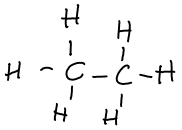
Notes: 3-8

Thursday, March 08, 2007
5:35 PM

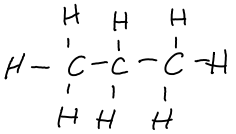
Last Time: Optical Activity
Free Radical Chain Reactions

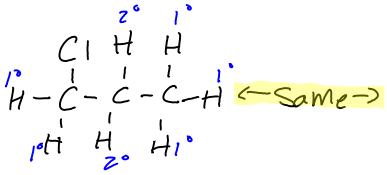
Today: Chlorination vs Bromination
Allylic Bromination

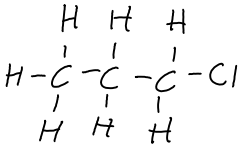
Ethane: CH_3CH_3

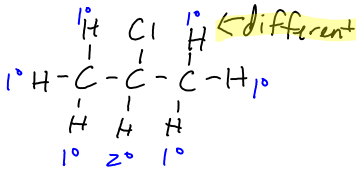


Propane:





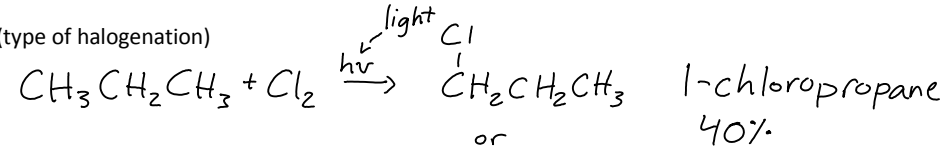




1° = primary 2° secondary

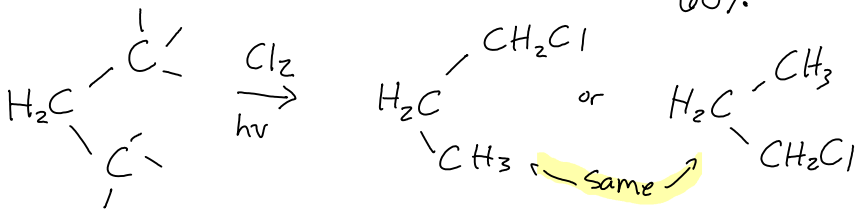
Mechanism of Chlorination (type of halogenation)

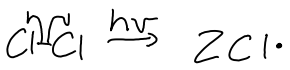
Propane:

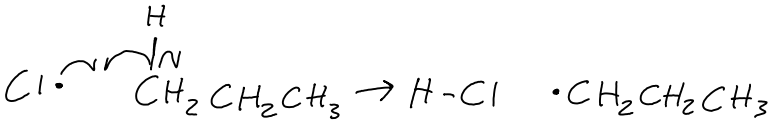


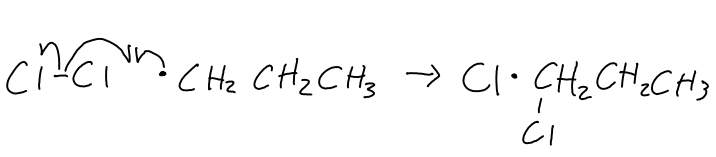
Replacement of hydrogen is specific - not random

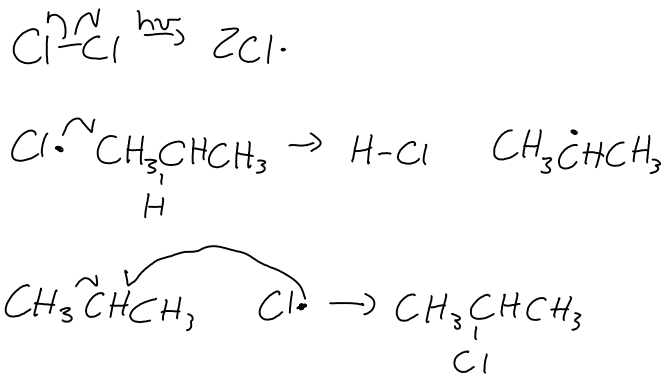
Mechanism:











$3^0 > 2^0 > 1^0$ - stability of free radicals

How reactive are the hydrogens?

