

Reactions Of Alkenes Via Protonation

from chapter(s) _____ in the recommended text

A. Introduction

B. Protonation Of Alkenes

Generation Of Carbocations Via Protonation

simplest

sp^3 hybridized carbon and a sp^2

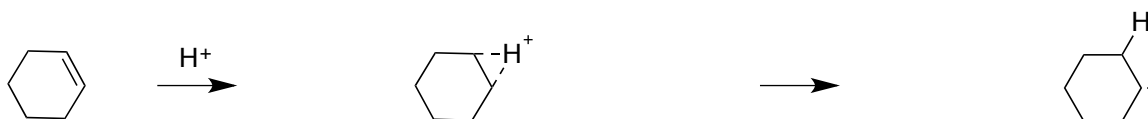
transition

intermediate.



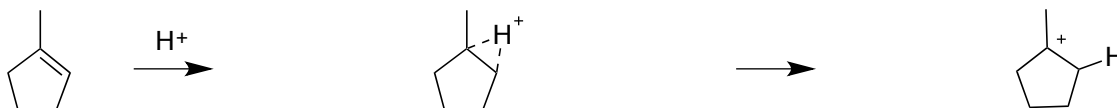
*protonated alkene
transition state*

*carbonium ion
intermediate*



*protonated alkene
transition state*

*carbonium ion
intermediate*



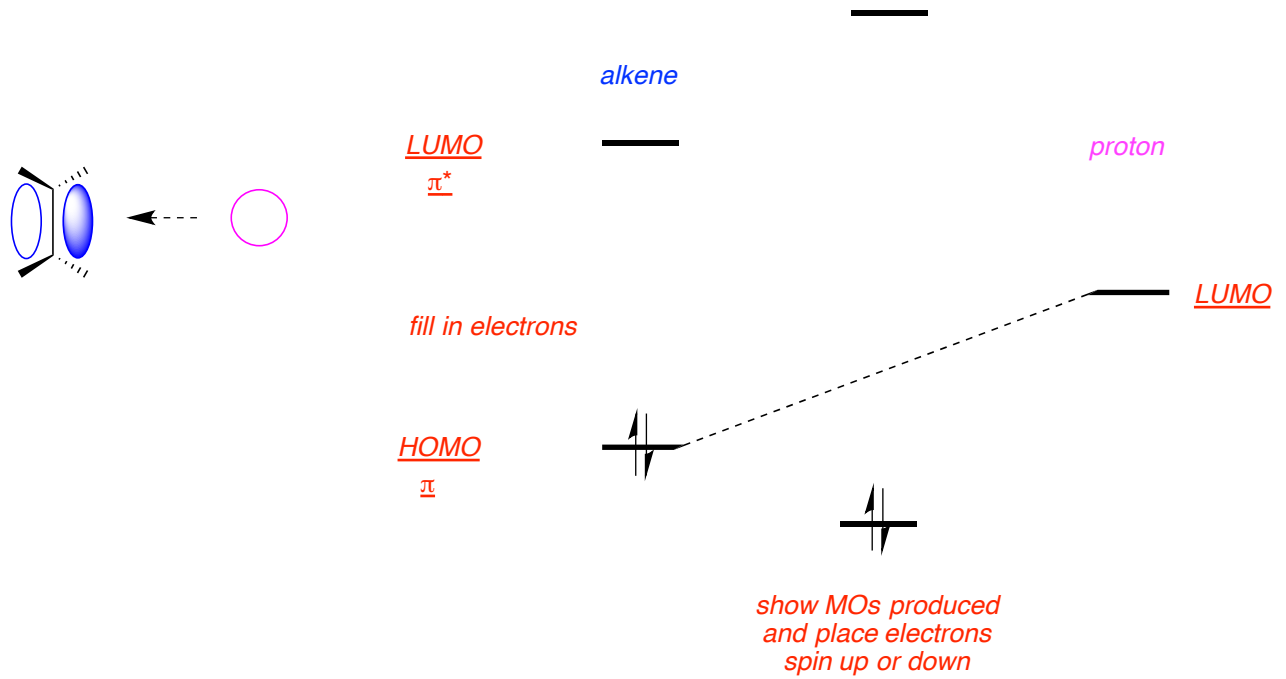
*protonated alkene
