

ACS Review Organometallic Compounds

Student: _____

1. Which one of the following would not be a suitable solvent for Grignard reagents?

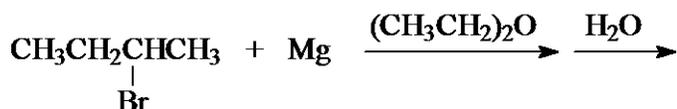
A. $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$, diethyl ether

B. $\text{CH}_3\text{CH}_2\text{OH}$, ethanol

C.  tetrahydrofuran (THF)

D. they would all be suitable solvents

2. What are the products of the following sequence of reactions?



A. 2-butanol and $\text{Mg}(\text{OH})\text{Br}$

B. 2-butanol and MgHBr

C. butane and $\text{Mg}(\text{OH})\text{Br}$

D. butane and MgHBr

3. Which of the following has the largest acid dissociation constant, K_a ?

A. CH_3CH_3

B. $\text{H}_2\text{C}=\text{CH}_2$

C. $\text{HC}\equiv\text{CH}$

D. $\text{CH}_3\text{CH}_2\text{OH}$

4. Arrange the following in order of decreasing basicity (most basic first).

I. $\text{CH}_3\text{CH}_2\text{MgBr}$

II. $\text{HC}\equiv\text{CMgBr}$

III. $\text{CH}_3\text{CH}_2\text{OMgBr}$

A. $\text{I} > \text{II} > \text{III}$

B. $\text{I} > \text{III} > \text{II}$

C. $\text{III} > \text{II} > \text{I}$

D. $\text{II} > \text{I} > \text{III}$

5. Select the strongest base in the following.

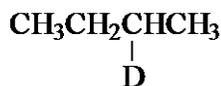
A. NaNH_2

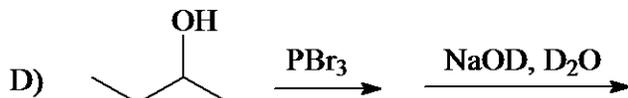
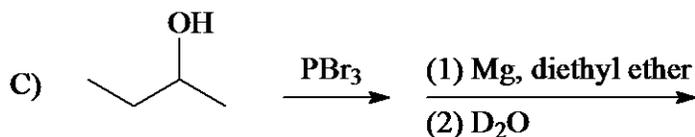
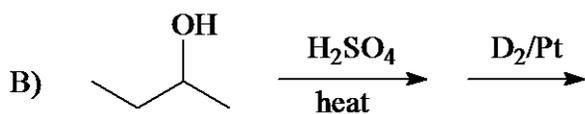
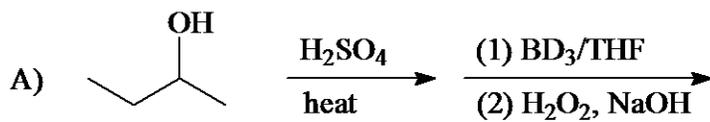
B. CH_3Li

C. $\text{NaOCH}_2\text{CH}_3$

D. $\text{HC}\equiv\text{CNa}$

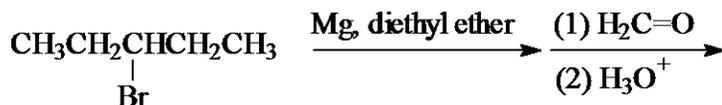
6. Which of the following reaction sequences would convert 2-butanol into the deuterated compound below?





- A. A
B. B
C. C
D. D

7. What is the major product of the following reaction?



- A. 2-ethyl-1-pentanol
B. 2-ethyl-1-butanol
C. 3-pentanol
D. 3-methyl-1-pentanol

8. The reaction of phenylmagnesium bromide ($\text{C}_6\text{H}_5\text{MgBr}$) with propanal ($\text{CH}_3\text{CH}_2\text{CH=O}$), followed by hydrolysis yields:

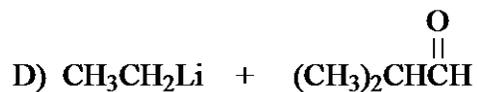
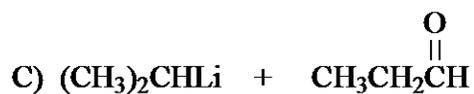
- A. 2-phenyl-1-propanol
B. 1-phenyl-1-propanol
C. 2-phenyl-2-propanol
D. 3-phenyl-1-propanol

