CHM 1321-C **Final Exam** **April 20– 2012**
(prof. S. Gambarotta)

Your Name: _____ **Student #: _____**

Exercise	key	Exercise	key
1		25	
2		26	
3		27	
4		28	
5		29	
6		30	
7		31	
8		32	
9		33	
10		34	
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16		40	
17		41	Page retro
18		42	Page retro
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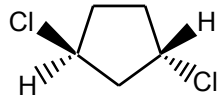
24			

1. You can keep the text. The solution key will be posted today on the web.
2. You must respond to 42 exercises. 42 right answers will count for 100%.

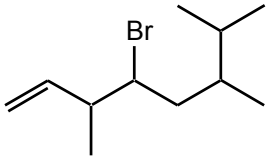
Draw the answer to question 41 and 42 on the back of this page.

1. Select the systematic name for



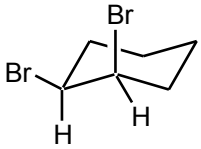
A) cis-1,3-Dichlorocyclopentane
B) trans-1,4-Dichlorocyclopentane
C) cis-1,2-Dichlorocyclopentane
D) trans-1,3-Dichlorocyclopentane
E) 1,1-Dichlorocyclopentane
Ans: D

2. A correct IUPAC name for the following compound is:

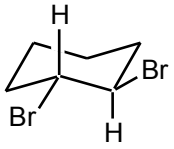


A) 3,6,7-trimethyl-4-bromo-1-octene
B) 4-bromo-3-methyl-6-isopropyl-1-heptene
C) 4-bromo-3,6,7-trimethyl-1-octene
D) 4-bromo-6-isopropyl-3-methyl-1-heptene
E) 4-bromo-6-isopropyl-3,6-dimethyl-1-hexene
Ans: C

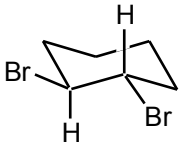
3. trans-1,2-Dibromocyclohexane is represented by



I



II



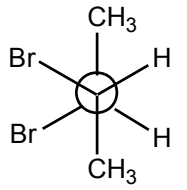
III

.

A) I
B) II
C) III
D) II and III
E) I and II
Ans: D

4. The preferred conformation of cis-3-tert-butyl-1-methylcyclohexane is the one in which:
A) the tert-butyl group is axial and the methyl group is equatorial.
B) the methyl group is axial and the tert-butyl group is equatorial.
C) both groups are axial.
D) both groups are equatorial.
E) the molecule exists in a boat conformation.
Ans: D

5. The most stable conformation of 2,3-dibromobutane, viewed through the C-2—C-3 bond :



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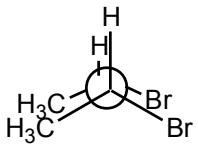

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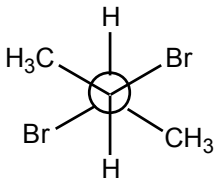
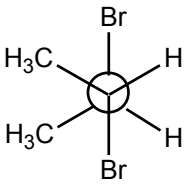


III



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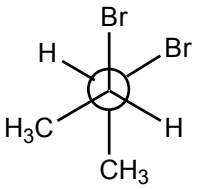
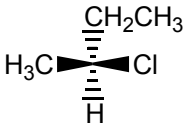


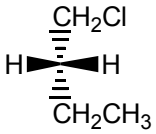
V

A) I
B) II
C) III
D) IV
E) V
Ans: C

6. I and II are:



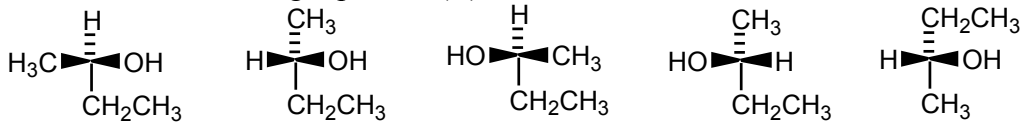
I



II

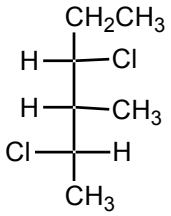
A) constitutional isomers.
B) enantiomers.
C) non-superposable mirror images.
D) diastereomers.
E) not isomeric.
Ans: A

