

Nucleophilic Addition Of Hard Anions To Aldehydes And Ketones

from chapter(s) _____ in the recommended text

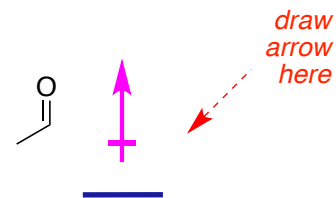
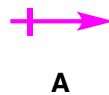
A. Introduction

B. Types Of Additions To Carbonyls

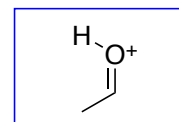
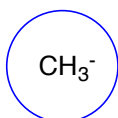
Polarity Of Carbonyls

positively polarized.

to carbonyl *carbons*
oxygen.



Reactivity Of Nucleophiles And Carbonyls At Different pH Values



more reactive
more reactive than ones that are not.

hard because
are likely to
cannot be used

completely wrong to show
neutral or basic conditions.

In the second edition of the book a somewhat ambiguous question has been changed from:

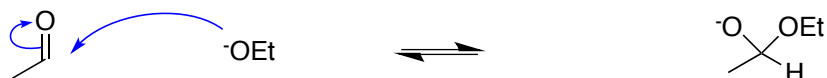
Additions of reactive basic anions to carbonyl compounds can/cannot be reversible if the anion involved is very stable.

to:

Additions of unstable, reactive, basic anions to carbonyl compounds tend to be reversible / irreversible.

the answer is *irreversible*.

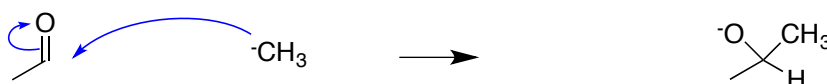
Formation Of Tetrahedral Intermediates



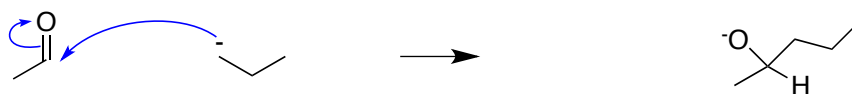
tetrahedral intermediate



tetrahedral intermediate



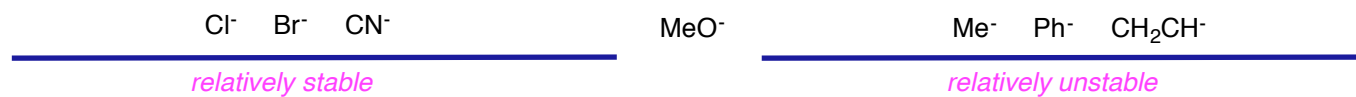
tetrahedral intermediate



tetrahedral intermediate

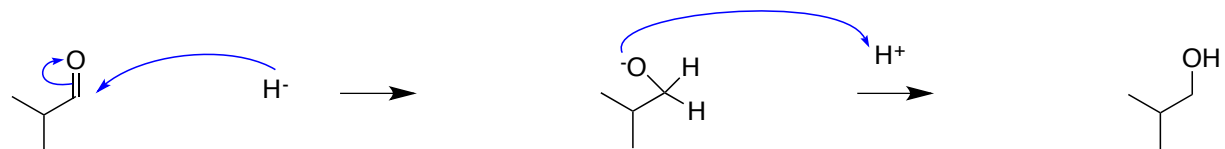
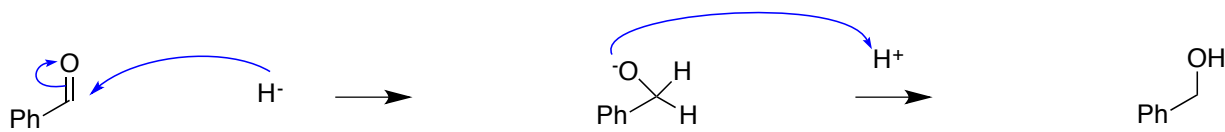
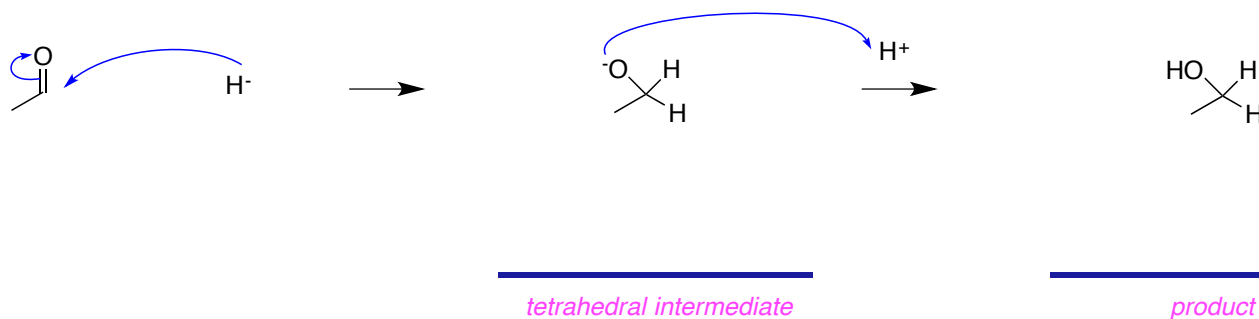
sp^3 hybridized.
 give *alcohols*.
 (this is *kinetics*),
 (*thermodynamics*).