9. The reaction of excess Grignard reagent with an ester of formic acid, HCO_2R , gives:

- A. a primary alcohol
B. a secondary alcohol
C. a tertiary alcohol
D. methanol

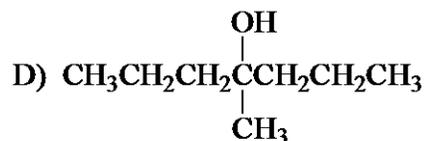
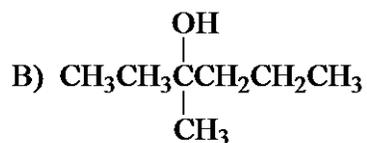
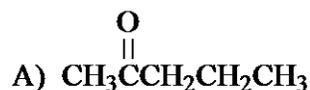
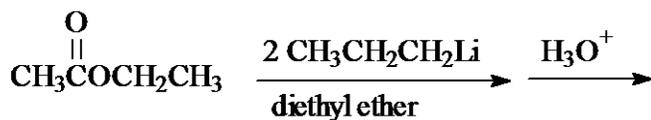
10. Which of the following pairs of reagents would you use to prepare 4-methyl-2-pentanol?





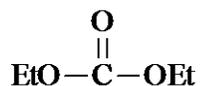
- A. A
B. B
C. C
D. D

11. What is the product of the following reactions?



- A. A
B. B
C. C
D. D

12. Reaction of excess Grignard reagent with diethyl carbonate, shown below, gives a(n):



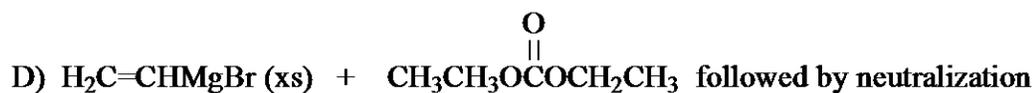
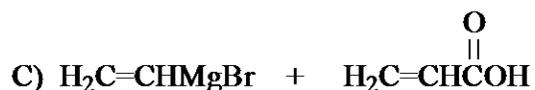
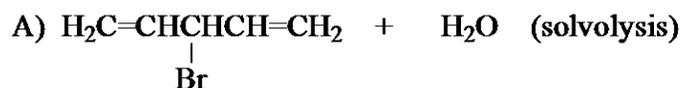
- A. ketone
B. tertiary alcohol
C. secondary alcohol
D. ester

13. The reaction of 4-methylcyclohexanone with CH_3MgBr followed by neutralization gives two alcohols.

These two alcohols are:

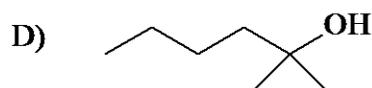
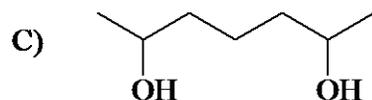
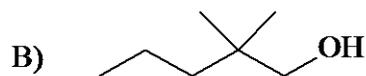
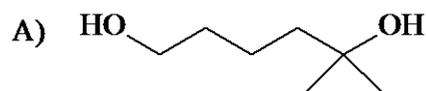
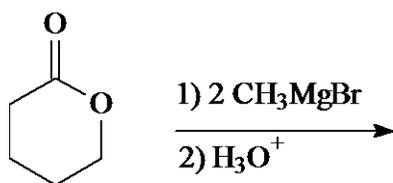
- A. constitutional isomers
- B. enantiomers formed in equal amounts
- C. enantiomers formed in unequal amounts
- D. diastereomers

14. Which of the reaction schemes below gives 1,4-pentadien-3-ol, $\text{H}_2\text{C}=\text{CHCH}(\text{OH})\text{CH}=\text{CH}_2$ as the major organic product and with minimal by-product formation?