7. Which of the following represent (R)-2-butanol?



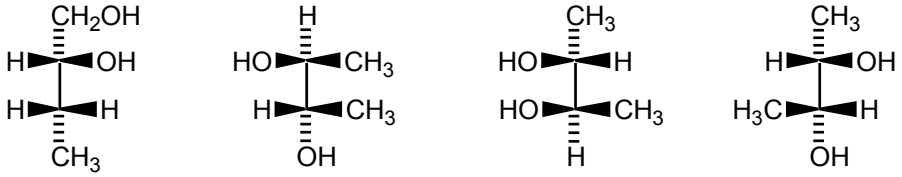
I II III IV V

A) III and V
B) I, III, IV and V
C) I, IV and V
D) I and III
E) I, II, IV and V
Ans: C

8.  is properly named:

A) (3R,4S,5R)- 3,5-Dichloro-4-methylhexane
B) (2S,3S,4S)- 2,4-Dichloro-3-methylhexane
C) (2S,3R,4R)- 2,4-Dichloro-3-methylhexane
D) (2S,3R,4S)-2,4-Dichloro-3-methylhexane
E) (2S,3S,4R)- 2,4-Dichloro-3-methylhexane
Ans: D

9. Consider the following compounds:



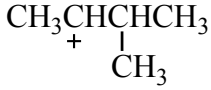
I II III IV

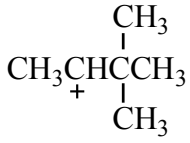
Which of the compounds above (I-IV) represent enantiomers?

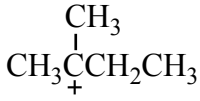
A) I and II
B) II and III
C) III and IV
D) II and IV
E) III and IV

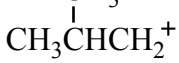
Ans: B

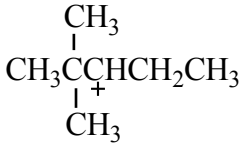
10. Which of the following carbocations would NOT be likely to undergo rearrangement?

A) 

B) 

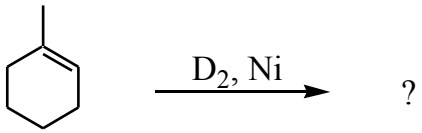
C) 

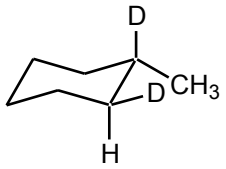
D) 

E) 

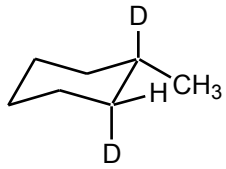
Ans: C

11. Which would be the major product of the following reaction?

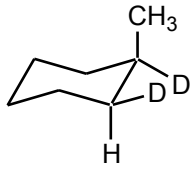




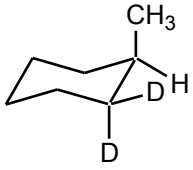
I



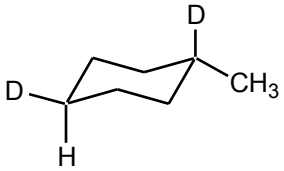
II



III



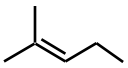
IV



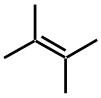
V

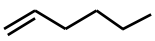
A) I
B) II
C) III
D) IV
E) V
Ans: A

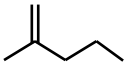
12. Which reaction would you expect to liberate the least heat?

A)  + $9O_2$ ⟶ $6CO_2$ + $6H_2O$

B)  + $9O_2$ ⟶ $6CO_2$ + $6H_2O$

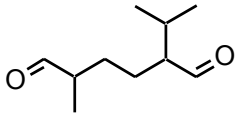
C)  + $9O_2$ ⟶ $6CO_2$ + $6H_2O$

D)  + $9O_2$ ⟶ $6CO_2$ + $6H_2O$

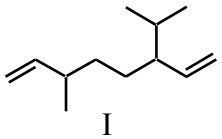
E)  + $9O_2$ ⟶ $6CO_2$ + $6H_2O$

Ans: C

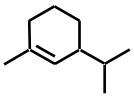
13. An alkene with the molecular formula $C_{10}H_{18}$ is treated with ozone and then with zinc and acetic acid. The product isolated from these reactions is:



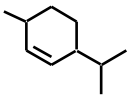
What is the structure of the alkene?



I



II



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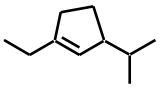

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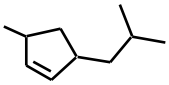
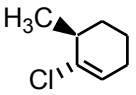


V

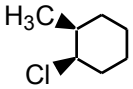
A) I
B) II
C) III
D) IV
E) V

Ans: C

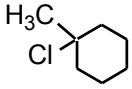
14. Treating 1-methylcyclohexene with HCl would yield primarily which of these?



