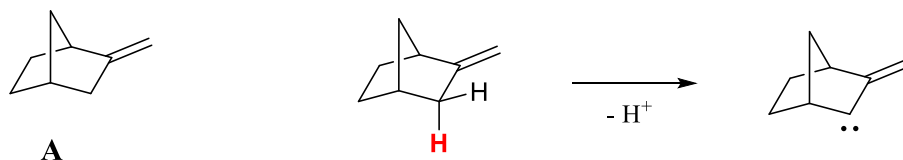


## Self-assessment test with focus on SynCat subjects (3) (solutions)

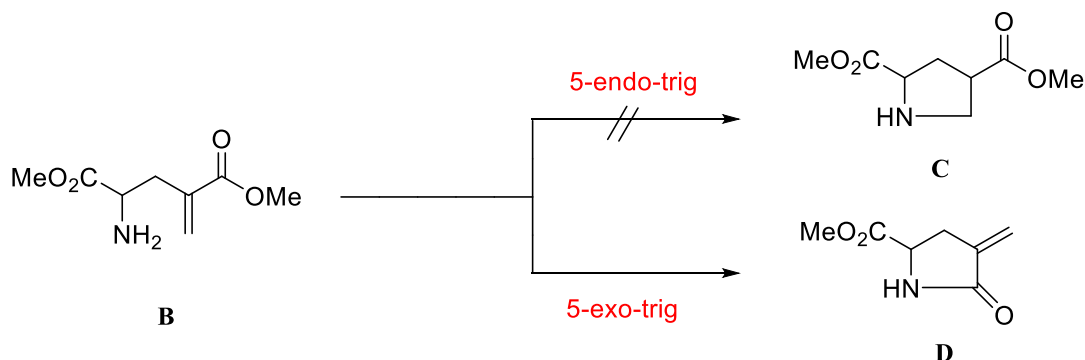
Organic Chemistry (advanced level)

1. Take a look at compound **A**. Clearly identify the most acidic proton and provide an explanation showing the decisive orbital interactions.



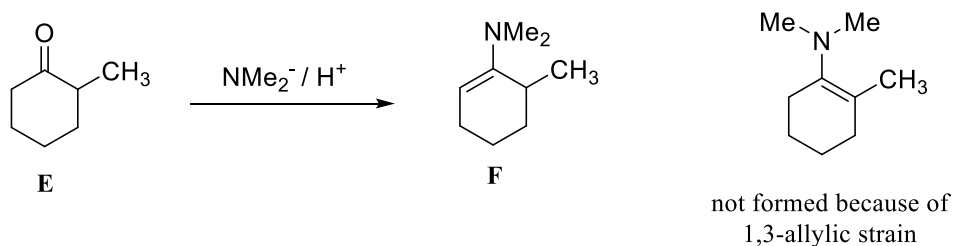
The bond to the axial (red) proton is the weakest because of the most decisive orbital interaction  $\pi_{CC} \rightarrow \sigma^*_{CH}$ . Alternatively, after deprotonation the negative charge in that particular position is stabilized best via  $lp \rightarrow \pi^*_{CC}$ .

2. From a chemical point of view, compound **B** could undergo two different cyclization reactions to give rise to **C** or **D**. In practice, only one product is observed. Provide the structure for **C** and **D** with a brief explanation which one of those two products is formed.

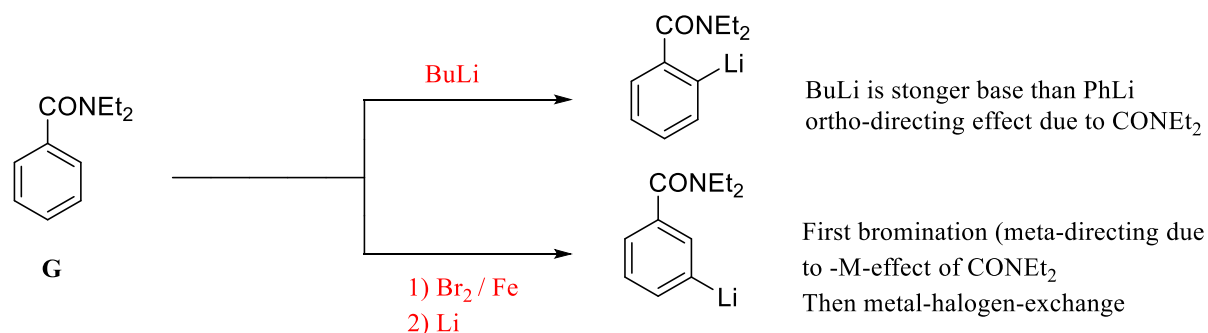


Consider Baldwin's rule. 5-endo-trig cyclizations are geometrically unfavoured while 5-exo-trig is geometrically possible.

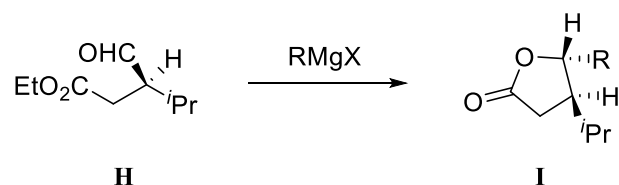
3. Provide the structure of product **F** that is formed in the reaction shown below. Give an explanation for possible stereochemical issues.



4. How would you approach the syntheses of these organolithium compounds starting from **G**? Please provide all necessary reagents and comment on regiochemistry if applicable.



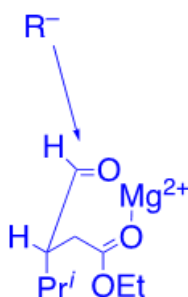
5. Compound **H** adds Grignard reagents with exceptionally high diastereoselectivity to **I**. Specify the reactive conformation of **H** (Sawbuck or Newman projection) and the direction of attack of the nucleophile, including a brief rationale for your choice to form **I**.



Felkin-Anh model:  $L = \text{iPr}$ ,  $M = \text{CH}_2\text{CO}_2\text{Et}$ ,  $S = \text{H}$

Carbonyl group on same side as M, attack of nucleophile from sterically less hindered side

Cram-Chelate model: chelation of aldehyde and ester group by metal:



Both models predict the same outcome for product **I**.