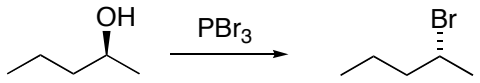
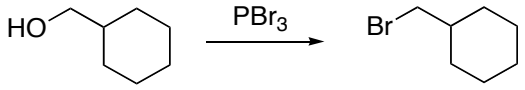
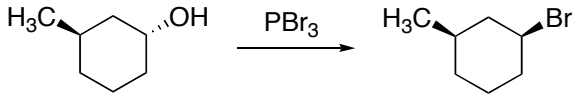
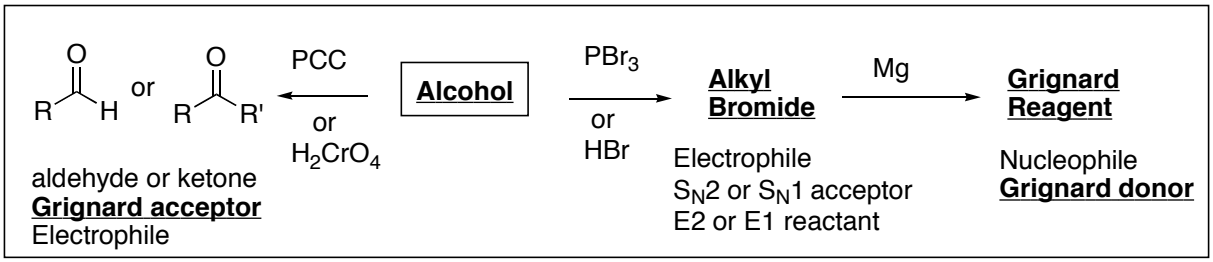
1 

2 

3 

Conversions of Alcohols into Other Reactive Species in Multi-Step Syntheses

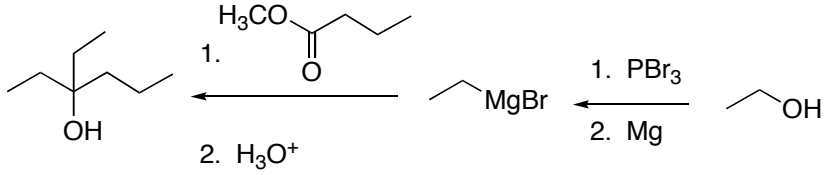


1. oxidation can convert an alcohol into a carbonyl = **Grignard acceptor (electrophile)**
2. PBr_3/Mg or HBr/Mg can convert an alcohol into RMgBr = **Grignard donor (nucleophile)**
3. PBr_3 or HBr can convert an alcohol into RBr, capable of normal substitution and elimination reactions.

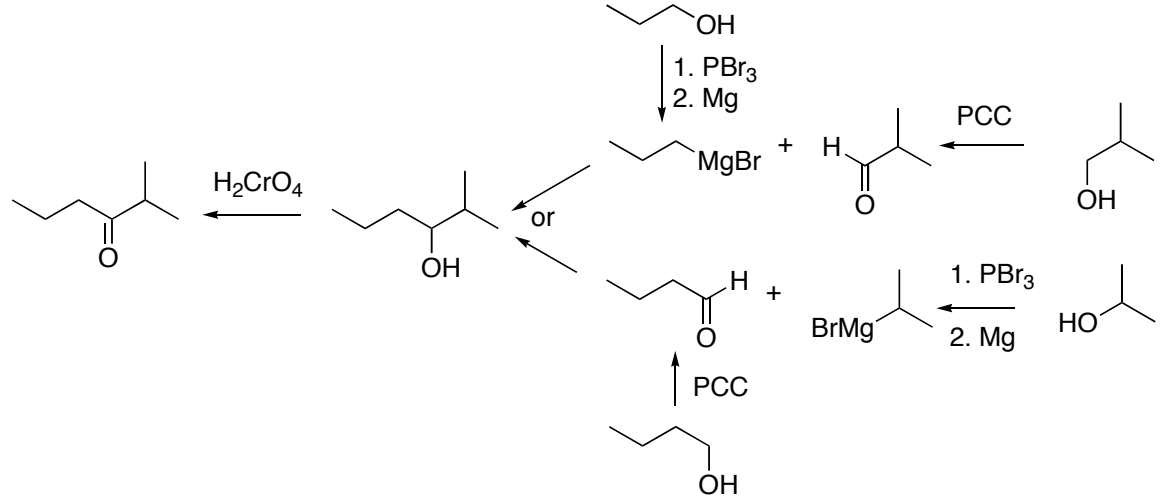
Retrosynthesis Problems (In which you decide what to start from): Design syntheses for the following.

