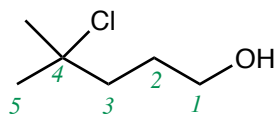


CHM 224
Test 2
Chapters 13,14, organometallics & 20

NAME:

1. Provide the IUPAC name for the following compound:



4-chloro-4-methyl-1-pentanol

2. Phenols are more acidic than saturated alcohols because of the:

- A. the atom effect
- B. the resonance effect**
- C. the inductive effect
- D. the orbital effect

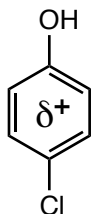
3. Of the following compounds, which one is most acidic and which one is least acidic?



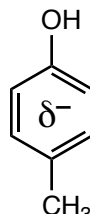
A



B



C



D

most acidic: B

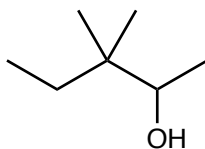
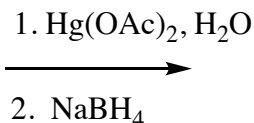
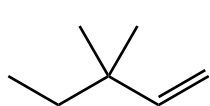
the conjugate base will be very *stabilized* by the large δ^+ charge in the ring

least acidic: A

the conjugate base will be very *destabilized* by the large δ^- charge in the ring

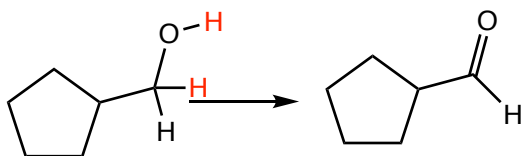
NH₂ = strong electron-donating group
 CN = strong electron-withdrawing group
 Cl = weak electron-withdrawing group
 CH₃ = weak electron-donating group

4. What is the expected product from the following hydration reaction?



• oxymercuration reaction is conditions for Markovnikov hydration of an alkene without any rearrangement possible

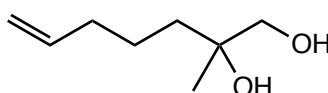
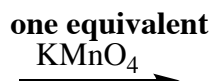
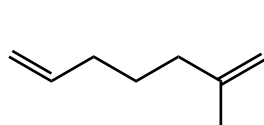
5. Which one of the following is the most suitable reagent to carry out the transformation below?



• this is an oxidation reaction as evidenced by loss of the two red H's to form the final product
 • oxidation of a 1° alcohol leads to an aldehyde product
 • must choose the weaker PCC oxidizing agent to prevent over-oxidation to the carboxylic acid

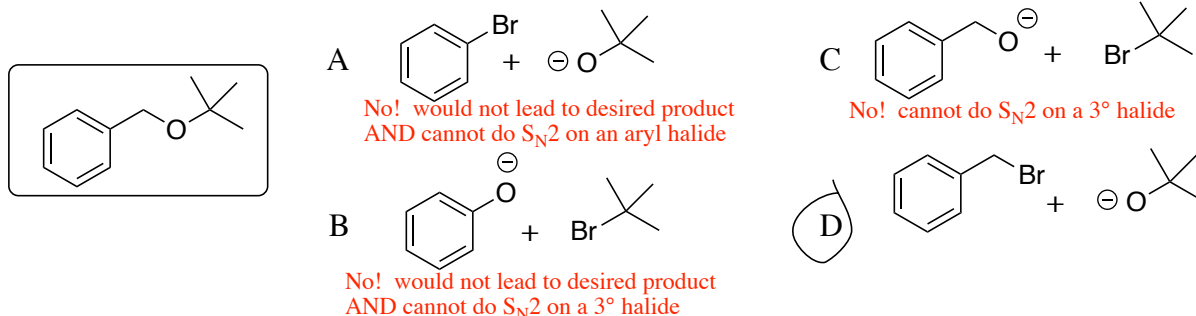
- A. KMnO₄
- B. PCC**
- C. NaH
- D. H₂SO₄, H₂O
- E. mCPBA

8. What would be the major product of the following reaction?



• reaction of KMnO₄ with an alkene leads to formation of a diol product
 • this is an electrophilic reaction so the disubstituted double bond reacts faster than the monosubstituted double bond