transition state*

*carbonium ion
intermediate*

sp³ hybridized carbon and sp²

A Molecular Orbital Picture Of Alkene Protonation

more
does not
LUMO
LUMO
HOMO



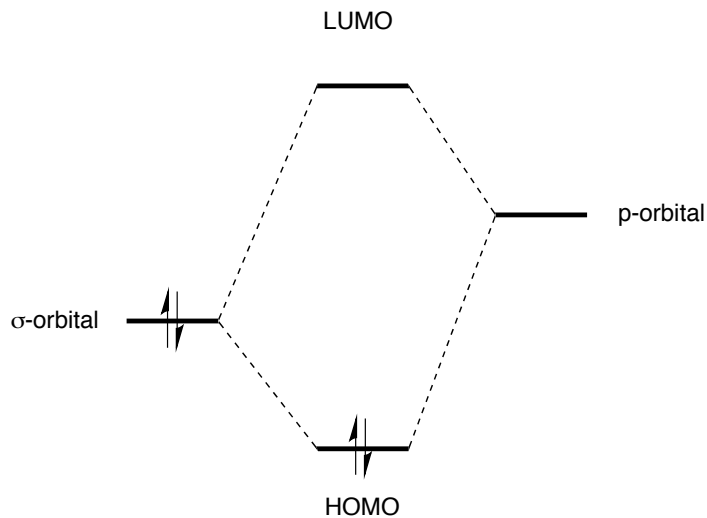
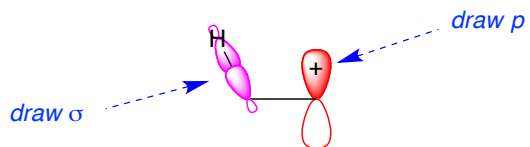
stabilizing.

C. Carbocation Stabilities

alternative theories to explain bonding in general.

(LUMO)

methyl (HOMO)



2 electrons into the interaction, whereas the p-orbital bears 2

are in the same plane.

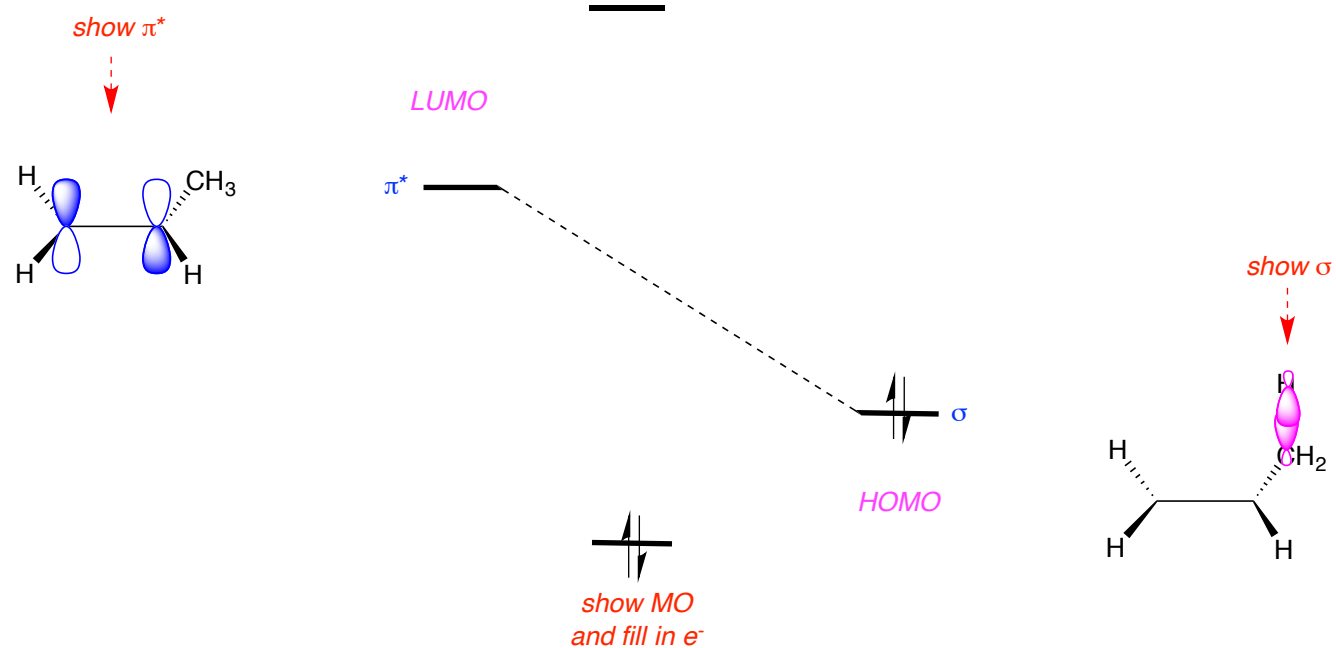
cannot achieve significant orbital overlap.