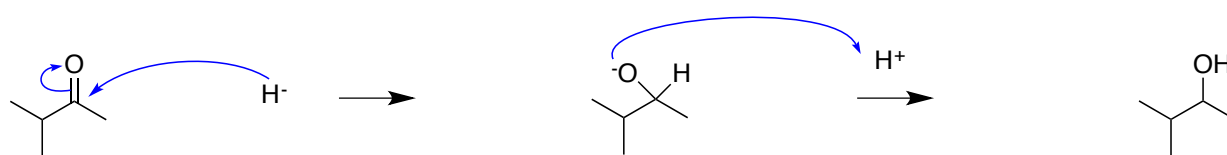
one C–O bond(s)
 one bond(s)
 the *starting materials*.
 it *will* be
 ie *irreversible* addition.

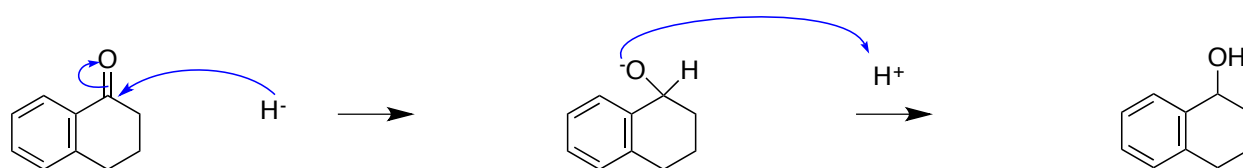


reversibly to ketones

C. Reactions of Aldehydes And Ketones With Hydridic Reducing Agents







NaBH₄

NaH

LiAlH₄

name: Sodium Borohydride

Sodium Hydride

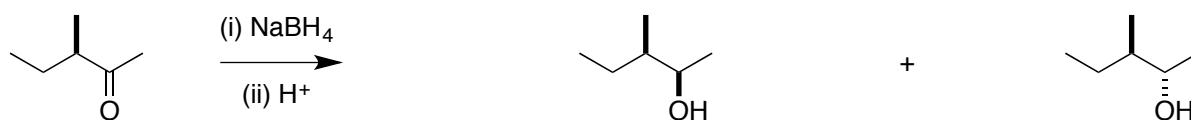
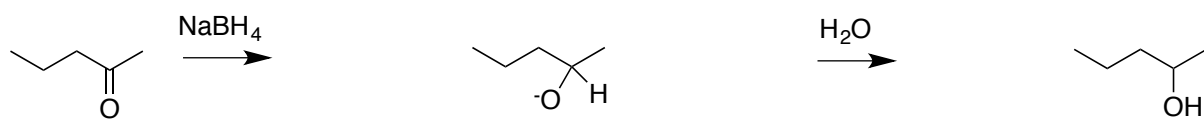
Lithium Aluminium Hydride

