B.Sc. Semester-VI
Organic Chemistry
Paper-XIV

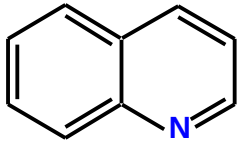
3. Heterocyclic Compounds

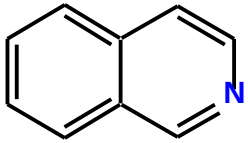
Coverage:
11. Quinolines and Isoquinolines : Synthesis

Dr. Rajeev Ranjan
University Department of Chemistry
Dr. Shyama Prasad Mukherjee University, Ranchi

Quinolines – Synthesis

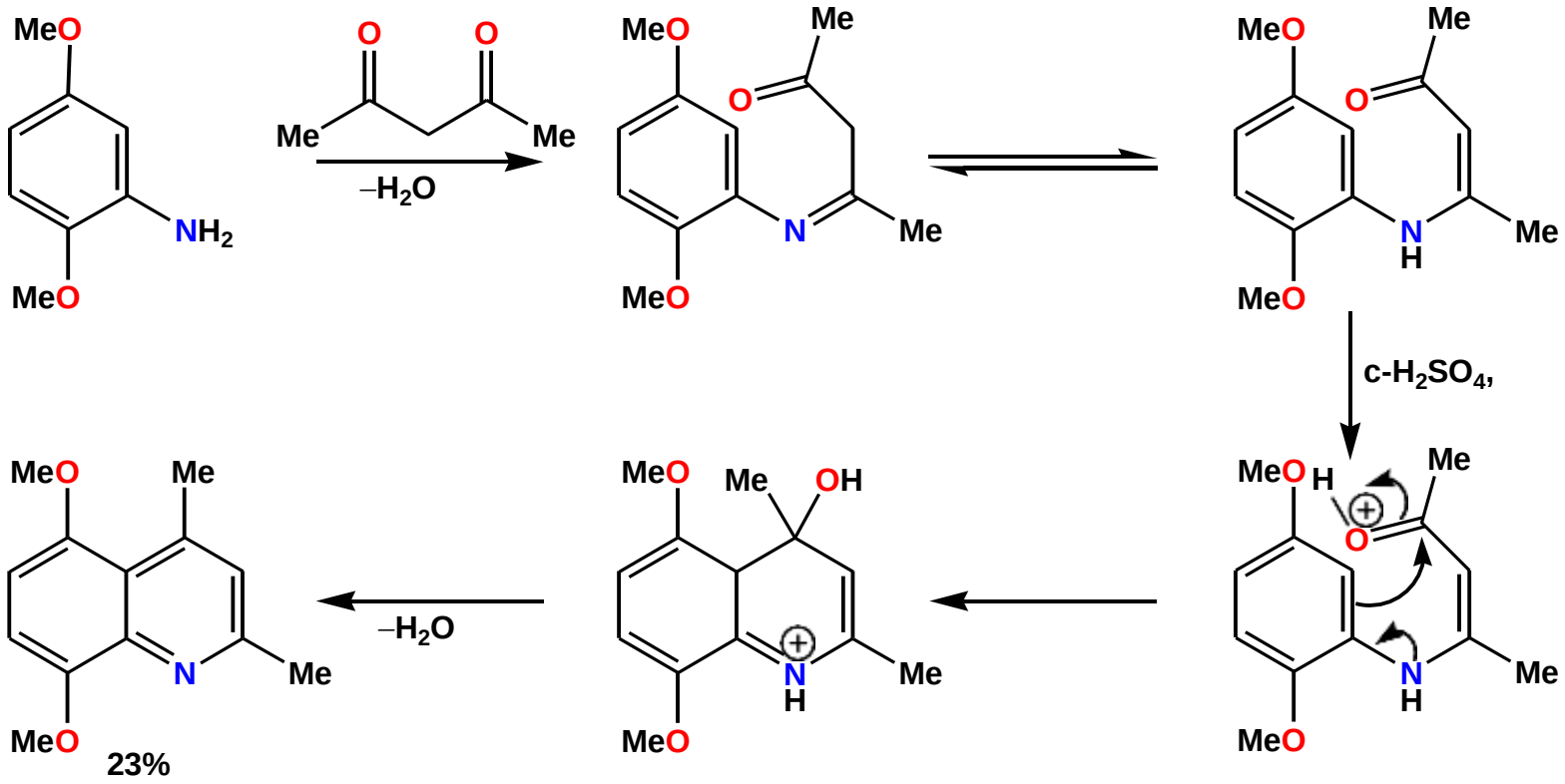
Structure





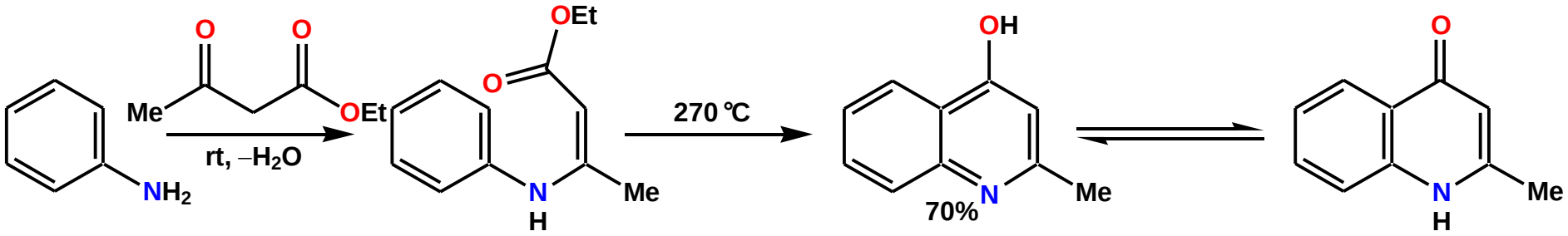
- pK_a values (4.9 and 5.4) are similar to that of pyridine
- Possess aspects of pyridine and naphthalene reactivity e.g. form *N*-oxides and ammonium salts