$\frac{40\%}{6\ 1°H} = 6.67$ per H

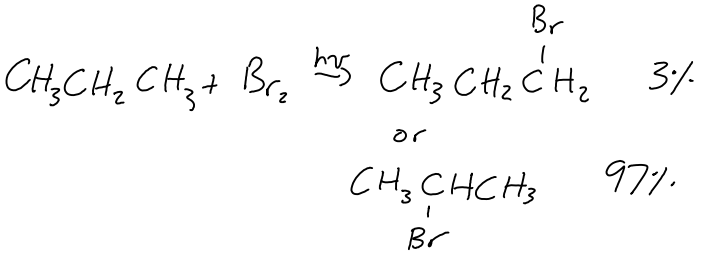
$\frac{60\%}{2\ 2°H} = 30\%$ per H

Compare the 2^0 H reactivity to 1^0 reactivity

30 : 6.67
2° : 1°
4.5 : 1

2^0 Hs are 4.5x as reactive as 1^0 Hs

Bromination is more selective than Chlorination.



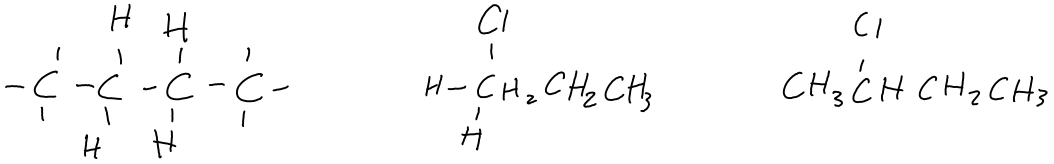
$\frac{3\%}{6\ 1°H} = .5\%$

$\frac{97\%}{2\ 2°H} = 48.5\%$

$\frac{48.5}{.5} = 97\%$

$2°H$ are 97 times reactive as $1°H$

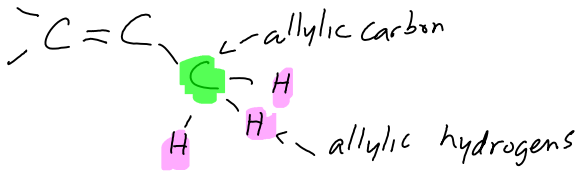
Florine is not selective at all… is approx 50% between 2^0 and 1^0



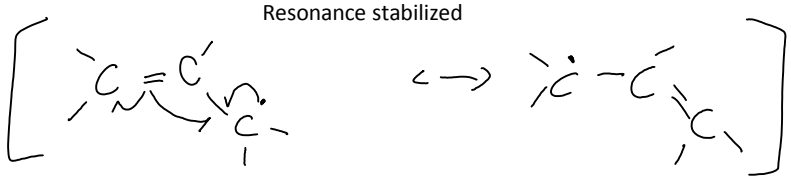
To control for multiple halogenations: use small amount of halogen and excess alkane

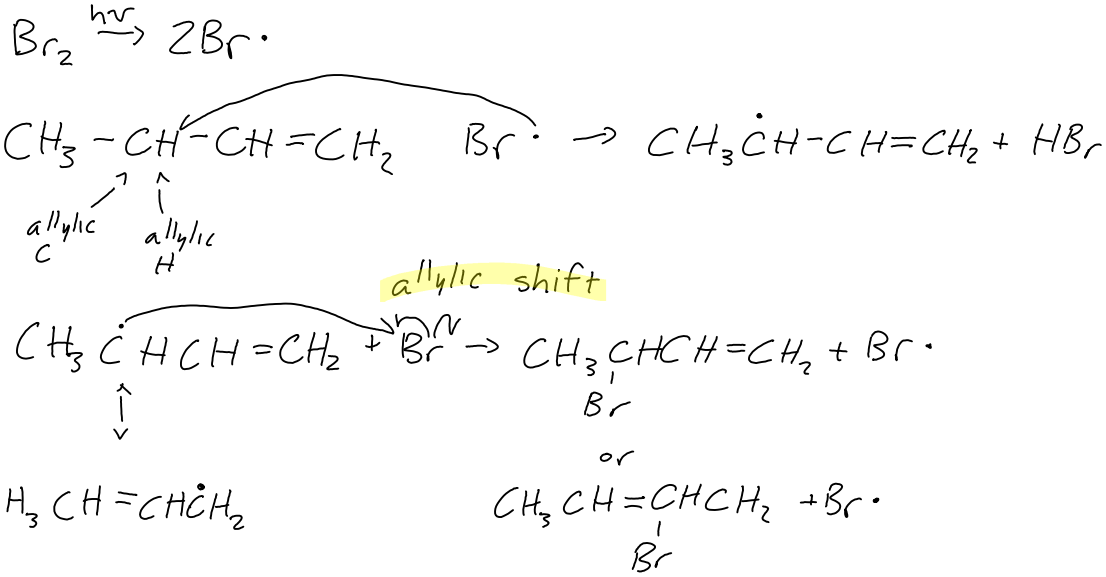
Allylic Free Radicals:

Free Radical Bromination and allylic shift



Resonance stabilized





Free radical stabilization: allylic>3^0>2^0>1^0>vinylic