nucleophilic

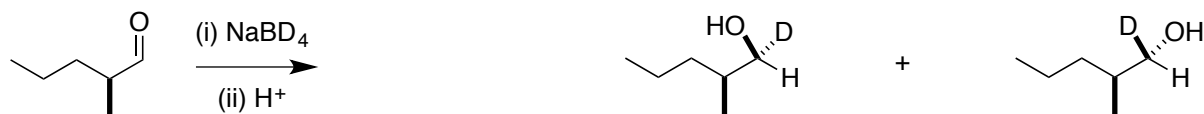
basic

nucleophilic

does not do



two diastereomers



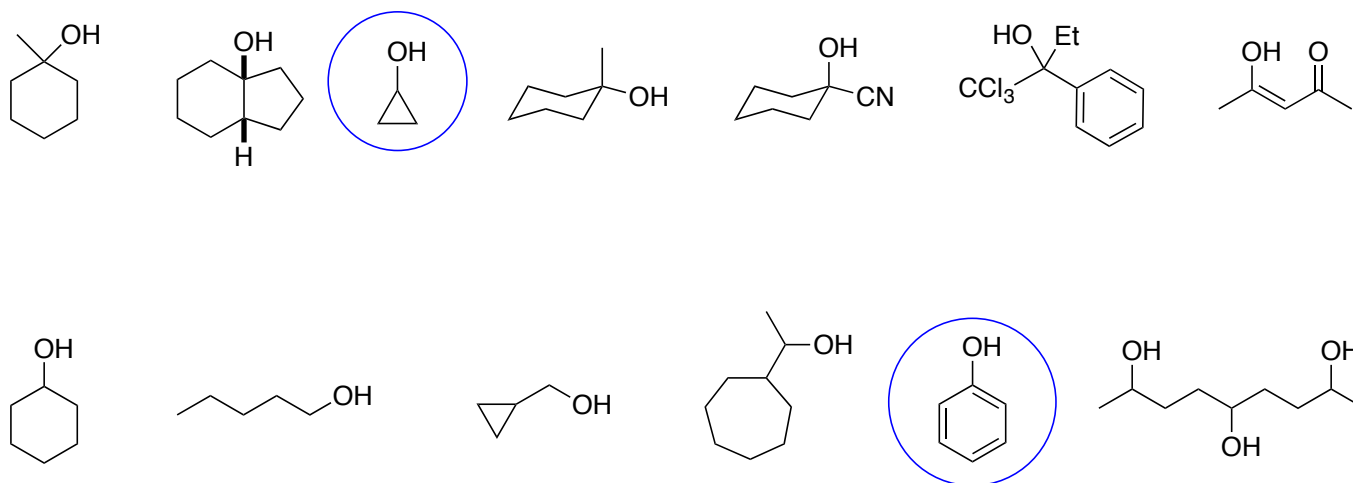
two diastereomers

reduction processes.



because:

Lithium aluminium hydride can reduce ester to alcohol, but sodium borohydride cannot.



D. Addition Of Carbanions

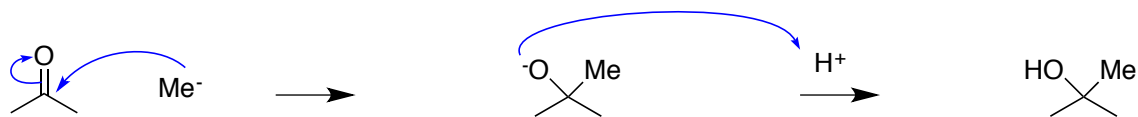
reactive

carbonyls *irreversibly*.

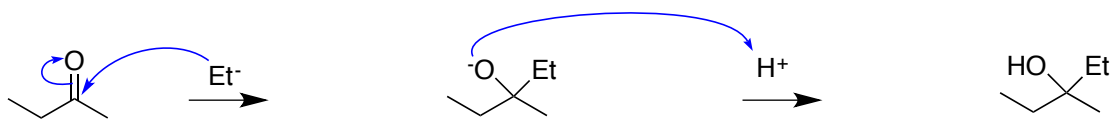
is *stronger* than

under *anhydrous* conditions.