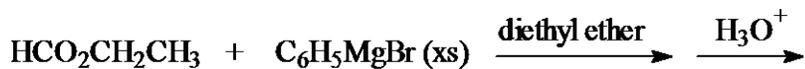
- A. A
- B. B
- C. C
- D. D

15. What is the product of the following reaction?



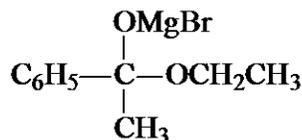
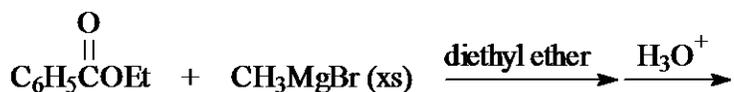
- A. A
- B. B
- C. C
- D. D

16. Which of the following is the product of the reaction below?

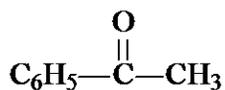


- A. $(\text{C}_6\text{H}_5)_3\text{COH}$
- B. $(\text{C}_6\text{H}_5)_2\text{CHOH}$
- C. $\text{C}_6\text{H}_5\text{CH}_2\text{OH}$
- D. $(\text{C}_6\text{H}_5)_3\text{CH}$

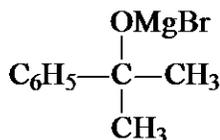
17. Which of the following are intermediates in the reaction of excess methylmagnesium bromide with ethyl benzoate (shown below) to make 2-phenyl-2-propanol?



I



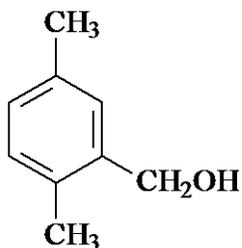
II

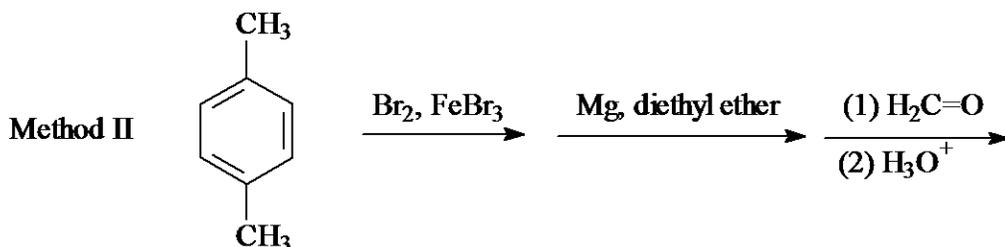
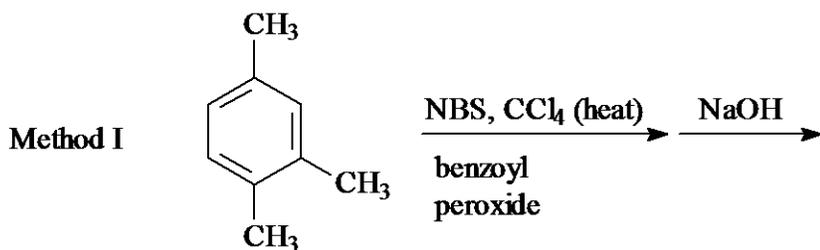


III

- A. I and II
- B. I and III
- C. II and III
- D. I, II, and III (they are all intermediates)

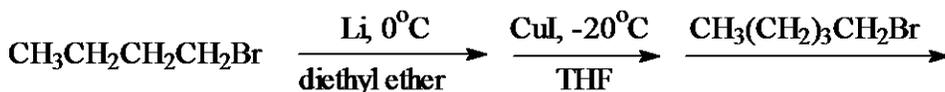
18. Consider the two syntheses of the compound shown below. Which method would work best with minimal by-products?