2 adjacent methyl groups, and therefore 2 more

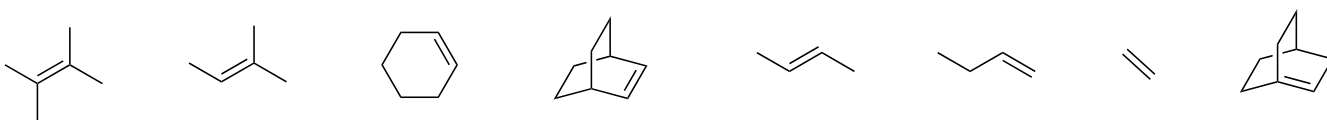
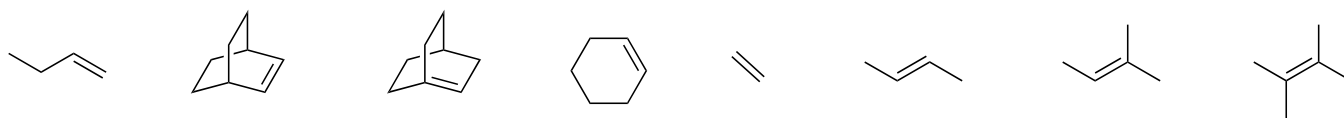
2 adjacent methyl groups, and therefore 3 more