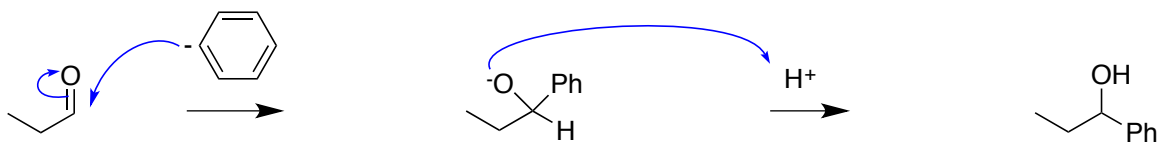
alkoxide *does not*



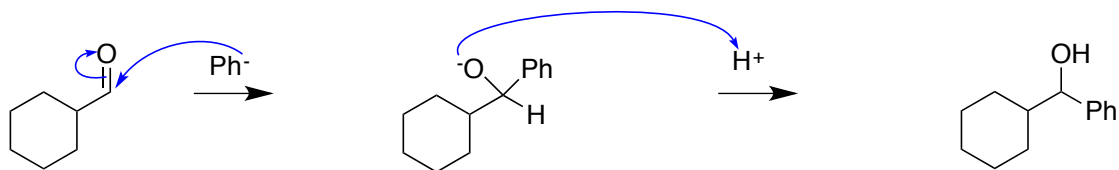
tetrahedral intermediate



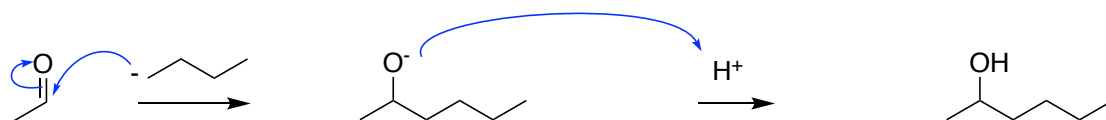
tetrahedral intermediate



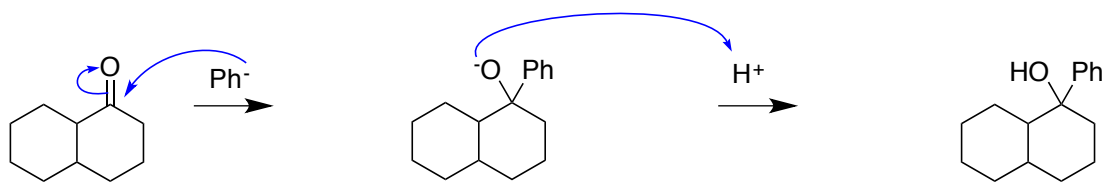
tetrahedral intermediate



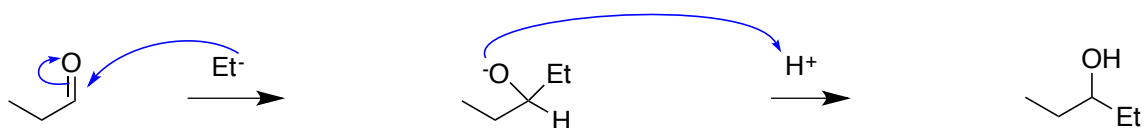
tetrahedral intermediate



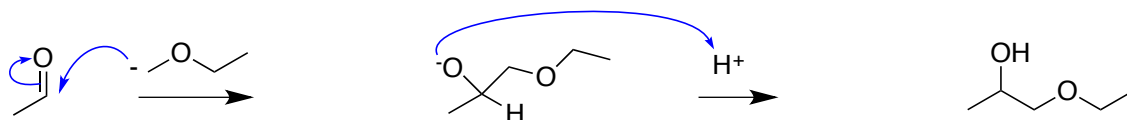
tetrahedral intermediate



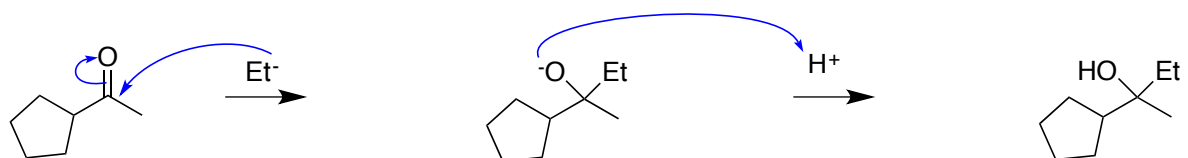
tetrahedral intermediate



tetrahedral intermediate



tetrahedral intermediate

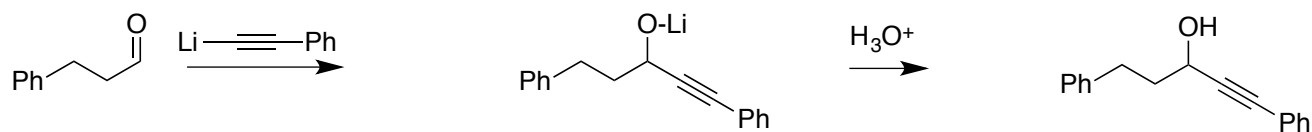


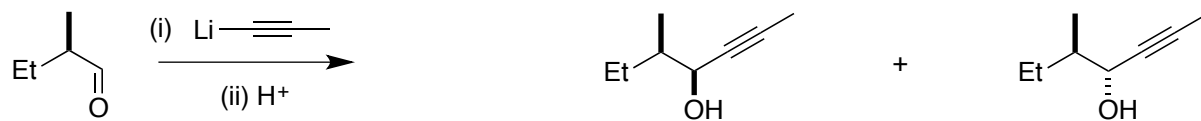
tetrahedral intermediate

E. Reactions Of Carbonyl Compounds With Acetylide Anions

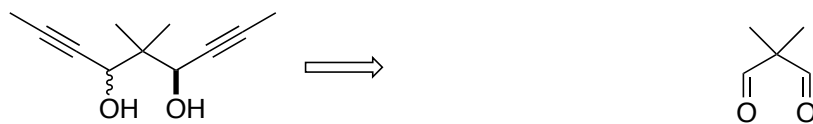


secondary or tertiary





two diastereomers



two diastereomers

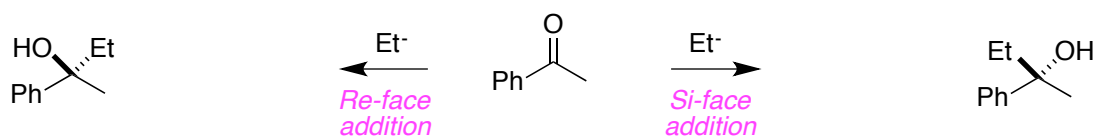


F. *Si* And *Re* Faces Revisited

enantiomers.

Re-face attack

Si-face attack.





(R)-Alcohols *are not*
 (S)-alcohols *are not*

