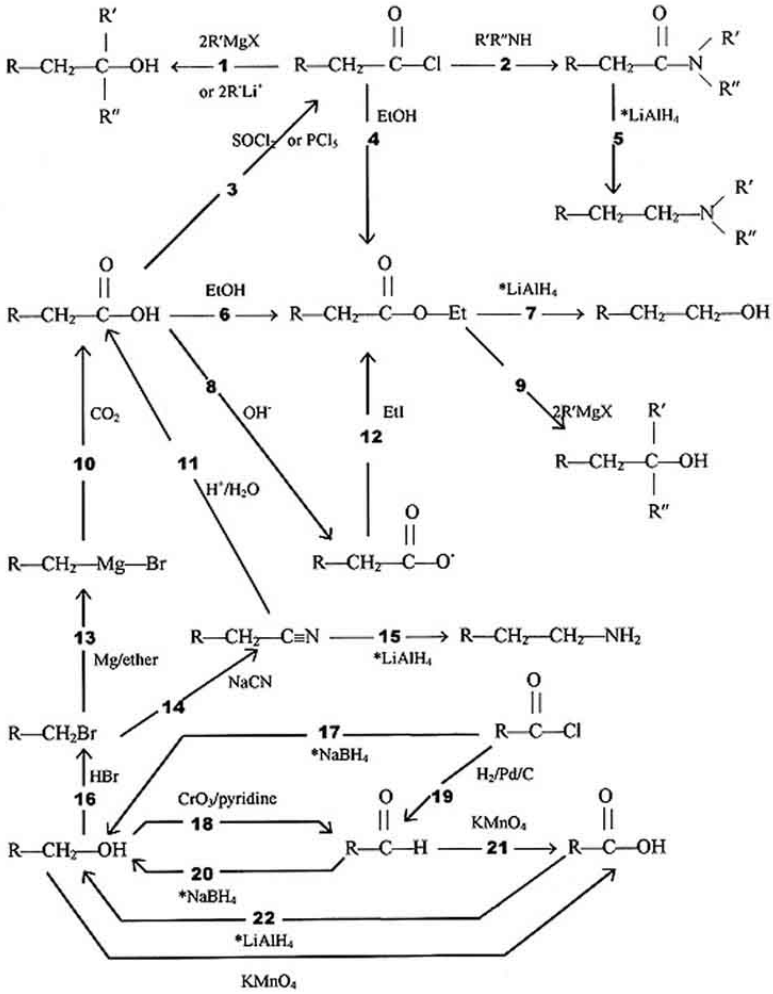
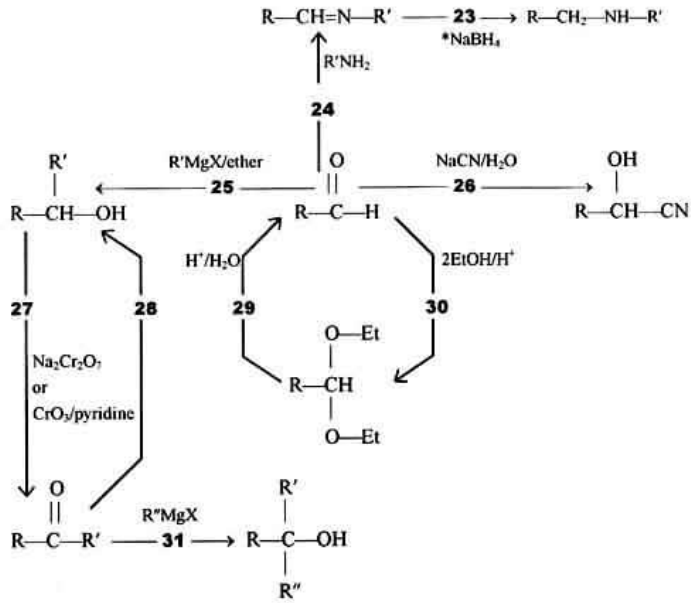
Note: Summaries are most helpful post-content review.

Gold Standard MCAT Organic Chemistry Mechanisms: Summary I



Gold Standard MCAT Organic Chemistry Mechanisms: Summary II



R = alkyl Et = ethyl X = halide $R^- MgX^+$ = Grignard reagent $R^- Li^+$ = alkyl lithium

Grignard reagents and **alkyl lithiums** are special agents since they can create new C—C bonds (see ORG 1.6).

