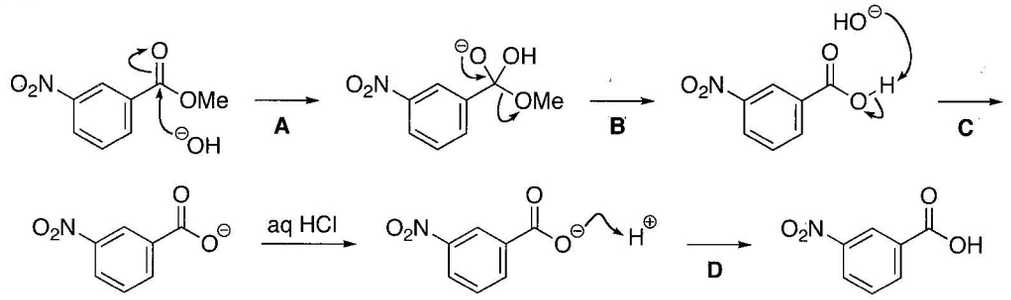
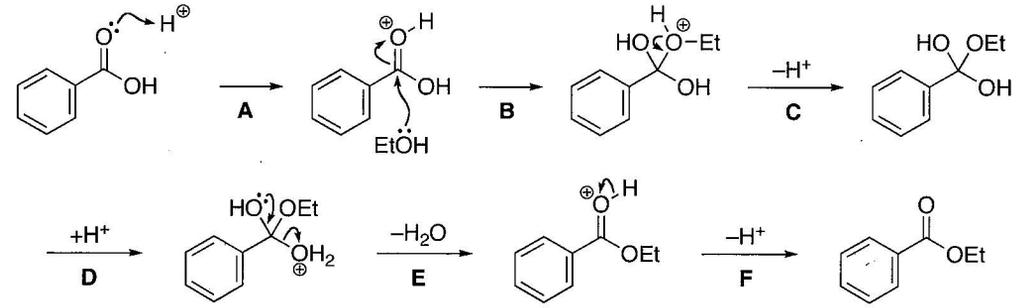
A001



Kamm, O.; Segur, J. B. *Org. Synth., Coll. Vol. I* **1941**, 391.

A: Addition of hydroxide ion to the carbonyl group to form a tetrahedral intermediate. **B**: Elimination of methoxide ion helped by the oxygen lone pair. **C**: Deprotonation. pKa AcOH = 4.8, H_2O = 15.7. **D**: Protonation on workup. pKa H_3O^+ = −1.7.

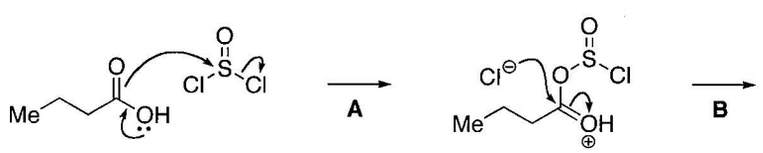
A002

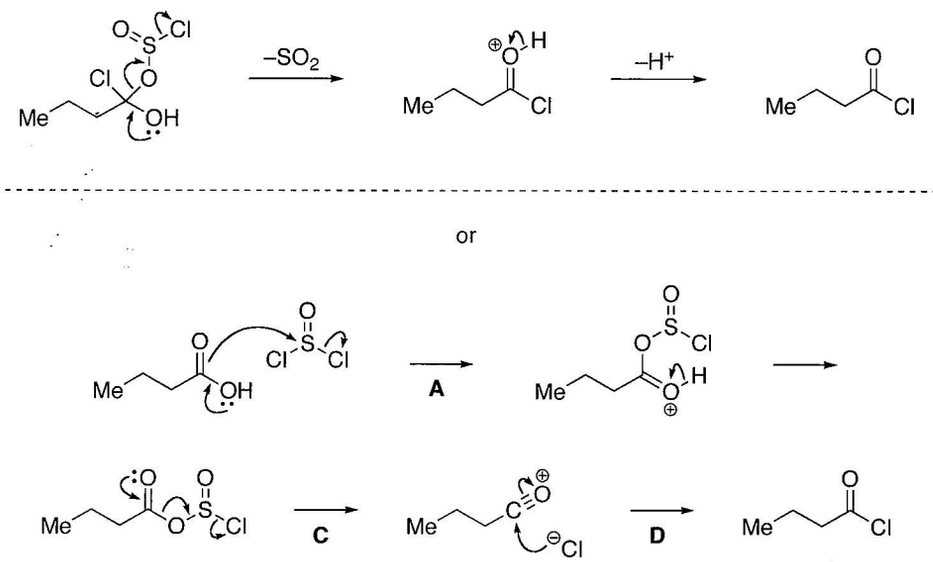


Fischer, E.; Speier, A. *Ber. Deut. Chem. Ges.* **1895**, *28*, 3252.

