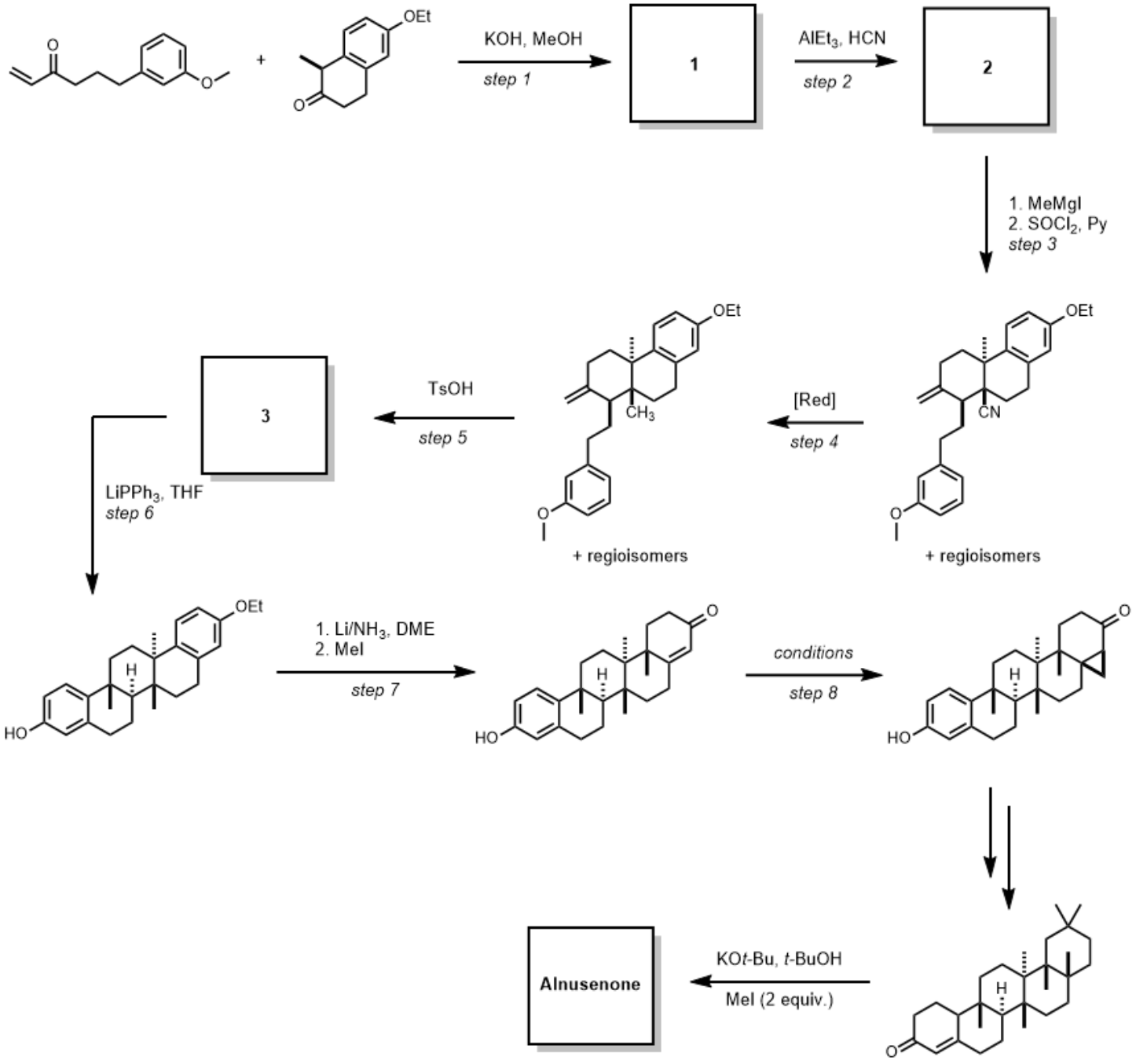
Total synthesis of Alnusenone

1. Suggest structure of compound 1 and draw mechanism of its formation
2. Suggest structure of compound 2
3. Suggest reduction conditions for step 4
4. Suggest the structure of product 3, and draw the mechanism of its formation
5. Explain formation of the product in step 7
6. Suggest conditions for step 8 (may consist of multiple steps)
7. Draw the Alnusenone structure and explain your answer.