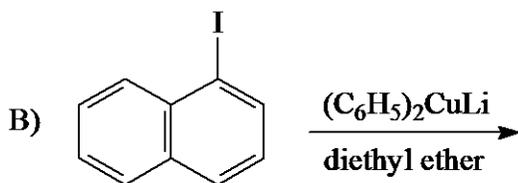
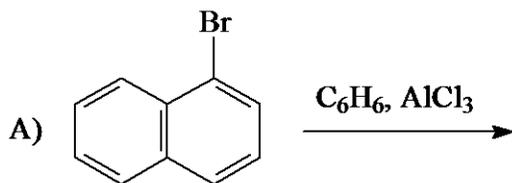
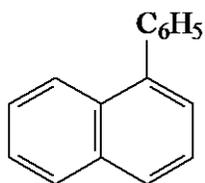
- A. Method I
- B. Method II
- C. Both methods would work
- D. Neither method would work

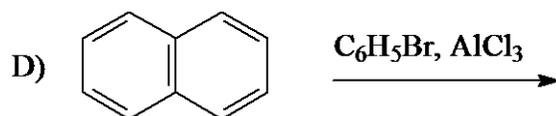
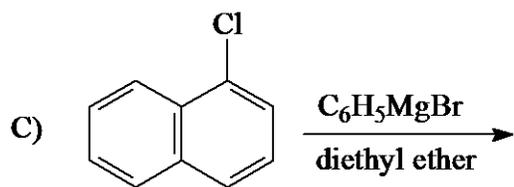
19. What is the product of the reaction shown below?



- A. 4-nonene
- B. nonane
- C. 4-bromononane
- D. 5-bromononane

20. 1-Phenylnaphthalene, shown below, can be prepared in over 80% yield by one of the reactions below. Which one?





- A. A
B. B
C. C
D. D

21. The product of the following reaction is:

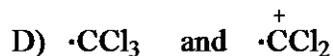
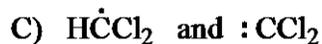
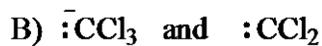
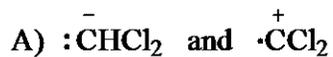
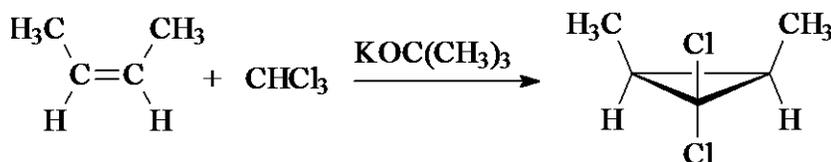


- A. 1,1-dichloro-2,2-dimethylcyclopropane
B. 1,1-dimethylcyclopropane
C. 1,1,1-trichloro-3-methylbutane
D. 2,2-dichloro-3-methylbutane

22. The reaction of *cis*-2-butene with CH_2I_2 and $\text{Zn}(\text{Cu})$ to give *cis*-1,2-dimethylcyclopropane is a(n):

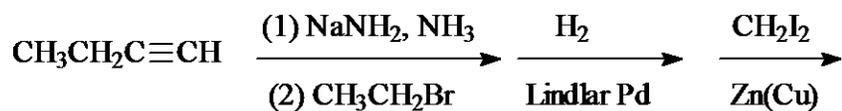
- A. enantiospecific reaction
B. diastereoselective reaction
C. stereospecific reaction
D. regioselective reaction

23. Which of the following are intermediates in the reaction below?



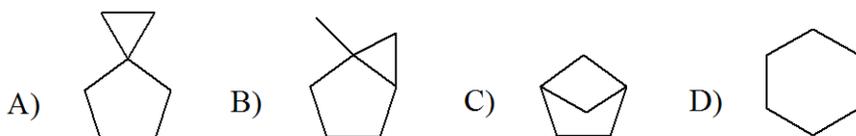
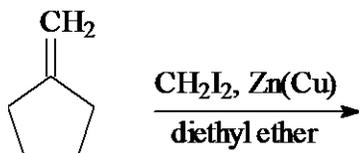
- A. A
B. B
C. C
D. D

24. What is the product of the following sequence of reactions?



- A. 1,1-diethylcyclopropane
- B. *trans*-1,2-diethylcyclopropane
- C. *cis*-1,2-diethylcyclopropane
- D. *cis* and *trans*-1,1-diiodo-2,3-diethylcyclopropane