Combes Synthesis

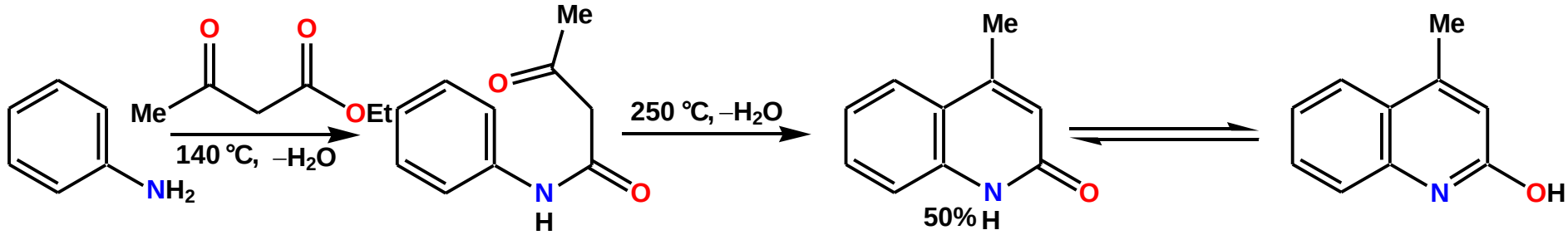


Quinolines – Synthesis

Conrad-Limpach-Knorr Synthesis

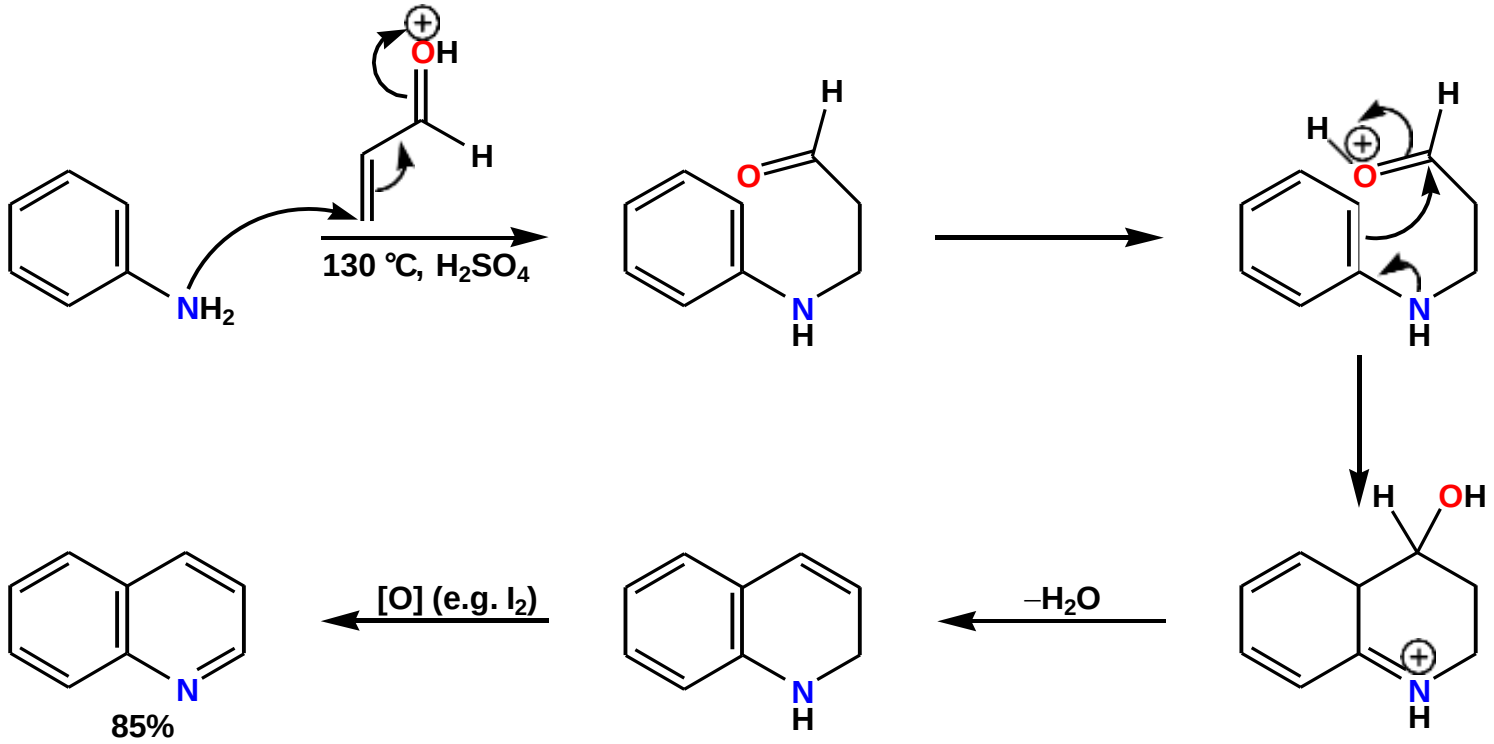


- Very similar to the Combes synthesis by a β-keto ester is used instead of a β-diketone
- Altering the reaction conditions can completely alter the regiochemical outcome

