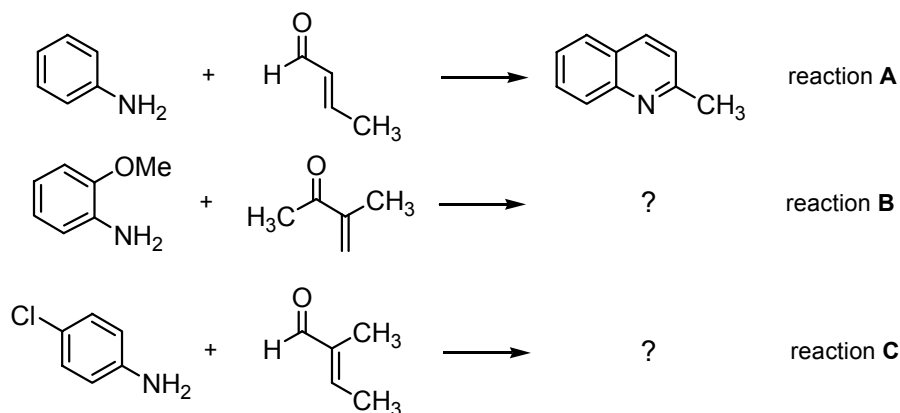


Page 1 This page
Page 2 Exam question from Jan 2007
Pages 3-4 Answer. Try the problems before you look at this page!

4. Answer **all** of the following parts.

- (a) Given that in the Doebner-Miller quinoline synthesis *trans*-but-2-enal and aniline react to give 2-methylquinoline (reaction A), formulate the products from reactions B and C.

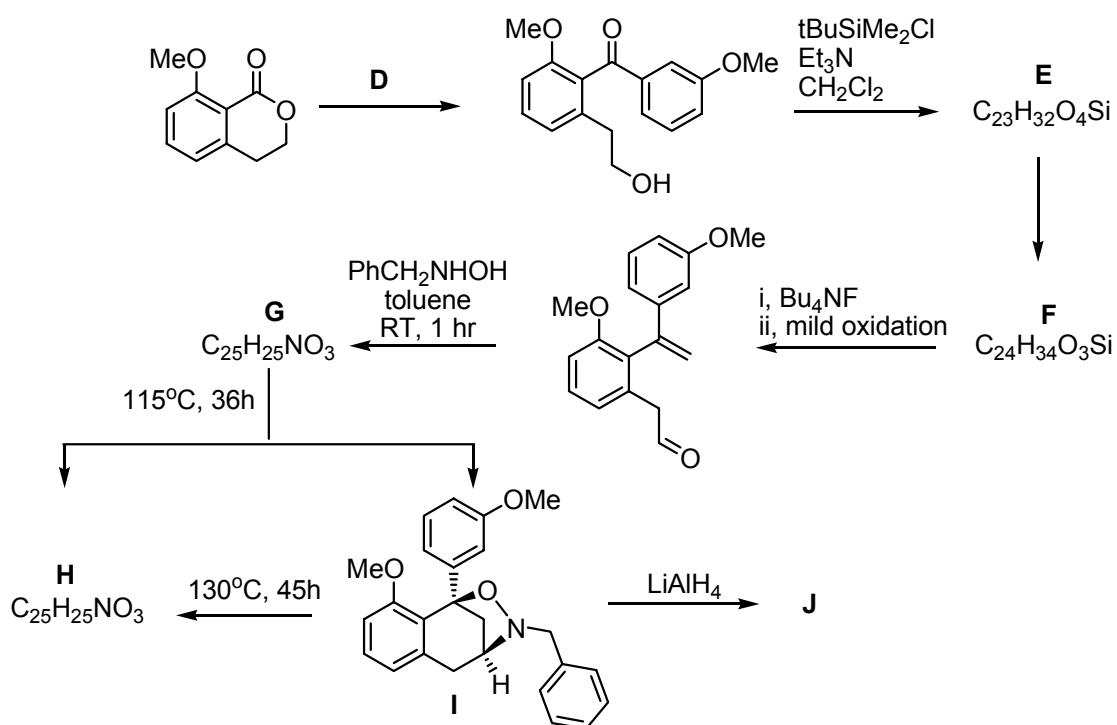


(5 marks)

- (b) Using reaction A as an example outline the mechanism of the Doebner-Miller synthesis. A full mechanism is not required, but key intermediate(s) should be shown.