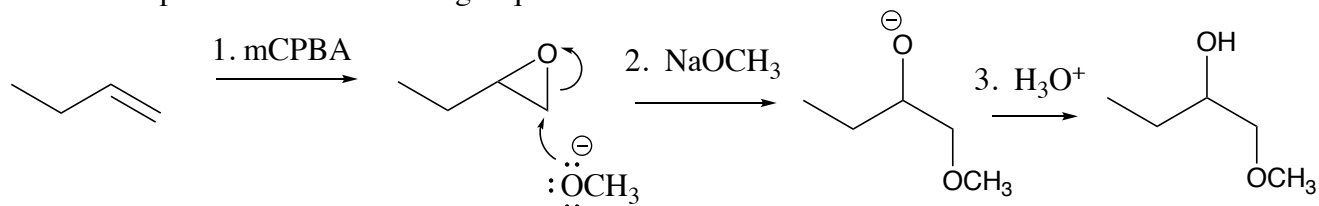
7. Which of the following combinations would be suitable to form the ether below via the Williamson ether synthesis (may be more than one answer)?



8. Which of the following are characteristics of ethers (may be more than one answer)?

- A. can form explosive peroxides with H₂O
- B. highly flammable
- C. reactive with strong acids
- D. reactive with strong bases

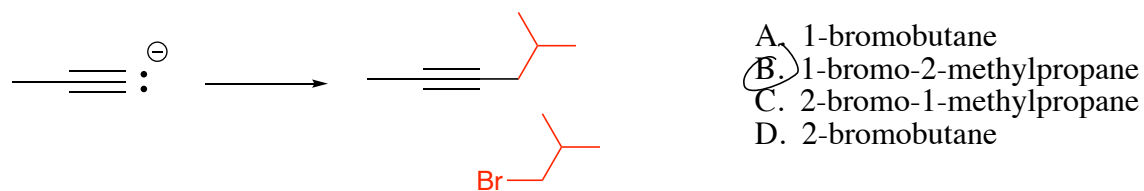
9. Predict the product of the following sequence of reactions:



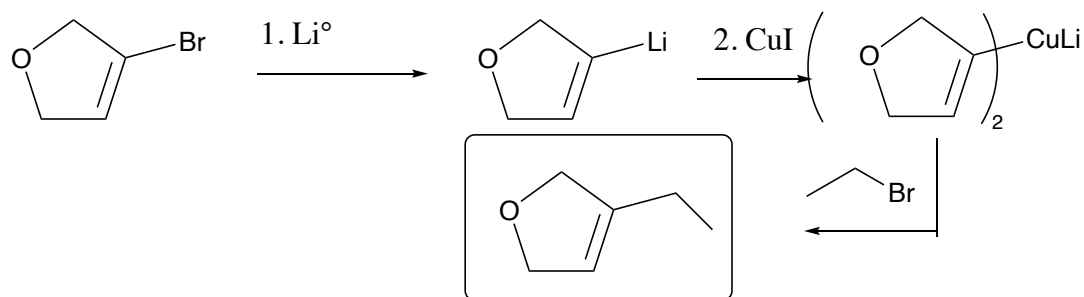
10. Which one of the following compounds was first used as an anesthetic?

- A. propofol
- B. propanol
- C. diethyl ether
- D. MTBE
- E. chloroform

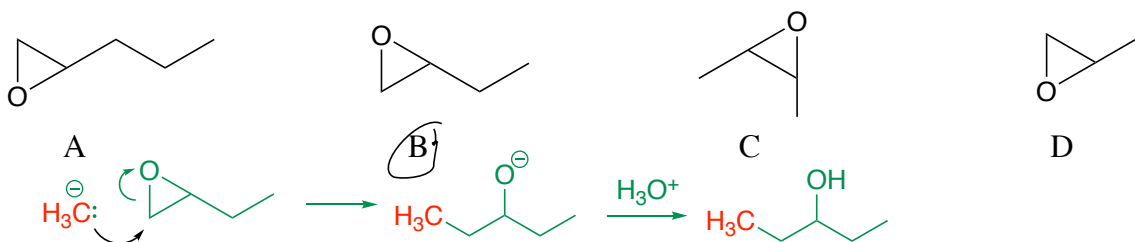
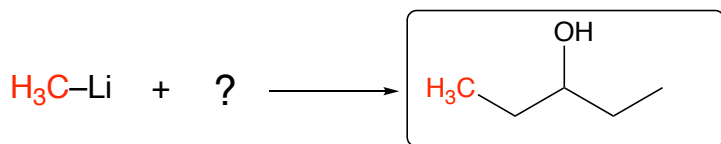
11. Which compound should be added to the nucleophile below to form the desired compound?



