Synthesis of (±)-Merrilactone A by Desymmetrization Strategy

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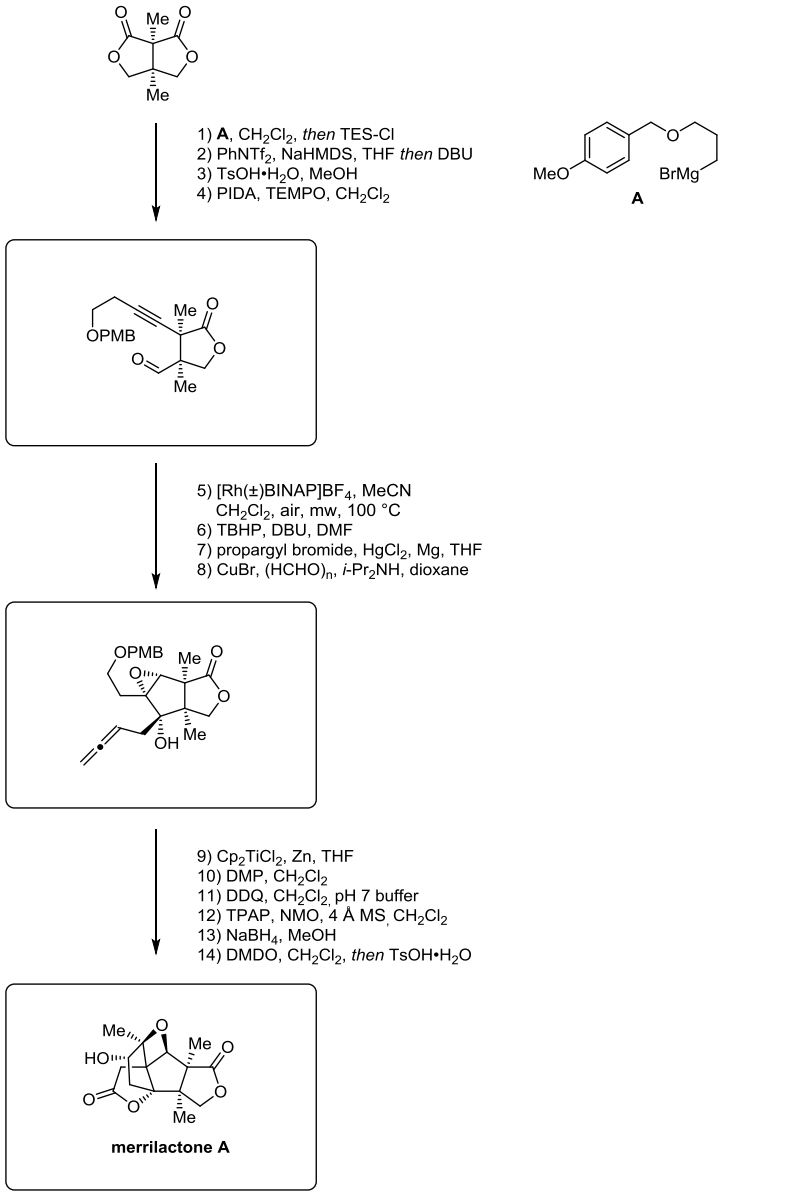
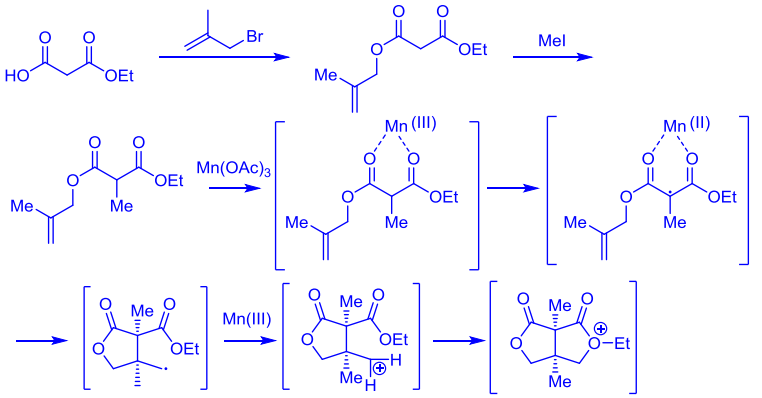
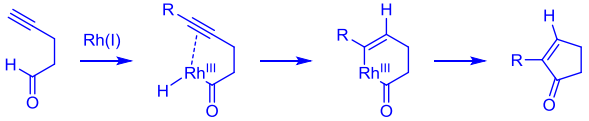


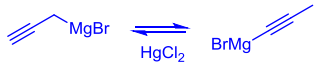
Step 1: How would you prepare the dilactone from commercially available mono-Ethyl malonate?



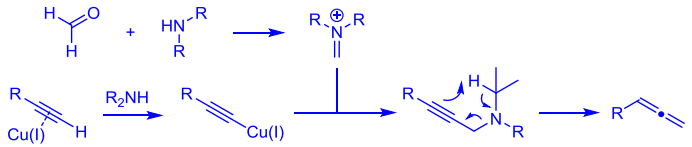
Step 5: Please come up with a Mechanism. What is a major competing side pathway?
-> decarbonylation, which in addition deactivates the catalyst via C=O coordination



Step 7: Why is $HgCl_2$ added?



Step 8: Name reaction? Mechanism?
-> Crabbé Homologation



Step 9: Please come up with a mechanism.