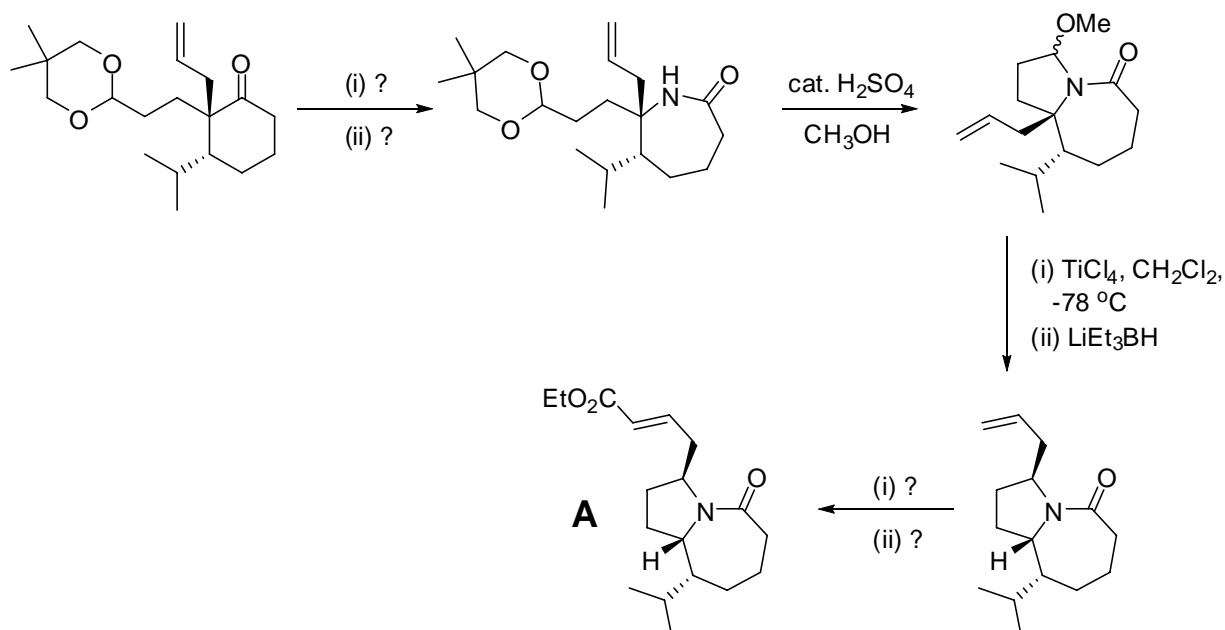


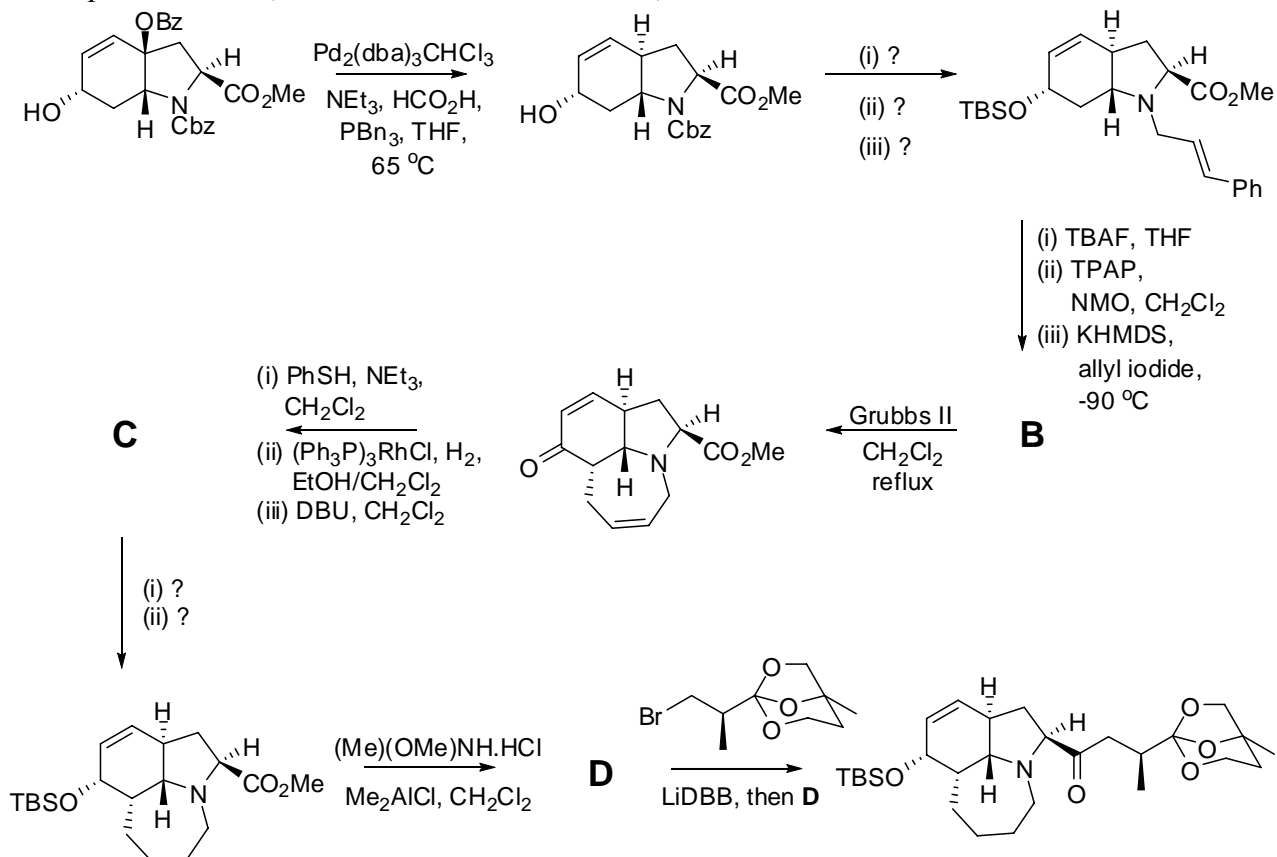
Problems: Synthesis of Stemona Alkaloids