D. Alkenes Stabilities

increase with



stabilizing
enhanced



most stable

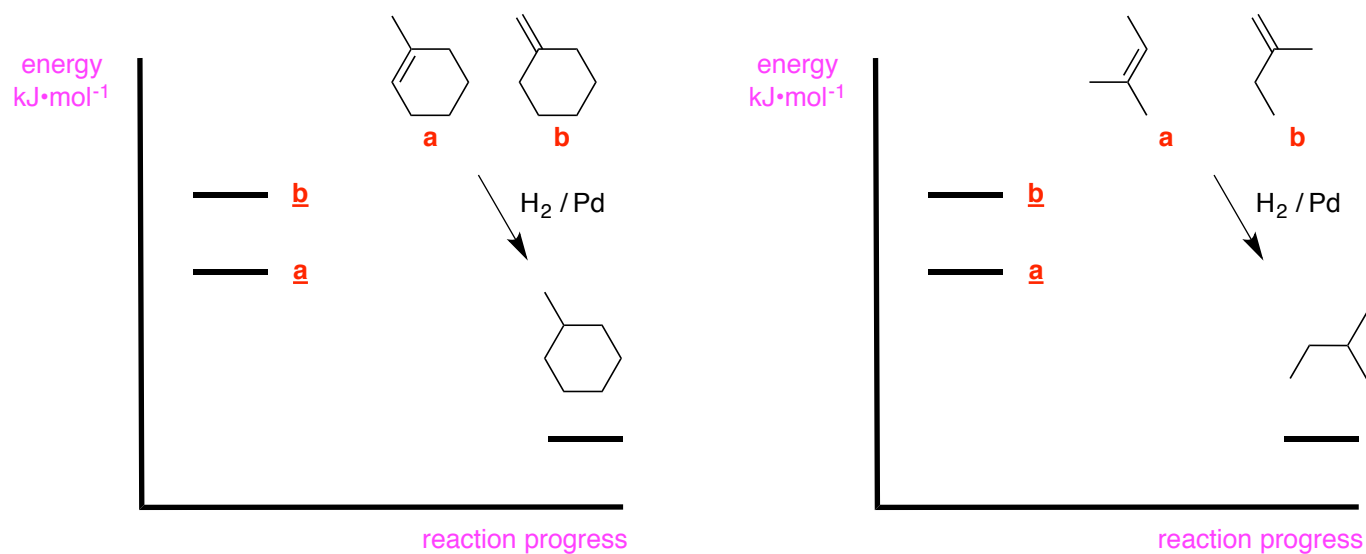
least stable

Heats Of Hydrogenation

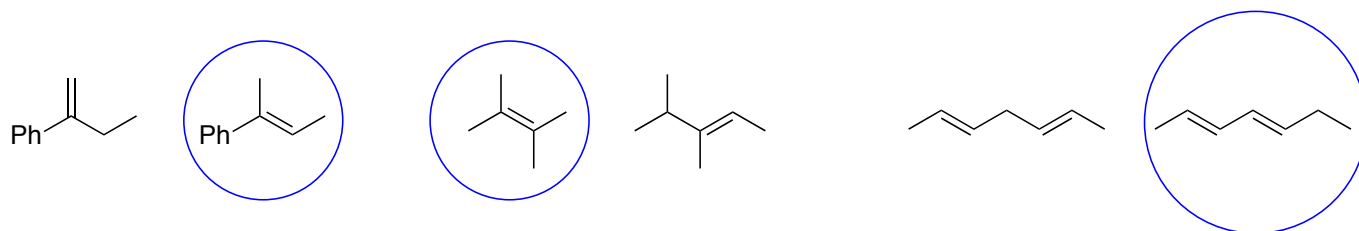
Energy is liberated

lower

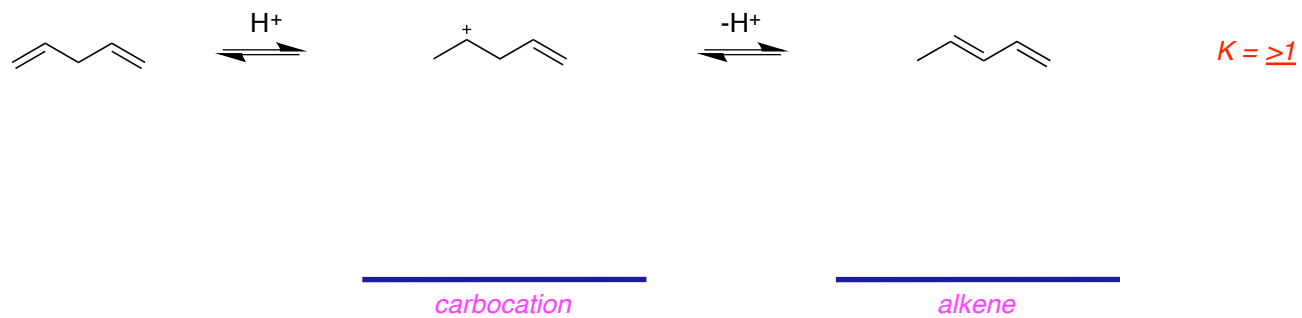
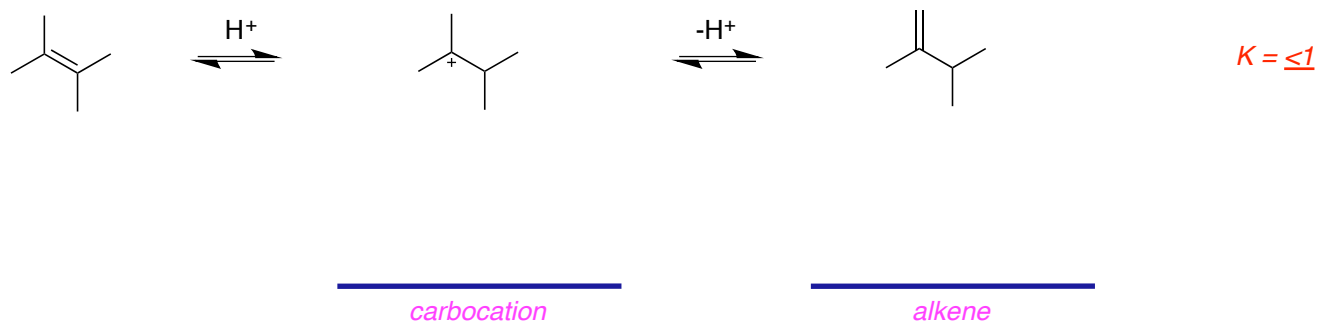
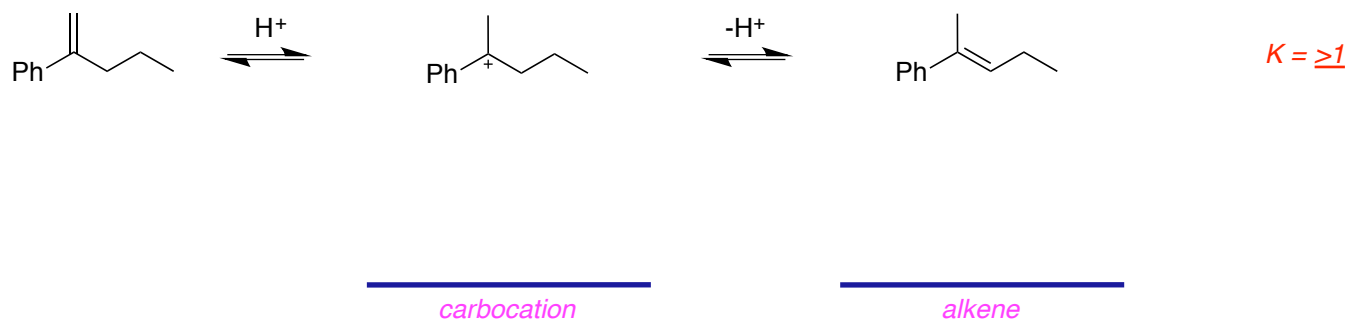
can

hydrogenation.

b
the right it is b.

E. Acid-mediated Alkene Isomerization

is an isomer of the first.
thermodynamics.



It is conceivable

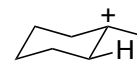
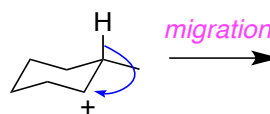
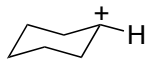
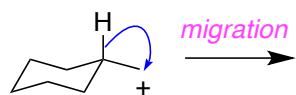
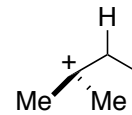
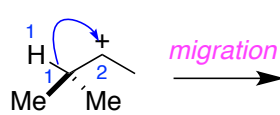
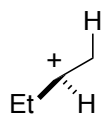
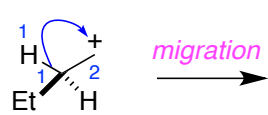
F. Carbocation Rearrangements

Hydride Shifts

hydride

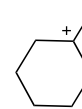
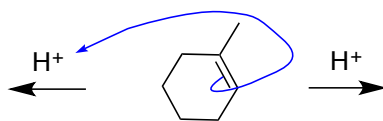
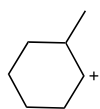
hydride anion.

: true.