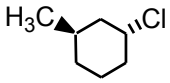
I



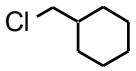
II



III



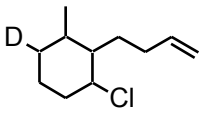
IV



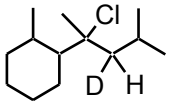
V

A) I
B) II
C) III
D) IV
E) V
Ans: C

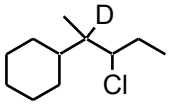
15. What product would you expect from addition of deuterium chloride to 2-cyclohexyl-4-methyl-2-pentene?



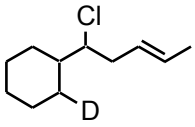
I



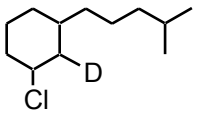
II



III



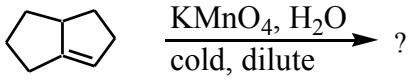
IV

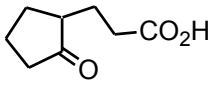


V

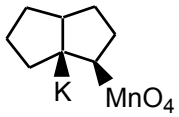
A) I
B) II
C) III
D) IV
E) V
Ans: B

16. What product would result from the following reaction?

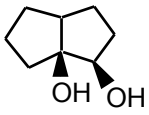




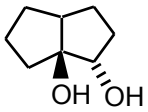
I



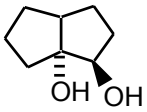
II



III



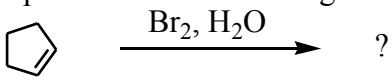
IV

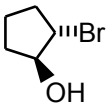


V

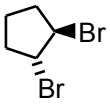
A) I
B) II
C) III
D) IV
E) V
Ans: C

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

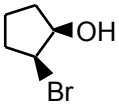




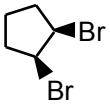
I



II



III



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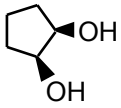
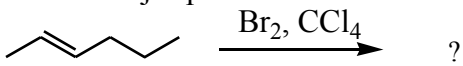
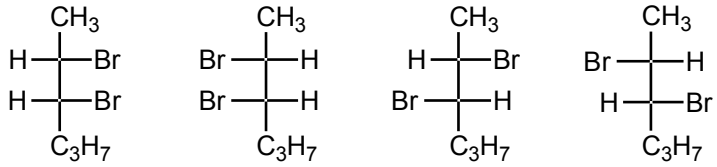


V

A) I
B) II
C) III
D) IV
E) V
Ans: A

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

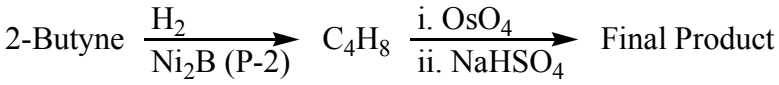


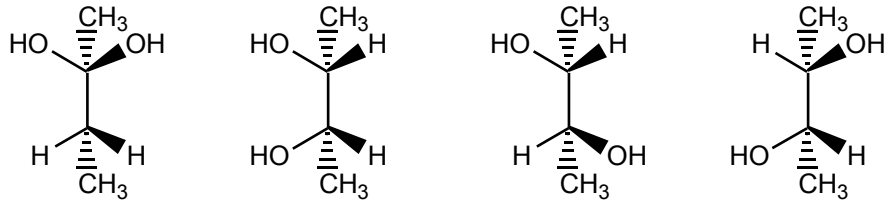


I II III IV

A) Equal amounts of I and II
B) Equal amounts of II and III
C) Equal amounts of III and IV
D) I and II as major products, III and IV as minor products
E) All of the above in equal amounts
Ans: A

