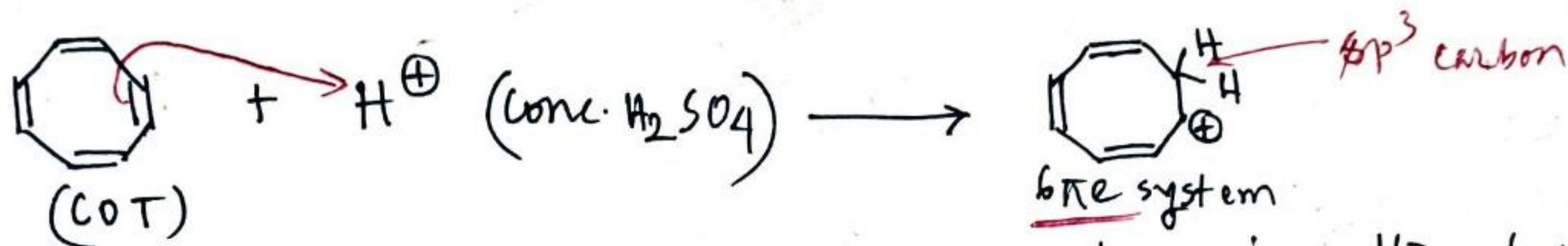


# HOMOAROMATICITY

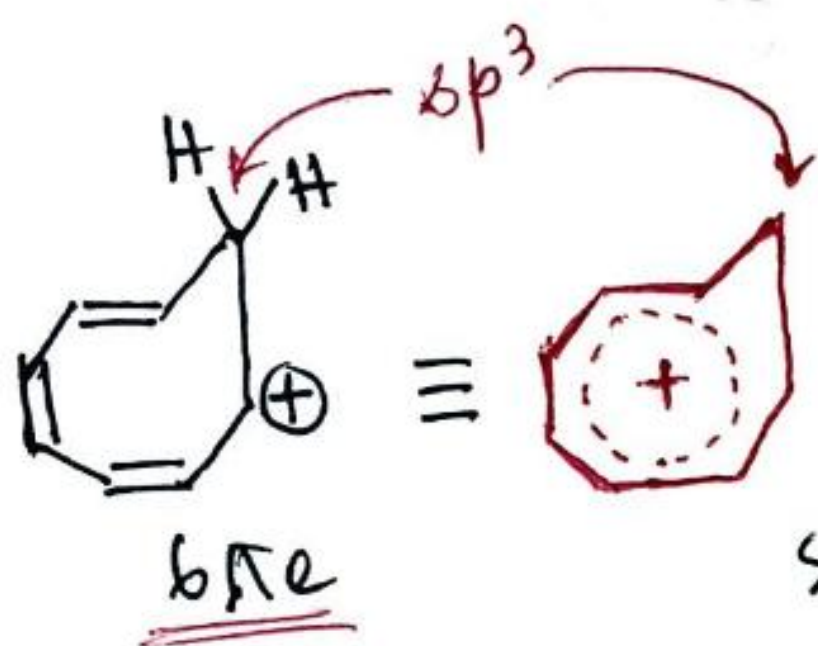
Aromaticity of a cyclic conjugated system is introduced by bypassing one (or more) saturated atom.

Eg, When cyclooctatetraene (COT) is dissolved in conc.  $H_2SO_4$ , a proton is added to ~~the~~ one of the double bonds to form the homotropylium ion.



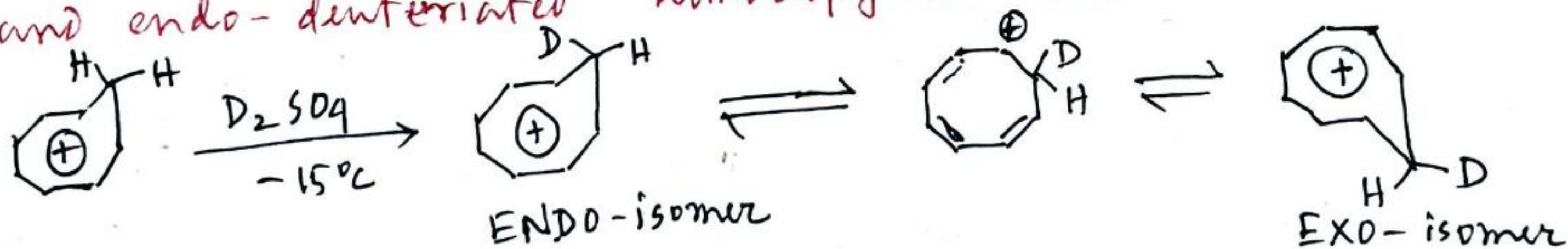
The system is quite stable due to attainment of some kind of aromaticity, known as homoaromaticity.