1,2-hydride

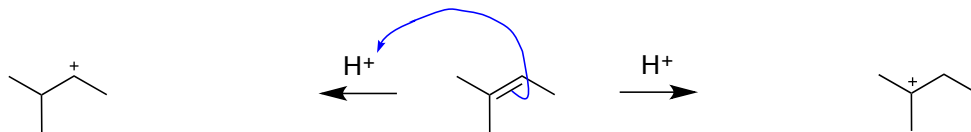
may
most

intermediates



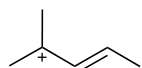
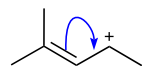
least favorable
2° carbonium ion

most favorable
3° carbonium ion

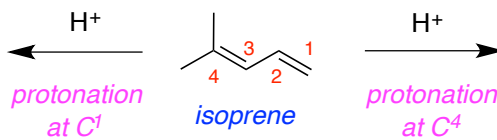


least favorable
2° carbonium ion

most favorable
3° carbonium ion



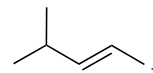
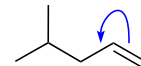
most favorable
3° carbonium ion



protonation
at C¹

protonation
at C⁴

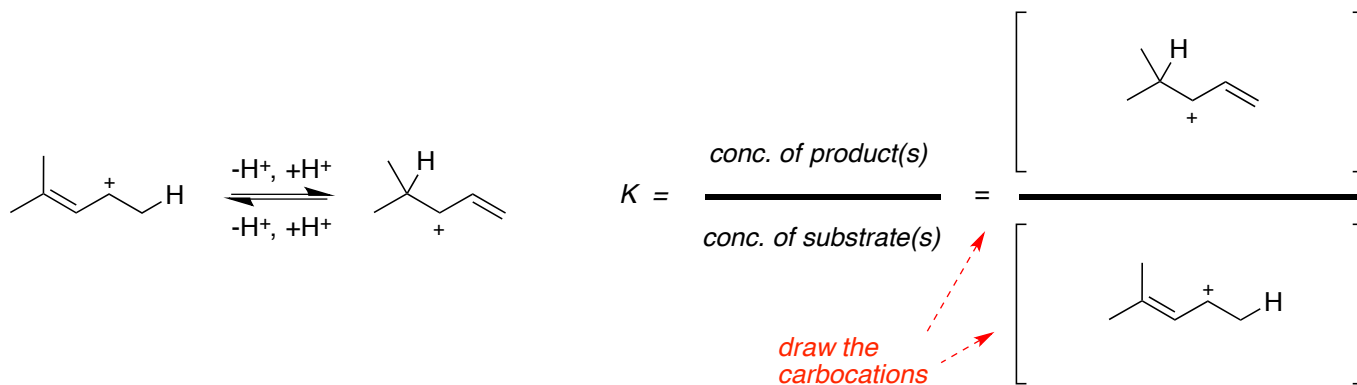
show resonance
stabilized forms



least favorable
1° carbonium ion

gives
does not.

small
equals



less than one.

Alkyl Shifts

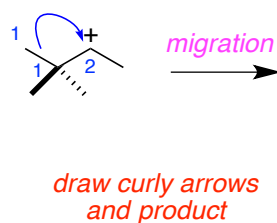
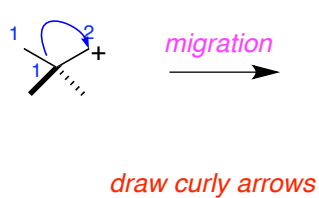
opposite