A: Activation of the carbonyl group by protonation. **B**: Addition of EtOH to the activated carbonyl group. **C**: Deprotonation of the oxonium ion. **D**: Protonation makes a hydroxy group a good leaving group. **E**: Elimination of water helped by the oxygen lone pair. **F**: Deprotonation.

A003

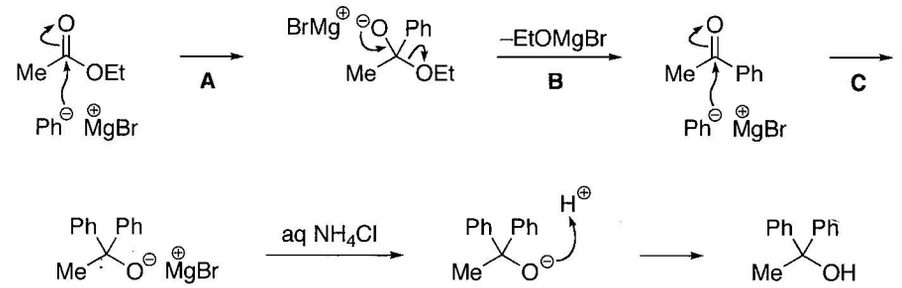




Helferich, B.; Schaefer, W. *Org. Synth., Coll. Vol. I* **1941**, 147.

A: Attack of a carboxylic acid to $SOCl_2$ forms a mixed anhydride. **B**: Addition of chloride ion to the carbonyl group to form a tetrahedral intermediate. **C**: Formation of an acylium ion. **D**: Addition of chloride ion to the acylium ion.

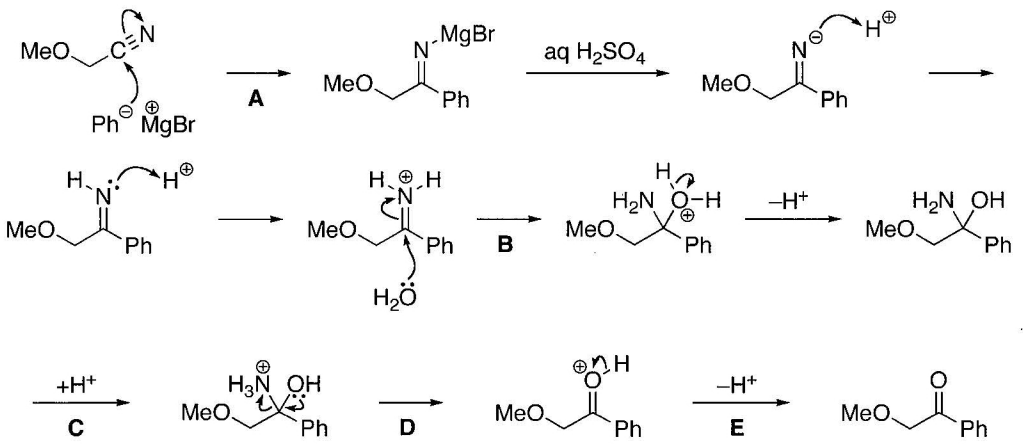
A004



Allen, C. F. H.; Converse, S. *Org. Synth., Coll. Vol. I* **1941**, 226.

A: Addition of PhMgBr to the carbonyl group of the ester to form a tetrahedral intermediate. **B**: Elimination of ethoxide ion to form a ketone. **C**: Addition of PhMgBr to the more reactive ketone to form a tertiary alkoxide.

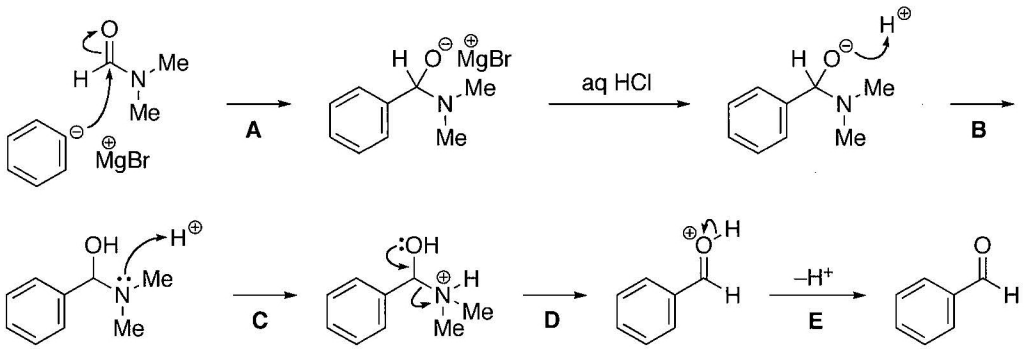
A005



Moffett, R. B.; Shriner, R. L. *Org. Synth., Coll. Vol. III* **1955**, 562.