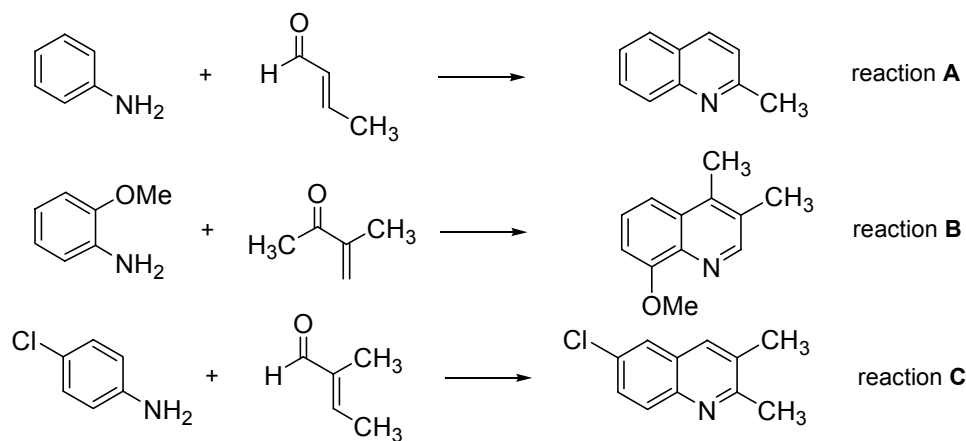
(5 marks)

- (c) Consider the scheme below and work out structures for **D-H** and **J** indicating clearly the relative stereochemistry where appropriate. Suggest a reagent for the transformation of **E** to **F**. Comment on the reasons why two products are formed when **G** is heated at 115 °C, and why **I** can be converted into **H** by heating at higher temperatures.

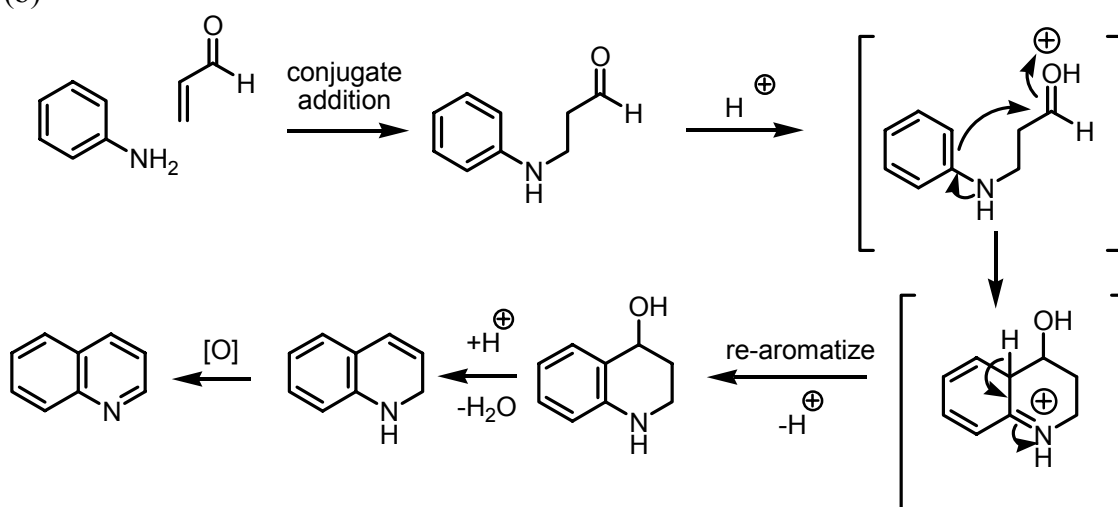


(15 marks)

4 (a)



(b)



(c) **E** may be converted to **F** with the ylid $\text{Ph}_3\text{P}=\text{CH}_2$ (Wittig reaction).

Two isomers of the cycloadduct may be produced. **H** comes from the *anti* nitron of **G**, and **I** from the *syn* nitron of **G**. **I** may convert *via* retro cycloaddition and then re-addition to the thermodynamically more stable adduct **H**.