Seven carbons are in one plane and the remaining one being  $sp^3$  hybridized goes out of plane

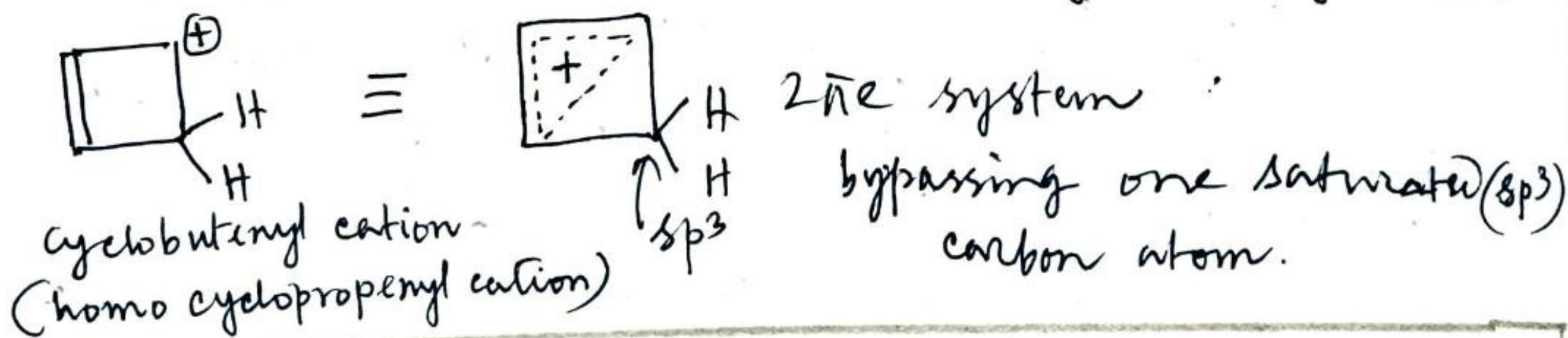


Six  $\pi$ -electrons are delocalized over seven carbons.

If the homotropylium ion generated is quenched with  $D_2SO_4$  at  $-15^\circ C$ , D exchange takes place at the  $sp^3$  carbon generating both exo- and endo-deteriated homotropylium ion.



Another example of homoaromatic species: Cyclobutenyl cation



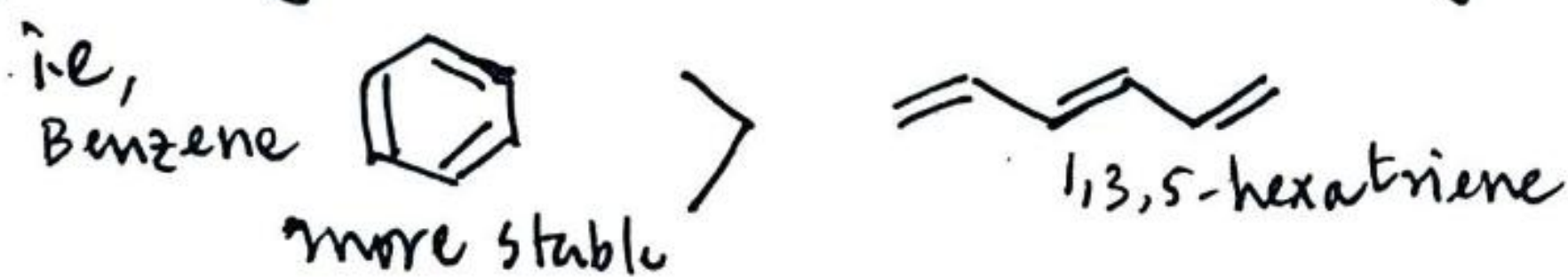
STABILITY ORDER:  
AROMATIC > HOMOAROMATIC > ANTIAROMATIC

KEEP IN MIND....

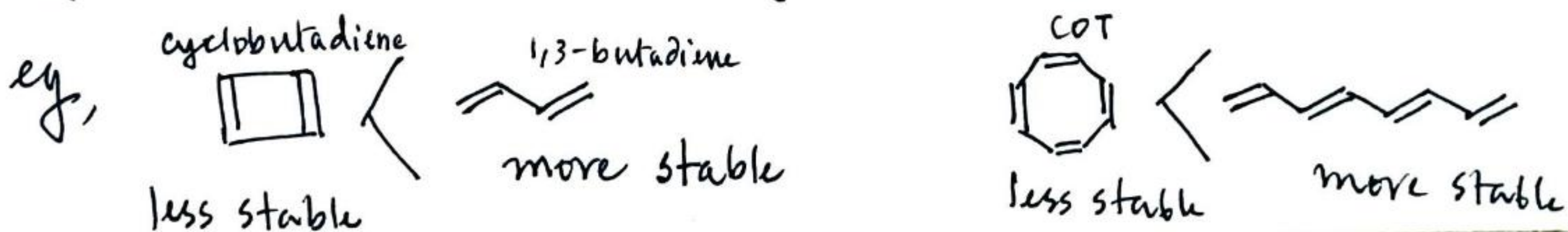
- If the ring has lower  $\pi$ -electron energy than the open chain, then the ring is aromatic.
- If the ring and chain have the same  $\pi$ -electron energy, then the ring is nonaromatic.
- If the ring has greater  $\pi$ -electron energy than the open chain, then the ring is antiaromatic.

for  $(4n+2)\pi$  electron systems:

Cyclic system is stabler than acyclic analogue.



But for  $4n\pi$  electron systems, the cyclic analogue becomes destabilized with respect to acyclic analogue (due to antiaromaticity)



Cyclopentadienyl anion reacts with iron(II) chloride  $[FeCl_2]$  to give a stable compound in which an iron atom is sandwiched between two cyclopentadiene rings. This compound is called ferrocene.

Ferrocene undergoes reactions that are typical of aromatic systems