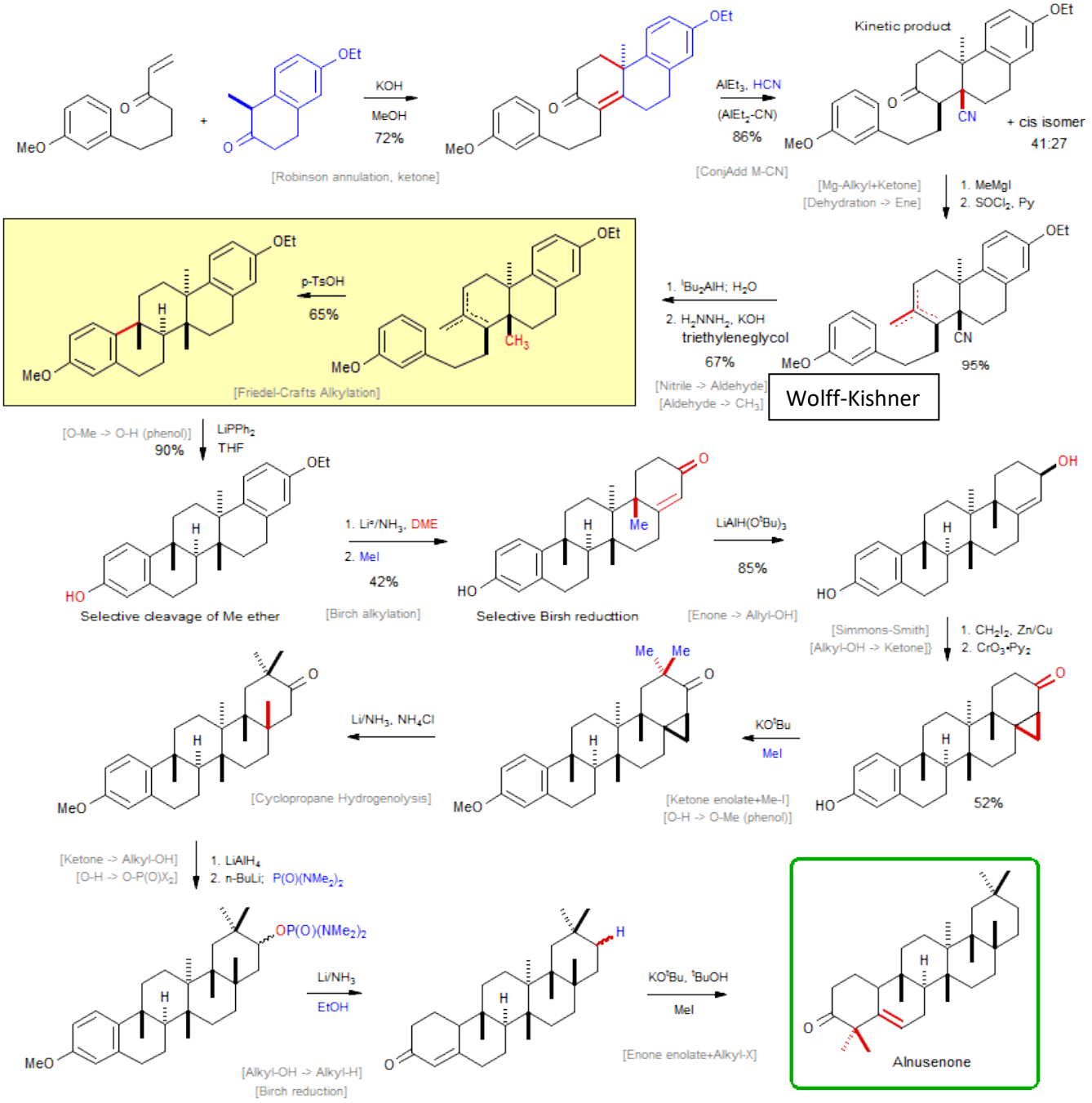


Answer sheet problems Feb 2026

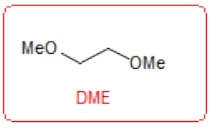
Alnusenone

73-17