Allowed starting materials include:
Bromobenzene cyclopentanol any acyclic alcohol or alkene with ≤4 carbons
any esters ethylene oxide formaldehyde (CH_2O)
any "inorganic" agents (things that won't contribute carbons to your skeleton)

Tips:
1. Focus on the functionalized carbon(s)
2. Try to figure out which groups of the skeleton began together, and where new C-C bonds will have been formed
3. When "breaking" it up into sub-chunks, try to make the pieces as large as possible (4 carbon max, in this case, for acyclic pieces)
4. Remember which direction is the "true" laboratory direction.
5. Be careful that you aren't adding or substracting carbons by mistake

1 

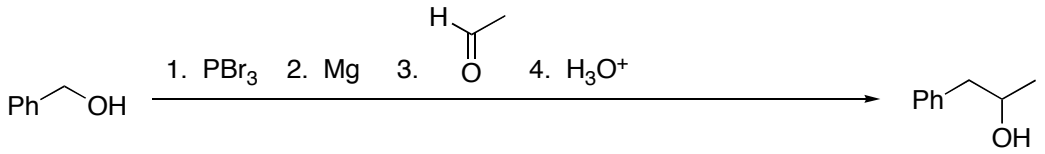
2



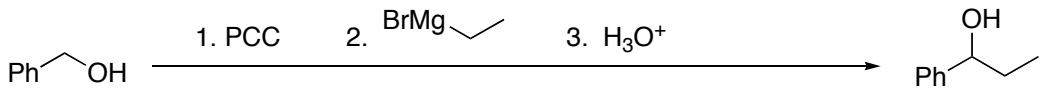
Normal Synthesis Design: In which you are given at least one of the starting Chemicals. Provide Reagents. You may use whatever reagents, including ketones or aldehydes or Grignards or esters, that you need. Tips:

- Identify where the reactant carbons are in the product
- Is the original carbon still oxygenated? → it will probably function as a Grignard acceptor
- Is the original carbon not still oxygenated? → it should probably function as Grignard donor
- Working backwards helps.

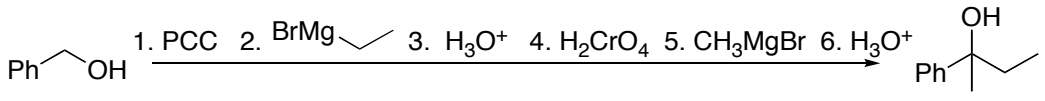
a.



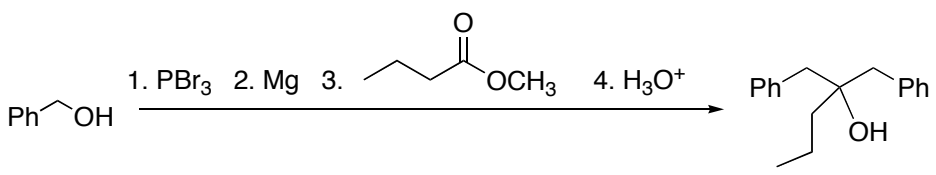
b.

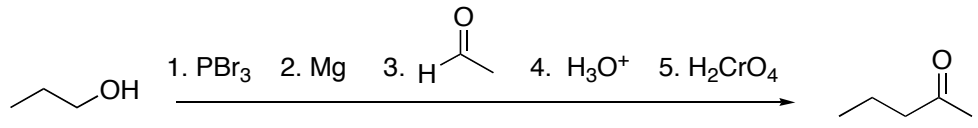


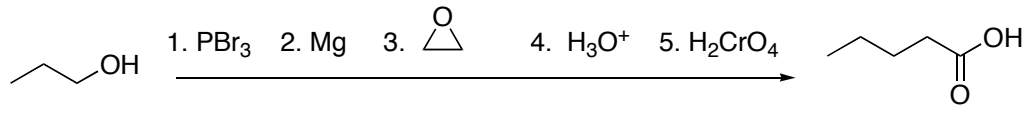
c.



d.



e. 

f. 

