

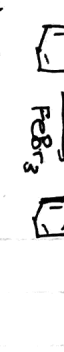
1) Nitration



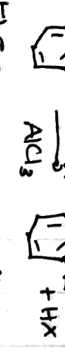
2) Sulfonation



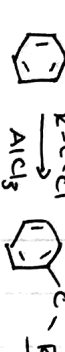
3) Halogenation



4) F.C Alkylation



5) F.C. Alkylation / Wolff's test.



Limitations of F.C.

1) Electrophile cannot be aryl/vinyl halide.

2) Aromatic ring cannot be highly deactivating

3) No aniline (NH₂, -Ph)

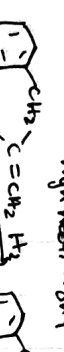
4) Possible rearrangement of alkyl groups

5) Free-Radical Halogenation in Alkyl groups.

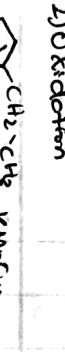
Limitations

1) needs a benzyllic H.

2) Hydrogenation



2) Oxidation



Limitation:

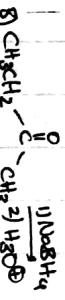
only works with benzyllic H.

Benzyllic H is more stable than 3°.

Chapter 17 - Alcohols & Ethers

Preparation of Alcohols

1) Reduction



2) Grignard Reactions (1°, 2°, 3°)



Limitations:

Grignard cannot have: -OH, -NH₂, -SH

3° alcohol = tertiary

2° alcohol = secondary

1° alcohol = primary

Grignard cannot have: -OH, -NH₂, -SH

2) Ethers - another way to make 3° OH.

Reaction of Ethers

1) cleavage by acid:

2) Williamson's synthesis (Lyon's).

Preparation of Ethers

1) Dehydration of alcohols

2) Epoxides

3) Grignard to make epoxide to alcohol

4) Oxidation to carbonyl (OH → C=O)

5) Conversion of alkyl halides (OH → X)

6) Grignard to make epoxide to alcohol

7) Dehydration of alcohols

8) Epoxides

4) Oxidation to carbonyl (OH → C=O)

Jones reagent (CrO₃) Jones should only be used for 2° alcohols or aldehydes.

1) Dehydration of alcohols

2) Epoxides

3) Grignard to make epoxide to alcohol

4) Oxidation to carbonyl (OH → C=O)

5) Conversion of alkyl halides (OH → X)

6) Grignard to make epoxide to alcohol

7) Dehydration of alcohols

8) Epoxides

9) Grignard to make epoxide to alcohol

10) Oxidation to carbonyl (OH → C=O)

11) Conversion of alkyl halides (OH → X)

12) Grignard to make epoxide to alcohol

13) Dehydration of alcohols

14) Epoxides

15) Grignard to make epoxide to alcohol

16) Oxidation to carbonyl (OH → C=O)

17) Conversion of alkyl halides (OH → X)

18) Grignard to make epoxide to alcohol

19) Dehydration of alcohols

20) Epoxides

21) Grignard to make epoxide to alcohol

22) Oxidation to carbonyl (OH → C=O)

23) Conversion of alkyl halides (OH → X)

1c) alkylation of enolate for

$\text{CH}_3\text{C}(\text{O})\text{CH}_2\text{CH}_3 \xrightarrow{1) \text{B. E.}} \text{CH}_3\text{C}(\text{O})\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$

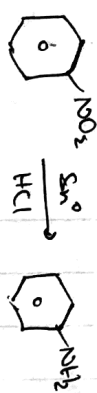
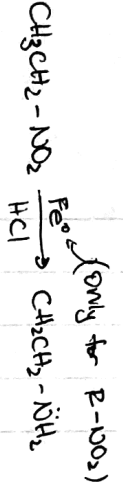
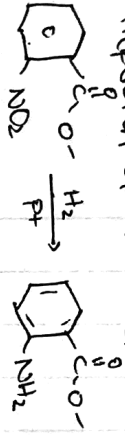
$\text{CH}_3\text{C}(\text{O})\text{CH}_2\text{CH}_3 \xrightarrow{2) \text{B. E.}} \text{CH}_3\text{C}(\text{O})\text{CH}(\text{CH}_3)_2$

X con't. completed

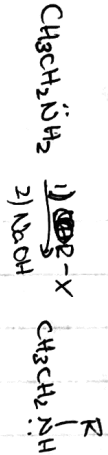
$$\text{CH}_3\text{COOEt} \xrightarrow[\text{H}^+]{\text{NaOH}} \text{CH}_3\text{COOH}$$

π

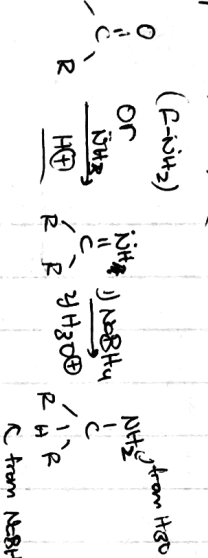
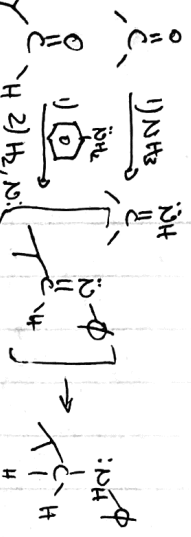
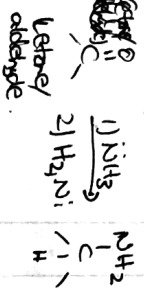
Preparation of Amines. (Reduction of nitrile-compounds.)



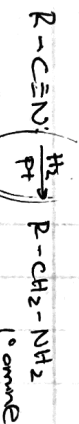
2) Preparation of amines (alkyl halide).



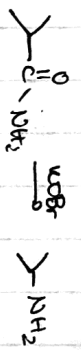
3) Reductive amination



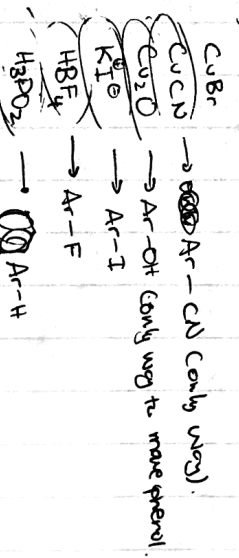
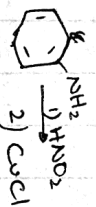
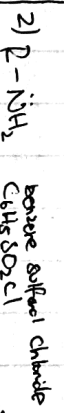
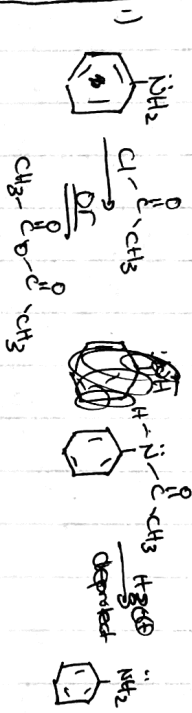
4) Reduction of nitriles.



5) Hoffman Degradation of Amide



amide of sulfonamide: protecting group. (useful for unsaturated & E.C. Alkylation / acylation)



Three ways to make nitrile.