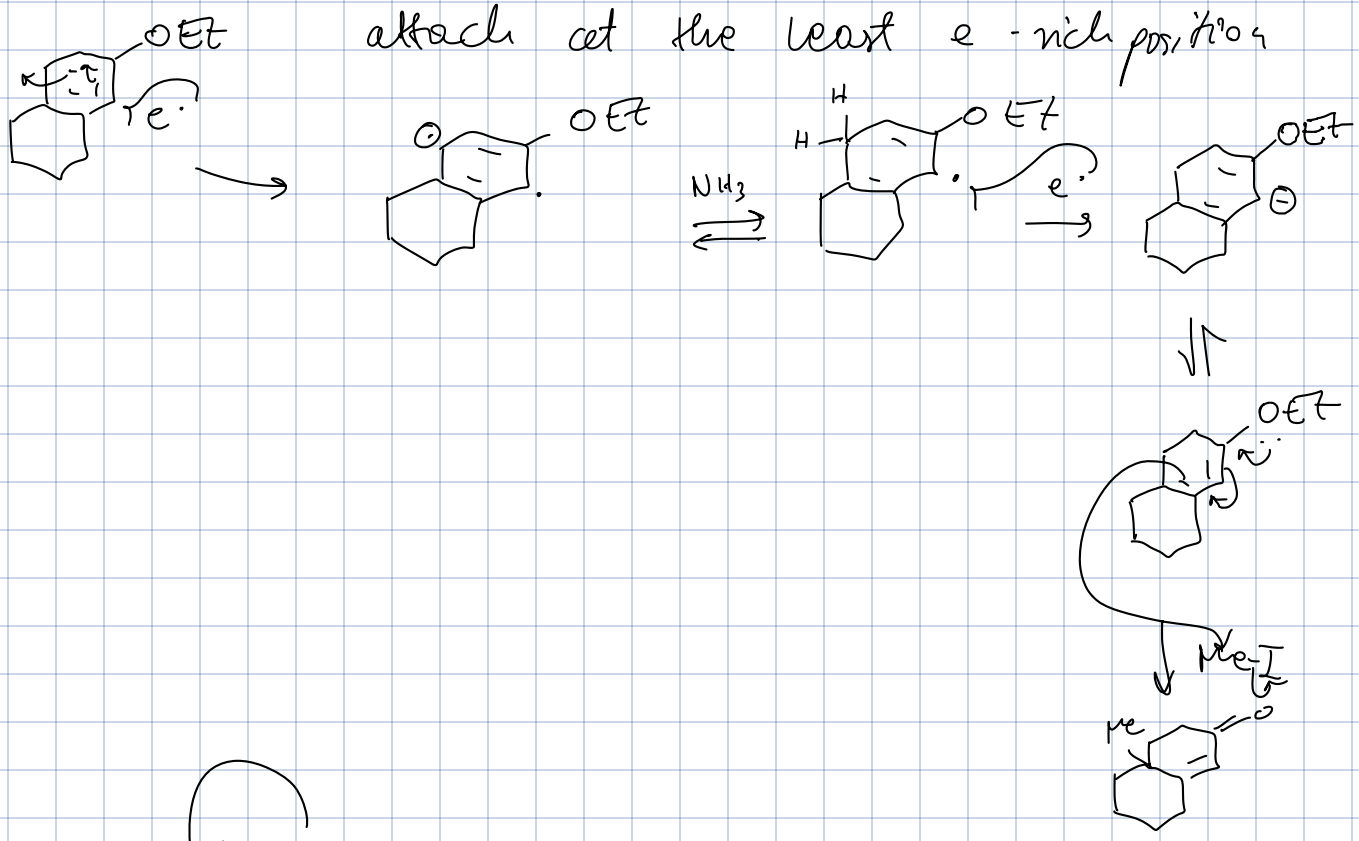
Ireland, R. E.; Dawson, M. I.; Welch, S. C.; Hagenbach, A.; Bordner, J.; Trus, B. *J. Am. Chem. Soc.*, **1973**, *95*, 7829–7841.