more

secondary / tertiary

tertiary

1,2-

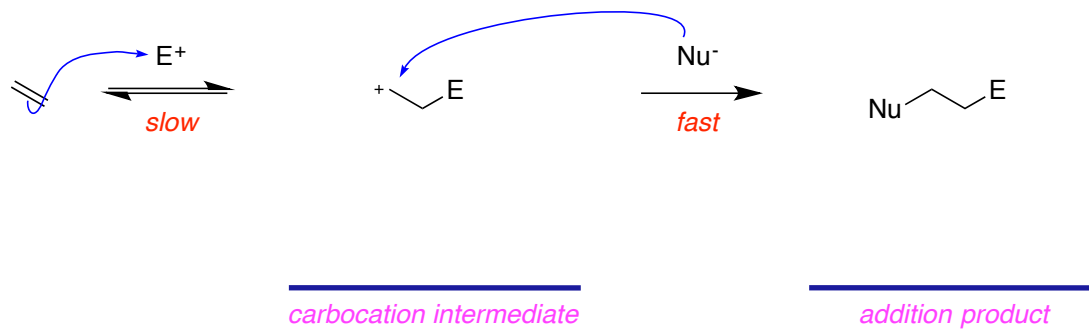


alkyl shift

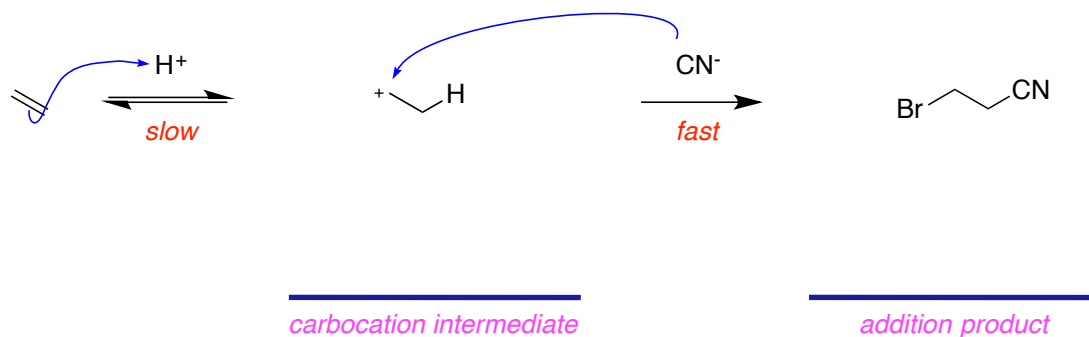
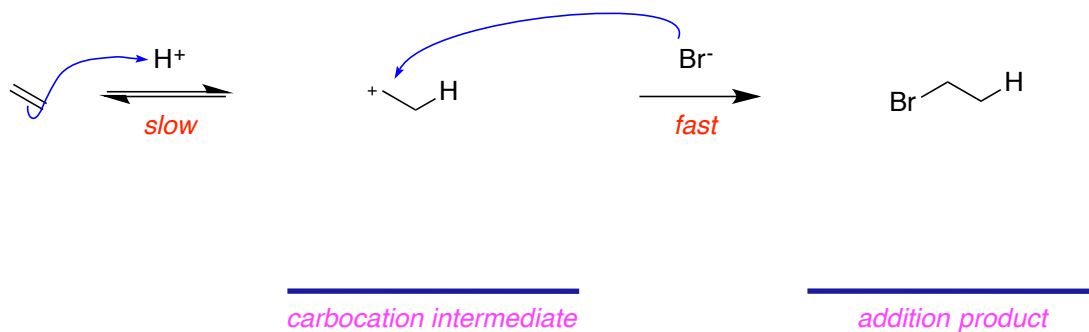
most able

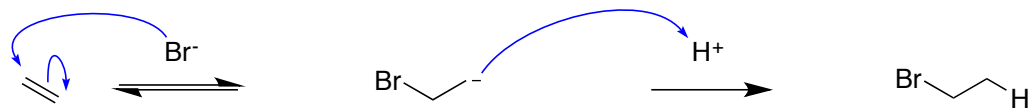
less stable than Et^+ .