12. Predict the product of the following reaction:



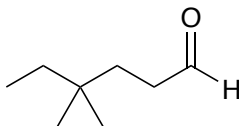
13. Which epoxide, when added to methyllithium, will provide the desired product after neutralization?



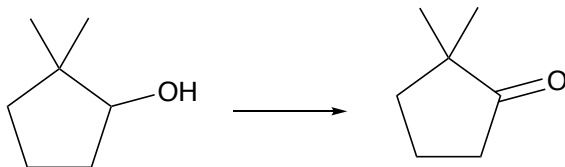
14. Alkylolithiums and Grignard reagents will not participate in $\text{S}_{\text{N}}2$ reactions with alkyl halides other than methyl substrates because:

- A. alkyl halides are unreactive with nucleophiles
- B. alkylolithiums and Grignard reagents are not strong enough nucleophiles
- C. E_2 elimination reactions tend to predominate over $\text{S}_{\text{N}}2$ reactions
- D. alkylolithiums and Grignards only react with epoxides

15. Draw the structure of 4,4-dimethylhexanal

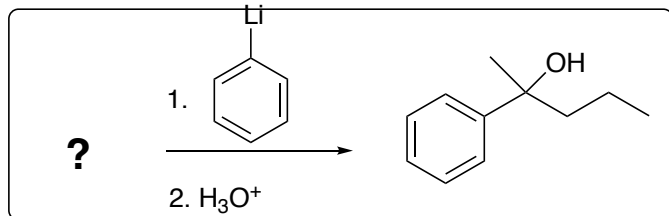


16. Which of the reagents is suitable for the following reaction (may be more than one):

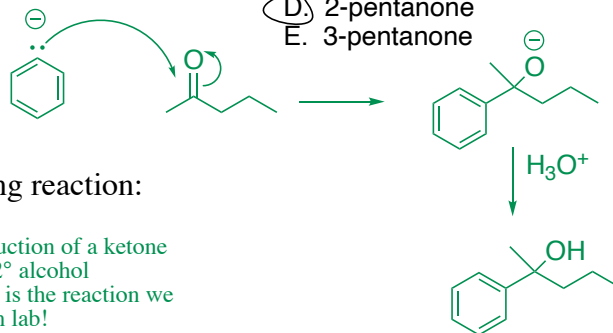


- A. Zn(Hg), HCl
- B. H_2, Pt
- C. KMnO_4
- D. $\text{N}_2\text{H}_4, \text{KOH, heat}$
- E. $\text{K}_2\text{Cr}_2\text{O}_7, \text{H}_2\text{SO}_4, \text{H}_2\text{O}$

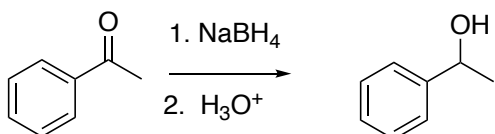
17. Which one of the following is the structure of the starting material for the reaction below?



- A. butanal
- B. 2-butanone
- C. pentanal
- D. 2-pentanone
- E. 3-pentanone

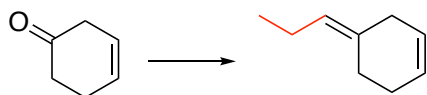


18. Provide the structure for the product of the following reaction:



- reduction of a ketone to a 2° alcohol
- this is the reaction we did in lab!

19. Which one of the following reagents is required to complete the reaction shown?



- this is conversion of a C=O bond to a C=C bond
- need a Wittig reagent to accomplish this

- A. $\text{CH}_3\text{CH}_2\text{Li}$
 B. i. $\text{Hg}(\text{OAc})_2, \text{H}_2\text{O}$ ii. NaBH_4
 C. $\text{CH}_3\text{CH}_2\text{CH}_2\text{Li}$
 D. $(\text{Ph})_3\text{P}=\text{CHCH}_2\text{CH}_3$
 E. $\text{CH}_3\text{CH}_2\text{NH}_2$

20. Predict the final product from the following sequence of reactions:

