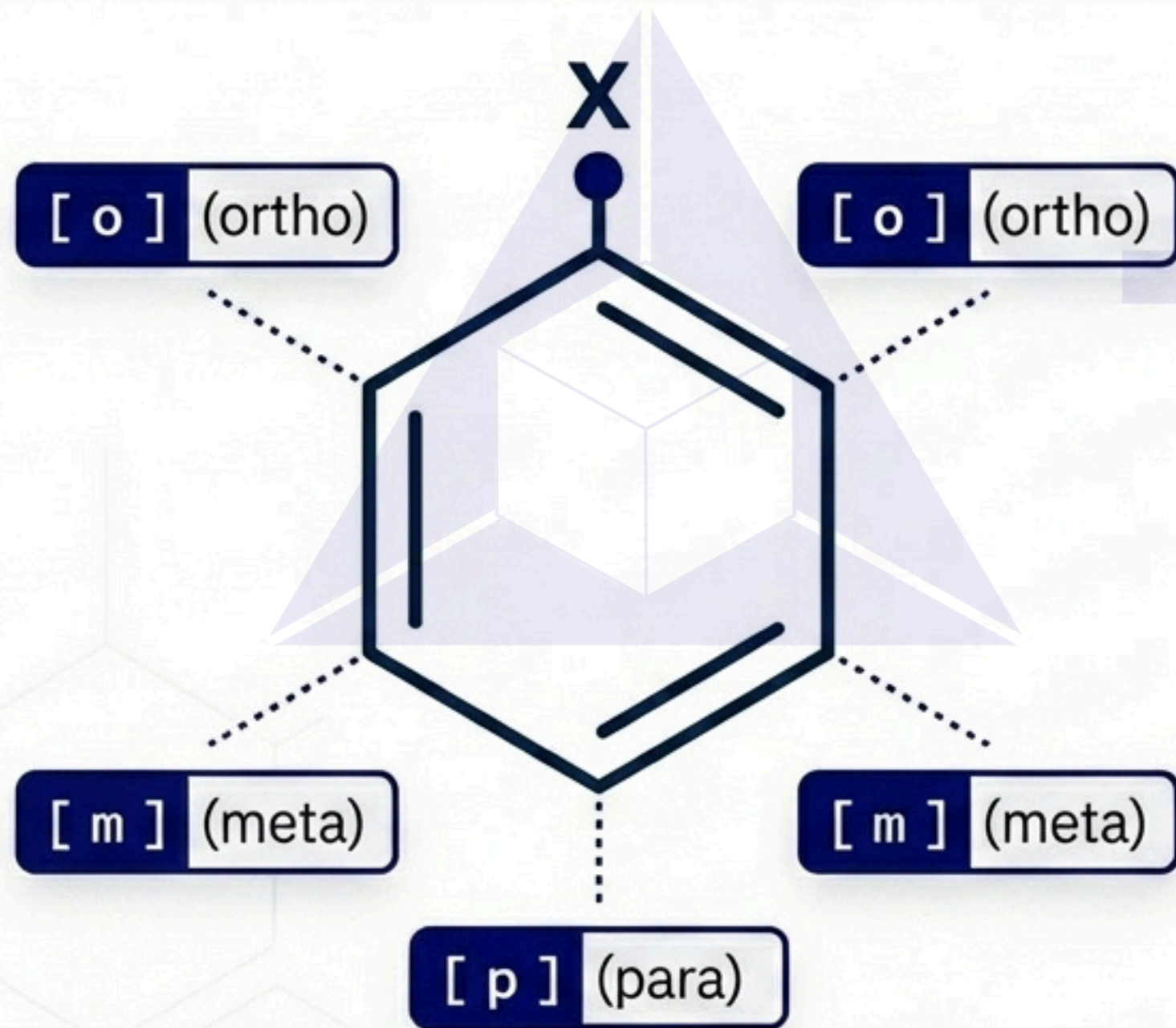
Molecular Formula: C_8H_{10} [Position Isomers]

Common vs. Systematic (IUPAC) Naming

Systematic (IUPAC)	Common Naming
[Uses Numbers] (1,2- , 1,3- , 1,4-)	[Uses Letters] (o- , m- , p-)
Always number to give the lowest possible locants to substituents on the ring.	Based on historical naming conventions for specific base derivatives (like xylenes or cresols).

Pro-Tip: IUPAC requires numbers. Common names use letters. Never mix them. (e.g., '1-meta-xylene' is completely incorrect).

O / M / P Quick Memory Panel



Key Takeaways

1. $[1, 2] / [1, 6]$ = Ortho (Adjacent)
2. $[1, 3] / [1, 5]$ = Meta (Separated)
3. $[1, 4]$ = Para (Opposite)



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