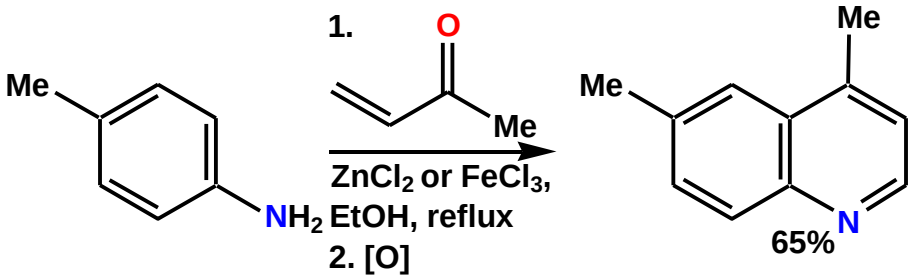


Quinolines – Synthesis

Skraup Synthesis

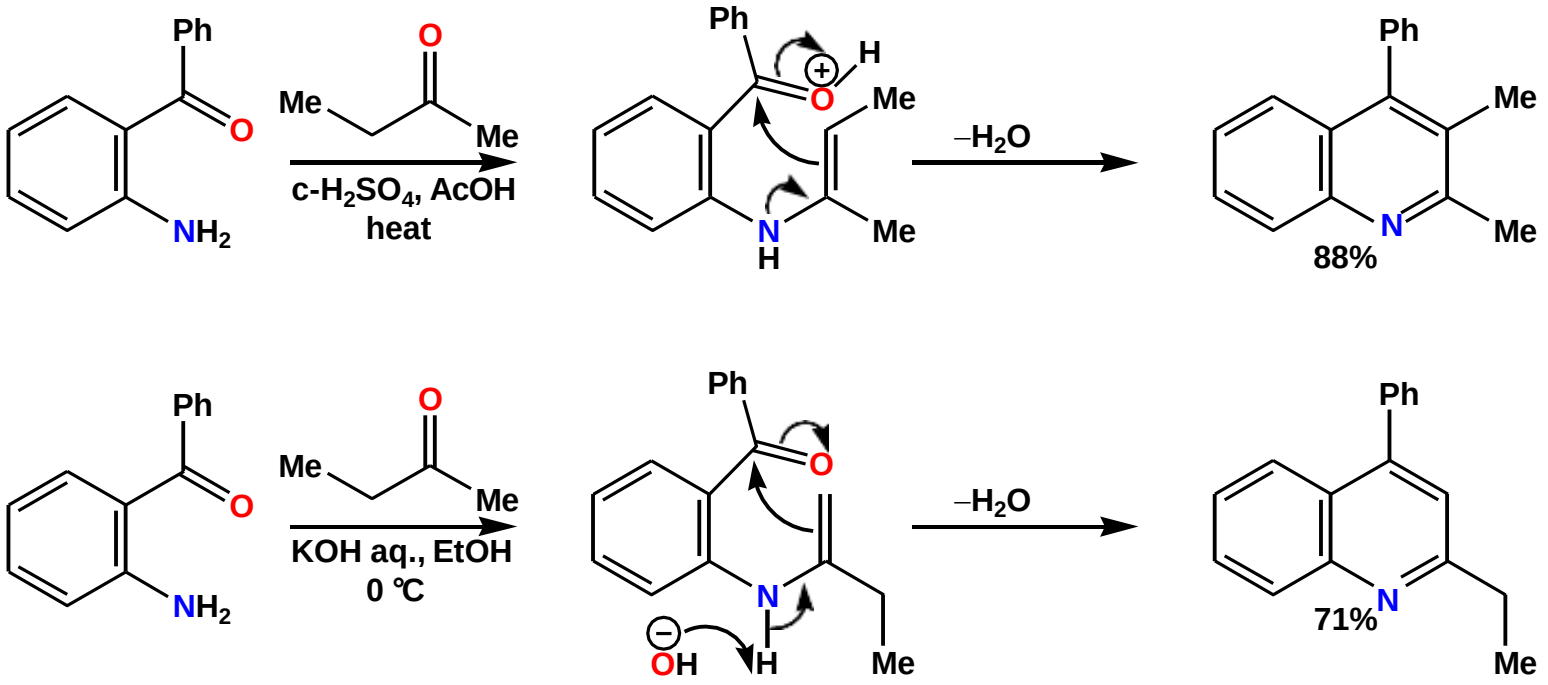


- Acrolein can be generated *in situ* by treatment of glycerol with conc. sulfuric acid
- A mild oxidant is required to form the fully aromatic system from the dihydroquinoline