A: Addition of PhMgBr to the nitrile forms an imine anion. **B**: Addition of water to the iminium ion gives a hemiaminal. **C**: Protonation occurs on a more basic amino group. pKa H_3O^+ = –1.7, $EtNH_3^+$ = 10.6. **D**: Elimination of ammonia helped by the oxygen lone pair. **E**: Deprotonation.

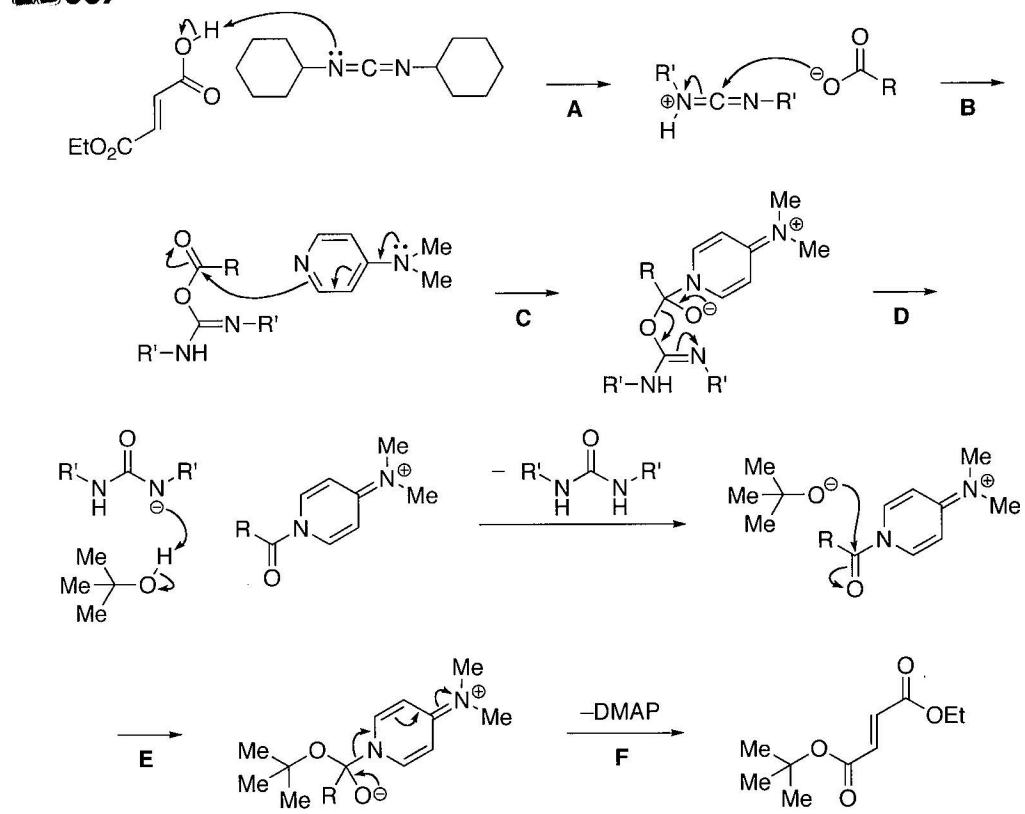
A006



Olah, G. A.; Surya Prakash, G. K.; Arvanaghi, M. *Synthesis* **1984**, 228.

A: Addition of PhMgBr to the carbonyl group. The resulting tetrahedral intermediate is relatively stable because the alkoxide anion cannot generate an amine anion (pKa *i*-PrOH = 17, Et_2NH = 36). **B**: Protonation on workup. **C**: Protonation of a more basic amino group. pKa H_3O^+ = –1.7, $EtNH_3^+$ = 10.6. **D**: Elimination of the amine helped by the oxygen lone pair. **E**: Deprotonation.

A007



Neises, B.; Steglich, W. *Org. Synth., Coll. Vol. VII* **1990**, 93.

A: Activation of DCC by protonation. **B**: Addition of the carboxylate to the protonated DCC. **C**: Addition of DMAP to the carbonyl group. **D**: Elimination of a urea anion which then abstracts a proton from an alcohol. **E**: Addition of the alkoxide anion to the carbonyl group to form a tetrahedral intermediate. **F**: Elimination of DMAP to form the product.

A008