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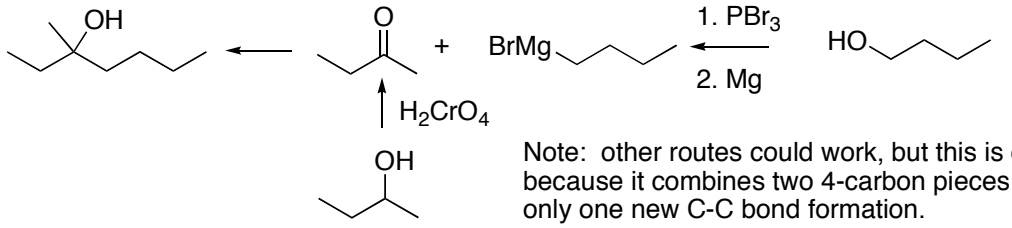
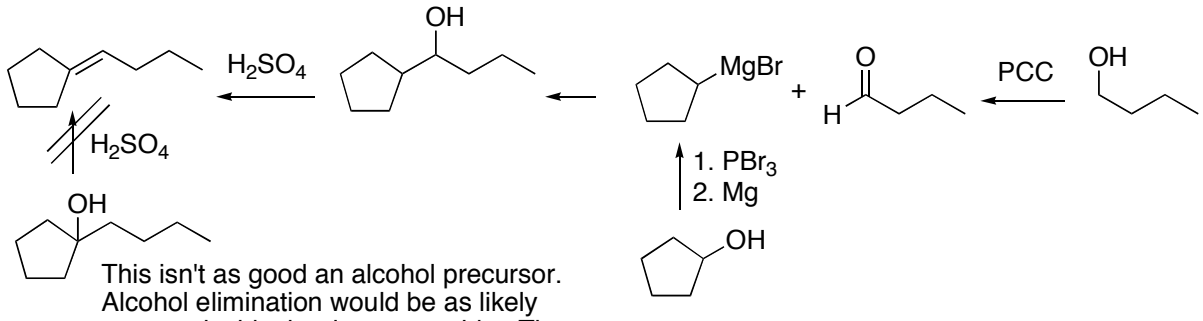
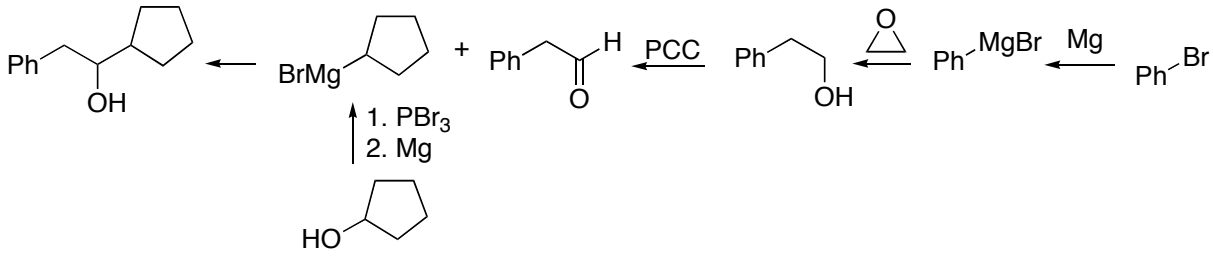
3 

Note: other routes could work, but this is cleanest because it combines two 4-carbon pieces, and requires only one new C-C bond formation.