25. What is the product of the following reaction?

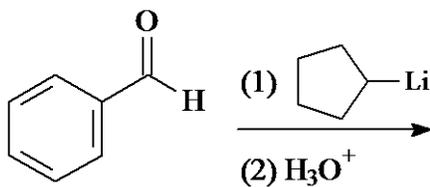


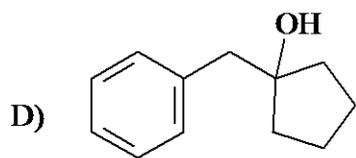
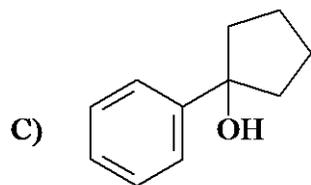
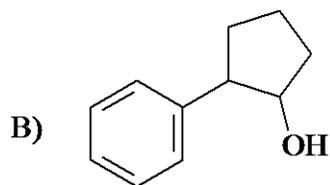
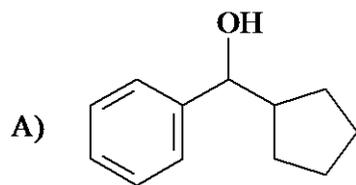
- A. A
- B. B
- C. C
- D. D

26. A Ziegler-Natta catalyst, such as TiCl₄/Al(CH₂CH₃)₃, is used for the preparation of:

- A. polyethylene
- B. cyclopropanes
- C. alcohols
- D. carbenes or carbenoids

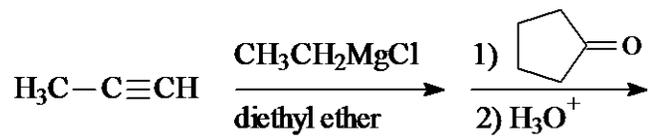
27. What is the product of the following reaction?

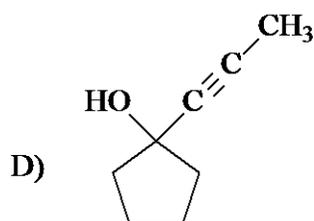
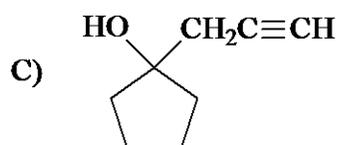
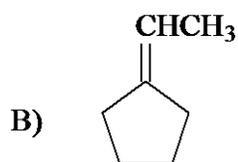
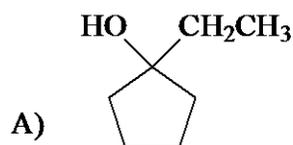




- A. A
 B. B
 C. C
 D. D

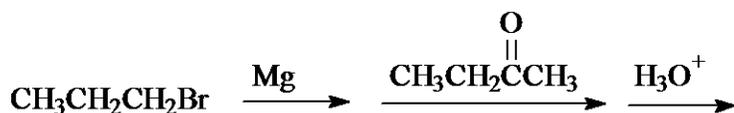
28. Which of the following is the major organic product in the reaction sequence below?





- A. A
B. B
C. C
D. D

29. What is the product of the following reaction sequence?



- A. 2-heptanol
B. 2-methyl-3-hexanol
C. 3-methyl-3-hexanol
D. 3-ethyl-2-pentanol

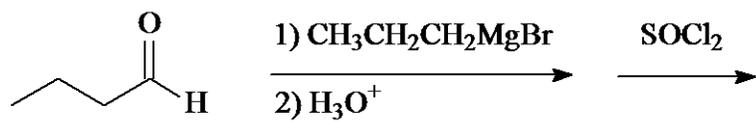
30. The reaction of a Grignard reagent with a ketone followed by dilute acid gives a(n):

- A. primary alcohol
B. secondary alcohol
C. tertiary alcohol
D. ester

31. The reaction of a Grignard reagent with an aldehyde followed by dilute acid gives a(n):

- A. primary alcohol
B. secondary alcohol
C. tertiary alcohol
D. ester

32. What is the product of the following reaction sequence?



- A. 3-chloro-4-heptanol
- B. 3-heptene
- C. 3-chloroheptane
- D. 4-chloroheptane

ACS Review Organometallic Compounds KEY

1. B
2. C
3. D
4. A
5. B
6. C
7. B
8. B
9. B
10. A
11. D
12. B
13. D
14. B
15. A
16. B
17. D
18. B
19. B
20. B
21. A
22. C
23. B
24. C
25. A
26. A
27. A
28. D
29. C
30. C
31. B
32. D