***Reduction** involves the addition of hydrogen or subtraction of oxygen.

- **Mild reducing agents** add fewer hydrogens/subtract fewer oxygens.
- **Strong reducing agents** add more hydrogens/subtract more oxygens.

Cross-referencing to The Gold Standard MCAT text are found below.

Gold Standard MCAT Organic Chemistry Mechanisms: Basic Principles

Most reactions presented can be derived from basic principles (i.e. ORG 1.6, 7. 1). Many of the reactions are cross-referenced for further information.

1. An acid chloride reacts with a Grignard reagent to produce a tertiary alcohol. See ORG 1.6, 9.1.
2. An acid chloride reacts with a primary or secondary amine to produce an amide. See ORG 9.3 & 11.2.
3. A carboxylic acid reacts with $SOCl_2$ or PCl_5 to produce an acid chloride. See ORG 9.1
4. An acid chloride reacts with an alcohol (e.g. ethanol) to produce an ester. See ORG 9.4.
5. An amide reacts with $LiAlH_4$ to produce an amine. See ORG 8.2, 9.3.
6. A carboxylic acid reacts with an alcohol (e.g. ethanol) to produce an ester. See ORG 8.2.
7. An ester reacts with $LiAlH_4$ to produce a primary alcohol. See ORG 8.2, 9.4.
8. A carboxylic acid reacts with base to produce a carboxylate anion. See CHM 6.3 & ORG 8.1.
9. An ester reacts with a Grignard reagent to produce a tertiary alcohol. See ORG 1.6, 8.1.1, 9.4.
10. A Grignard reagent reacts with carbon dioxide to produce a carboxylic acid. See ORG 8.1.1.
11. A nitrile reacts with aqueous acid to produce a carboxylic acid. See ORG 8.1.1.
12. A carboxylate ion reacts with ethyl iodide to produce an ester.
13. An alkyl halide reacts with Mg/ether to produce a Grignard reagent.
14. An alkyl halide reacts with NaCN to produce a nitrile. See ORG 6.2.3.
15. A nitrile reacts with $LiAlH_4$ to produce an amine. See ORG 8.2.
16. A primary alcohol reacts with HBr to produce an alkyl halide.
17. An acid chloride reacts with $NaBH_4$ to produce a primary alcohol. See ORG 8.2, 9.1.
18. A primary alcohol reacts with CrO_3/pyridine to produce an aldehyde. See ORG 6.2.2, 7.2.1.
19. A acid chloride reacts with H_2/Pd/C to produce an aldehyde. See ORG 7.1, 7.2.1, 9.1.
20. An aldehyde reacts with $NaBH_4$ to produce a primary or secondary alcohol. See ORG 7.1, 8.2.
21. An aldehyde reacts with $KMnO_4$ to produce a carboxylic acid. See ORG 7.2.1, 8.1.1.
22. A carboxylic acid reacts with $LiAlH_4$ to produce a primary alcohol. See ORG 8.2.
23. An imine reacts with $NaBH_4$ to produce a secondary amine. See 7.2.3, 8.2.
24. An aldehyde reacts with a primary amine to produce an imine. See ORG 7.2.3.
25. An aldehyde reacts with a Grignard reagent and ether to produce a secondary alcohol. See ORG 1.6, 7.1.
26. An aldehyde reacts with aqueous NaCN. See ORG 7.1.
27. A secondary alcohol reacts with Na_2CrO_7 or CrO_3/pyridine to produce a ketone. See ORG 6.2.2.
28. A ketone reacts with $NaBH_4$ to produce a secondary alcohol. See ORG 7.2.1.
29. An acetal reacts with aqueous acid to produce an aldehyde. See ORG 7.2.1/2.
30. An aldehyde reacts with an alcohol (e.g. ethanol) and acid to produce an acetal. Note that using with less $EtOH/H^+$, a hemiacetal will form. See ORG 7.2.2.
31. A ketone reacts with a Grignard reagent to produce a tertiary alcohol. See ORG 1.6, 9.

Gold Standard MCAT Organic Chemistry Review: IR Spectroscopy

Memorize at least the following IR spectra data for the MCAT:

- Approx. 3300 cm^{-1} for -OH (alcohol functional group)
- Approx. 1700 cm^{-1} for C=O (carbonyl functional group)

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