4 

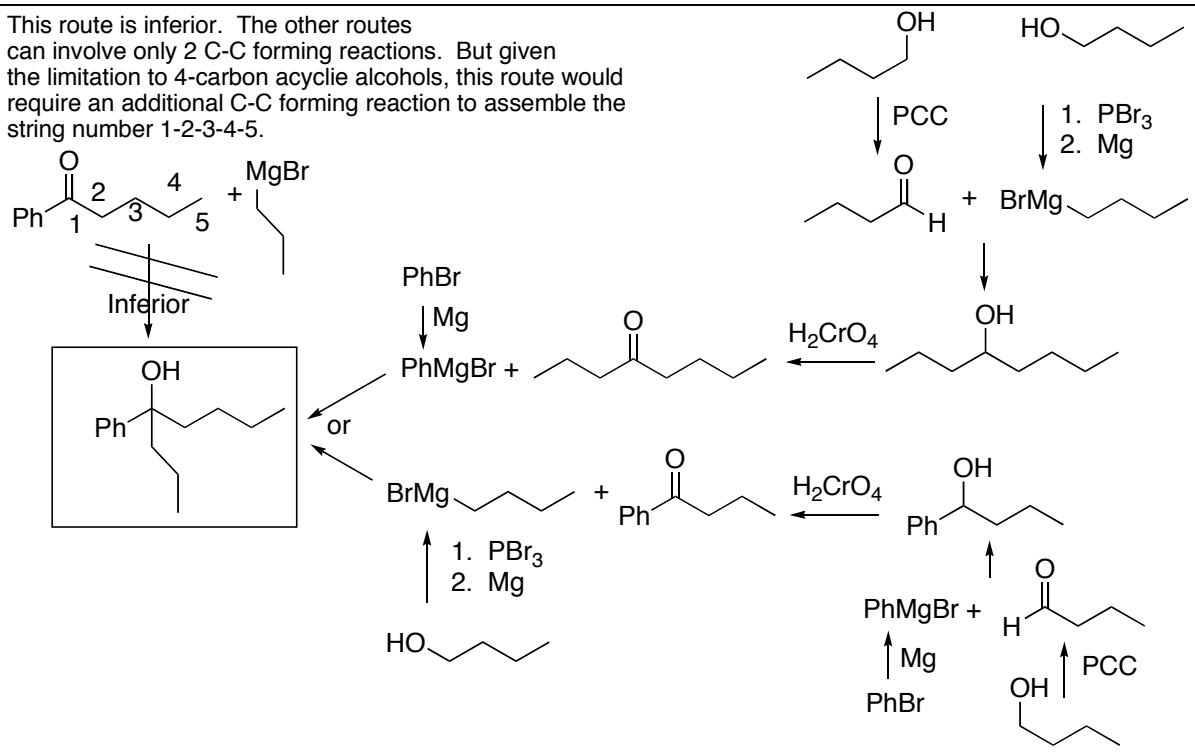
This isn't as good an alcohol precursor. Alcohol elimination would be as likely to occur inside the ring as outside. The better route involves an alcohol who should have a pretty clean Zaytsev elimination.

5



6

This route is inferior. The other routes can involve only 2 C-C forming reactions. But given the limitation to 4-carbon acyclie alcohols, this route would require an additional C-C forming reaction to assemble the string number 1-2-3-4-5.



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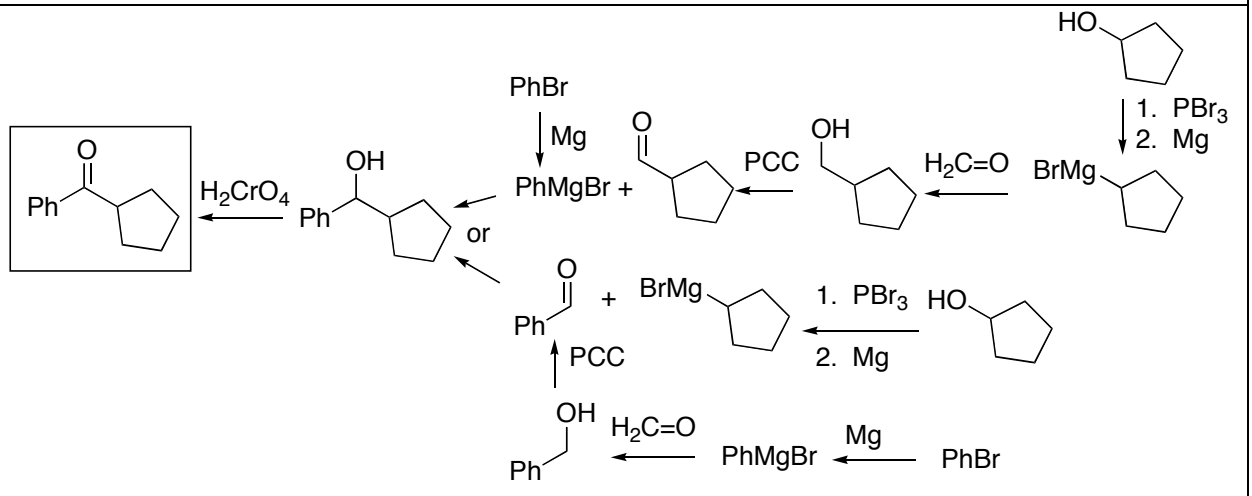

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