Quinolines – Synthesis

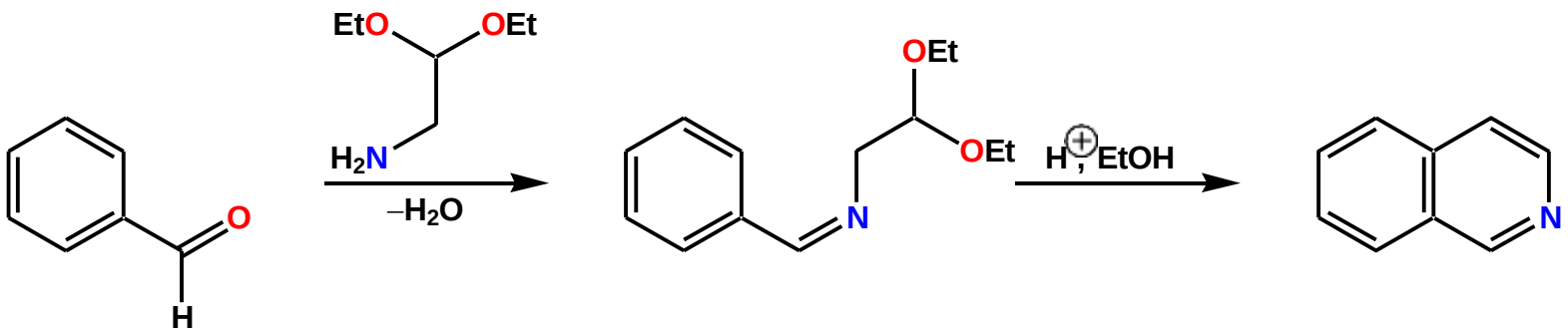
Friedlander Synthesis



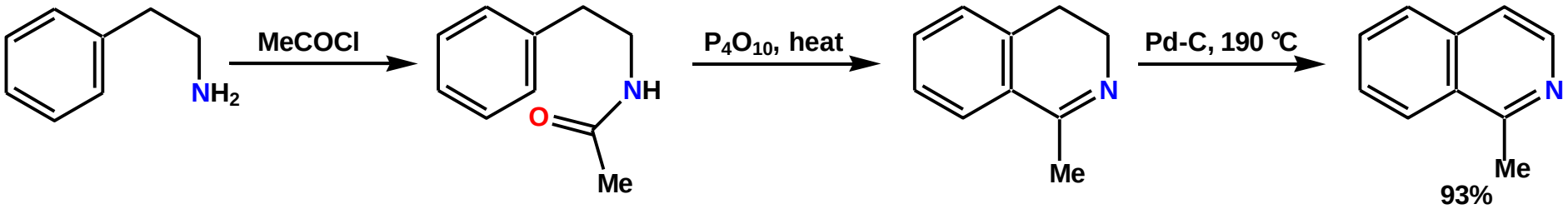
- The starting acyl aniline can be difficult to prepare
- Acidic and basic conditions deliver regioisomeric products in good yields

Isoquinolines – Synthesis

Pomeranz-Fritsch Synthesis



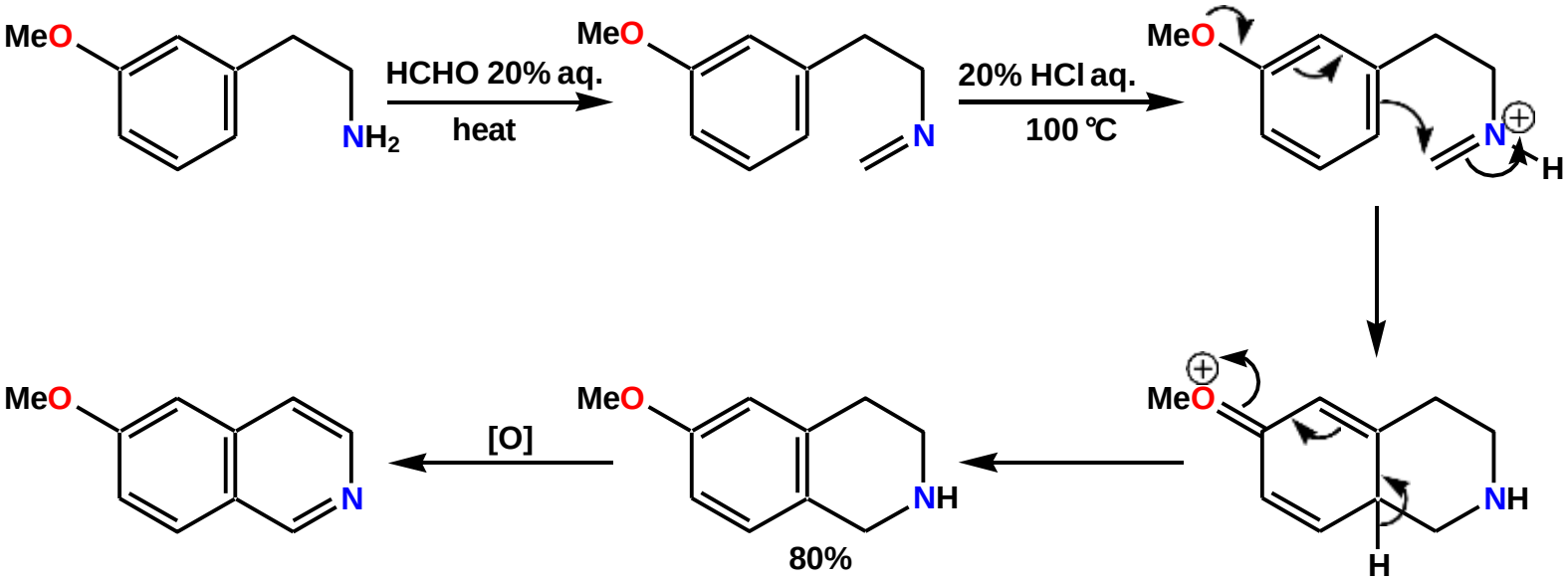
Bischler-Napieralski Synthesis



- Cyclisation can be accomplished using $POCl_3$ or PCl_5
- Oxidation of the dihydroisoquinoline can be performed using a mild oxidant

Isoquinolines – Synthesis

Pictet-Spengler Synthesis



- An electron-donating substituent on the carboaromatic ring is required
- A tetrahydroisoquinoline is produced and subsequent oxidation is required to give the fully aromatic isoquinoline

THANK YOU