G. Electrophilic Addition Mechanisms



slow





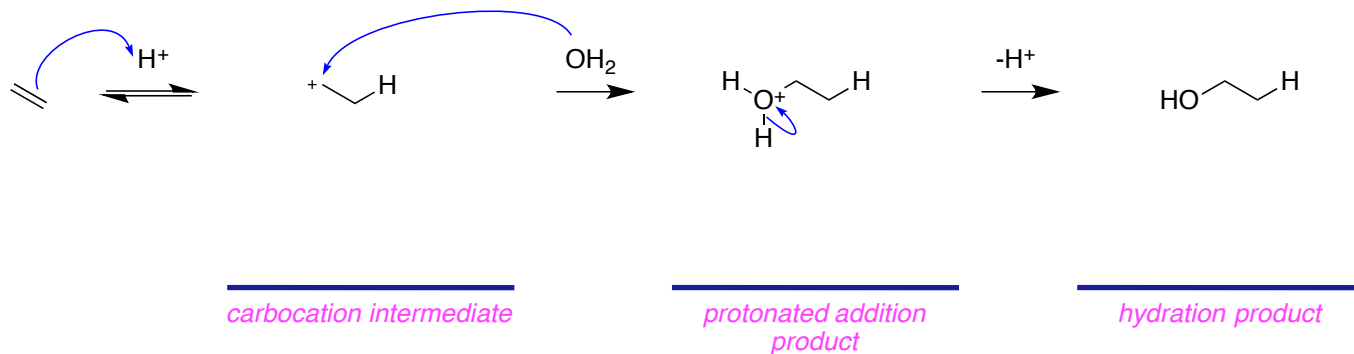
carbanion intermediate

addition product

does not proceed

- bromide, being negatively charged, is repelled by electrons in the alkene π -bond

proton,



H. Acid-mediated Hydration Of Alkenes

1°.

two

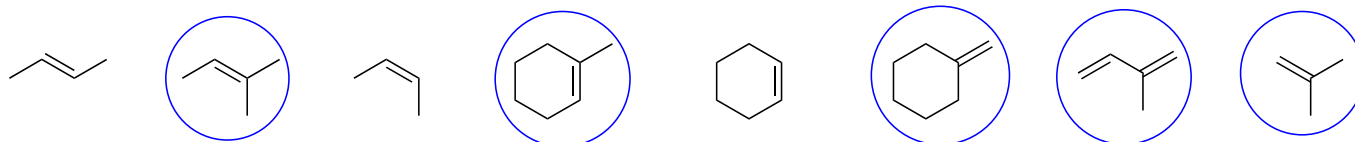
ie regioisomers;



regioselective.

, reactions that involve reaction of one chemical functional group in preference to others are called chemoselective.

enantioselective and diastereoselective

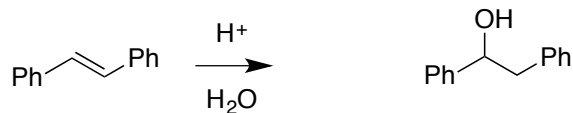
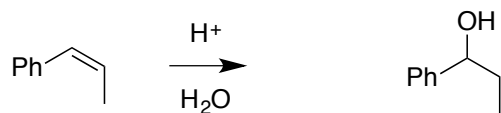
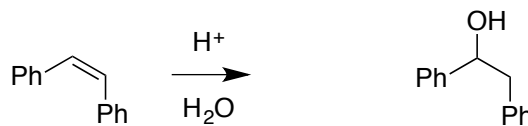
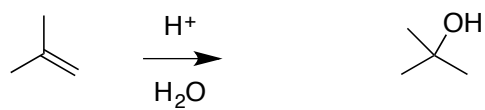




gives 2-propanol
more stable

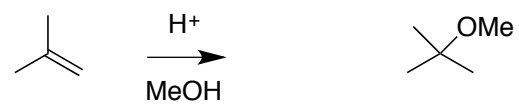
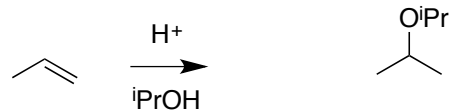
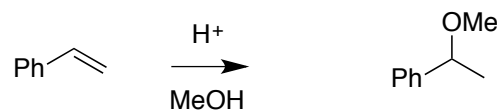


gives 1-propanol
less stable



E1 pathway.

ethers.



are not