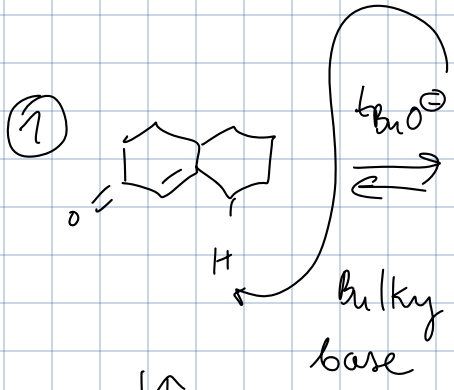


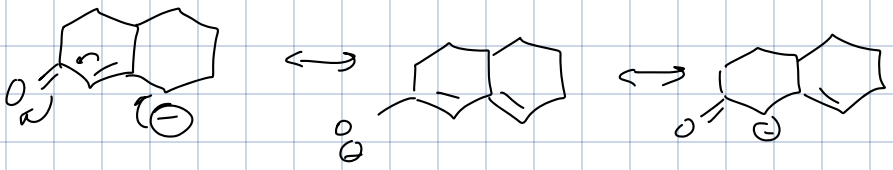
2019-02-21



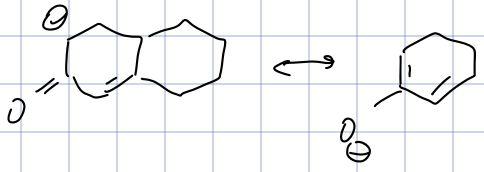
Birch reduction:



① 



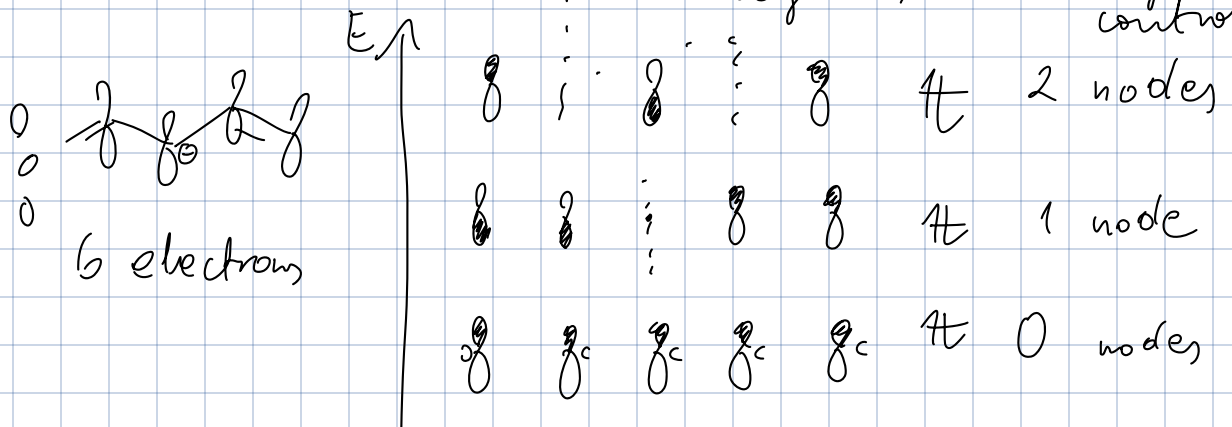
more resonance forms, more stable neg. charge



competes with alkene resonance

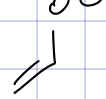
② After -ve charge is formed, MeI addition occurs under thermodynamic control

MO diagram:

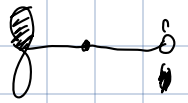


electron pair on the out-of-phase orbital

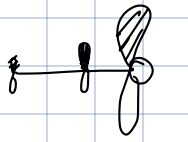
orbitals polarised similarly to enolate case



2 nodes — LUMO

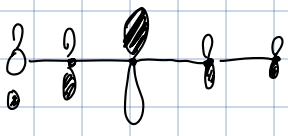


1 node ⇄ HOMO 4 electrons



0 nodes ⇄

When applied to 6-electron system case,



is the HOMO with the largest orbital coeff in the middle, i.e. α to carbonyl.