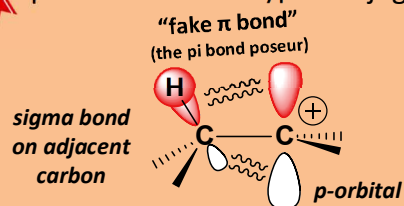


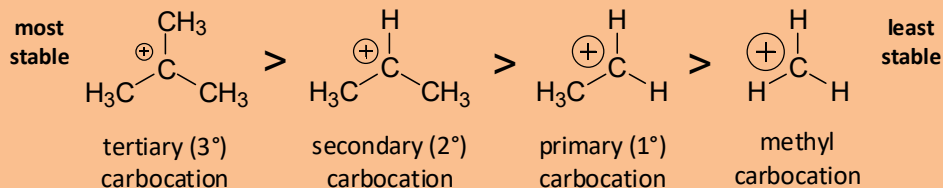
## Carbocation Stability

⚡ **ALL carbocations have an empty (also called vacant), unhybridized  $p$ -orbital and an incomplete octet.**

"Level one carbocation stability" (good): since alkyl groups are electron donating through the phenomenon of hyperconjugation, a more substituted carbocation will be more stable.

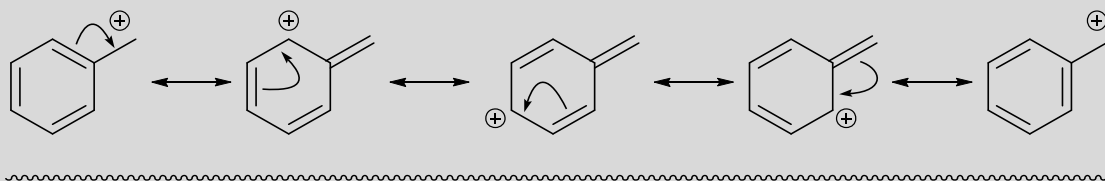


**hyperconjugation:**  
electrons of an eclipsing  $\sigma$  bond feed into a  $p$ -orbital

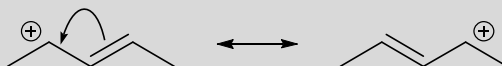


"Level two carbocation stability" (better): allylic and benzylic resonance stabilized carbocations will typically be more stable than non-resonance stabilized carbocations.

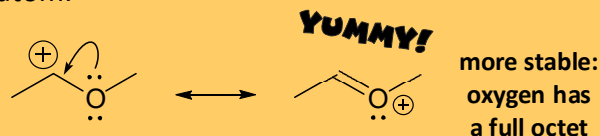
**benzylic** = position next door to a benzene carbon



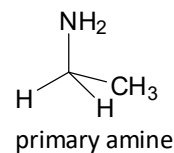
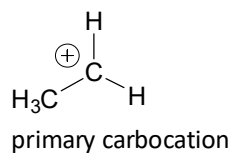
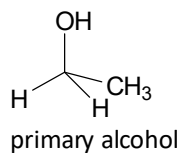
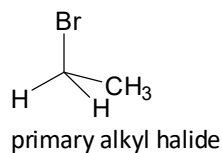
**allylic** = position next door to an alkene carbon



"Level three carbocation stability" (BEST!!): the most stable carbocations are the ones that involve resonance stabilization from a lone pair of electrons. This creates a resonance structure with the highly desirable full octet on every atom.



**Side Note: don't be fooled by this nuance of amines; they are classified in the same manner as carbocations . . .**



For amines, you look at the number of carbons attached directly to the nitrogen. This is the same system we use for carbocations.