(1) Scheme 1 shows the synthesis of *trans*-pyrrolidine **A**, containing the core ring system common to the Stemona Alkaloids. Please give reagents for the steps marked “?” and mechanisms for all reactions.



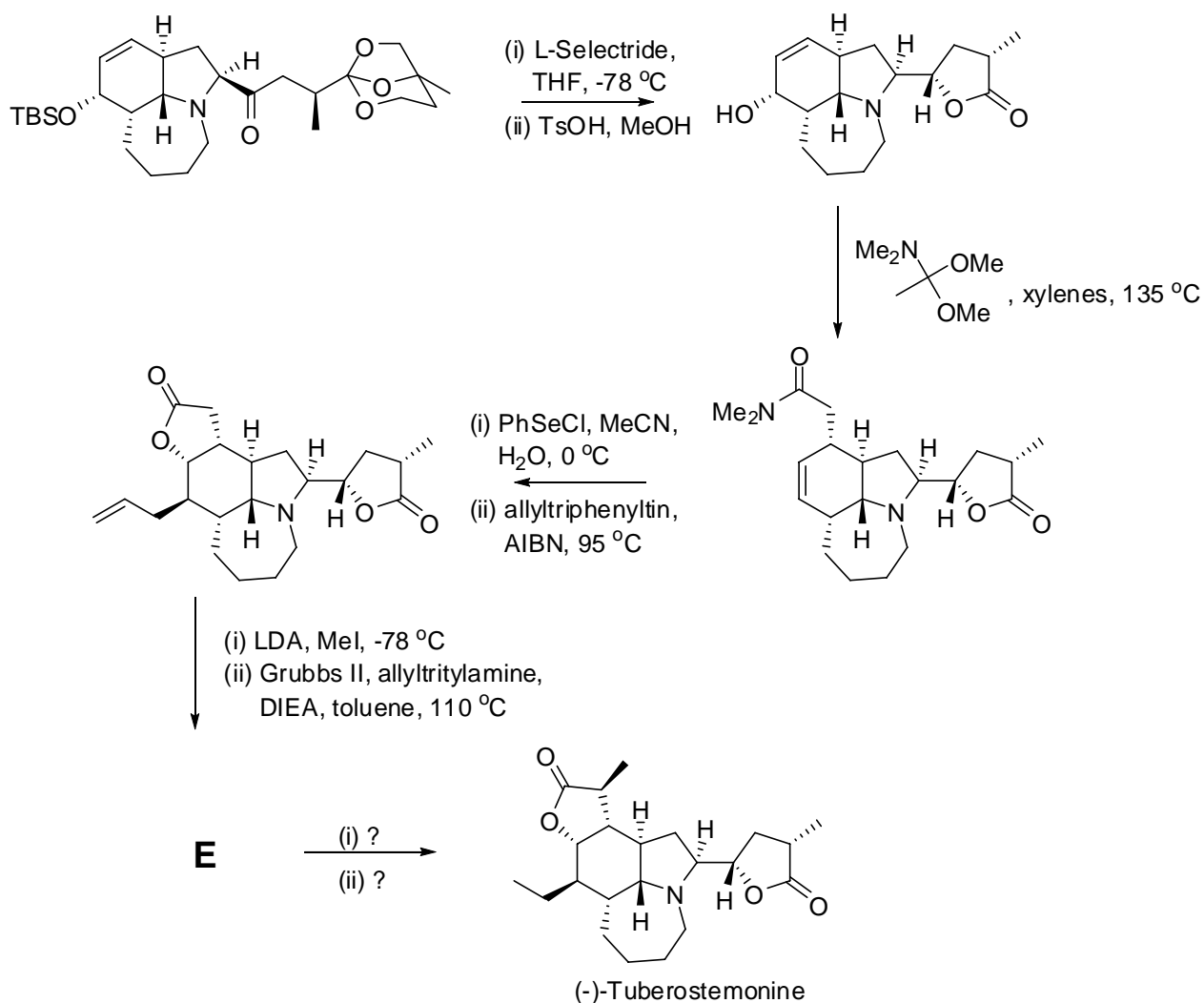
Scheme 1

(2) Scheme 2 shows key steps in the synthesis of (-)-Tuberostemonine. Please give reagents for the steps marked “?”, structures of intermediates **B**, **C** and **D** and mechanisms for all reactions.



Scheme 2

(3) Scheme 3 shows how the synthesis of (-)-Tuberostemonine was completed. Please give reagents for the steps marked “?”, the structure of intermediate **E** and mechanisms for all reactions.



Scheme 3

And just in case the Part II's are a bit rusty on their chemical abbreviations:

Bz =benzoyl, TBS = *tert*-butyldimethylsilyl, TBAF = tetrabutylammonium fluoride, TPAP = tetrapropylammonium perruthenate, LiDBB = ask a Bircher, DIEA = diisopropylethylamine, L-Selectride = lithium tri-*sec*-butylborohydride