19. What is the final product of the following synthesis?

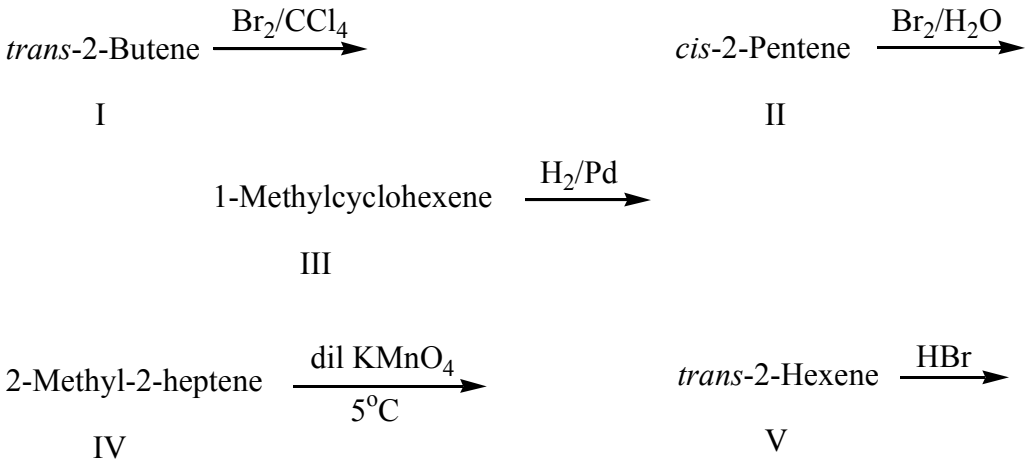




I II III IV

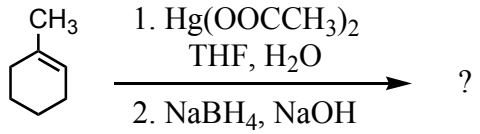
A) I
B) II
C) III
D) IV
E) An equimolar mixture of III and IV
Ans: B

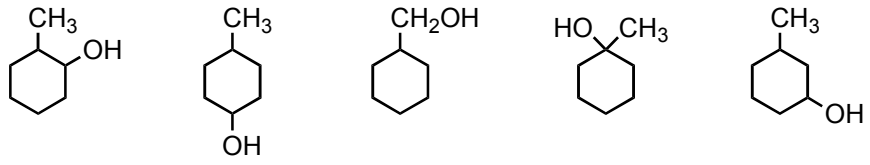
20. Which reaction is NOT stereospecific?



A) I
B) II
C) III
D) IV
E) V
Ans: E

21. Select the structure of the major product formed from the following reaction.

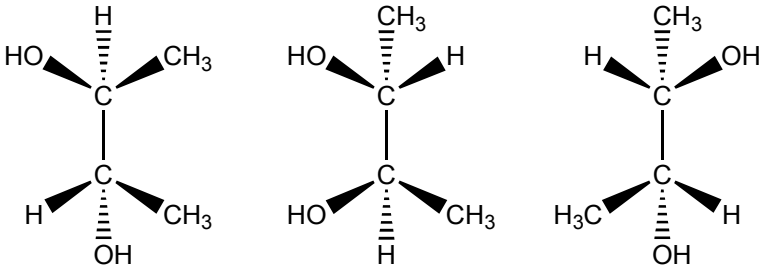




I II III IV V

A) I
B) II
C) III
D) IV
E) V
Ans: D

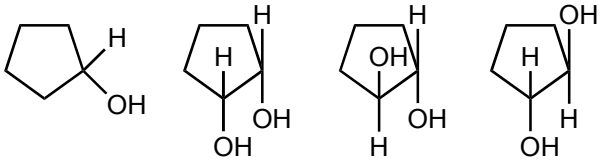
22. Which compound (or compounds) would be produced when trans-2-butene is treated first with a peroxy acid to form an epoxide, and then the epoxide is subjected to acid-catalyzed hydrolysis?



I II III

A) An equimolar mixture of I and II
B) An equimolar mixture of II and III
C) I alone
D) II alone
E) III alone
Ans: E

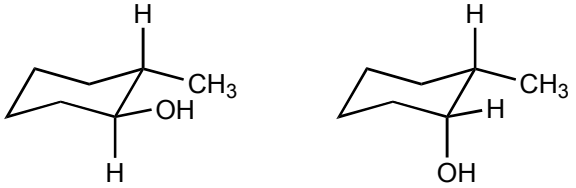
23. Epoxidation followed by reaction with aqueous base converts cyclopentene into which of these?



I II III IV

A) I
B) II
C) III
D) IV
E) Equal amounts of III and IV
Ans: E

24. What is the relationship between alcohols I and II?



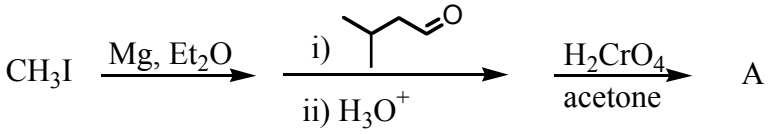
I II

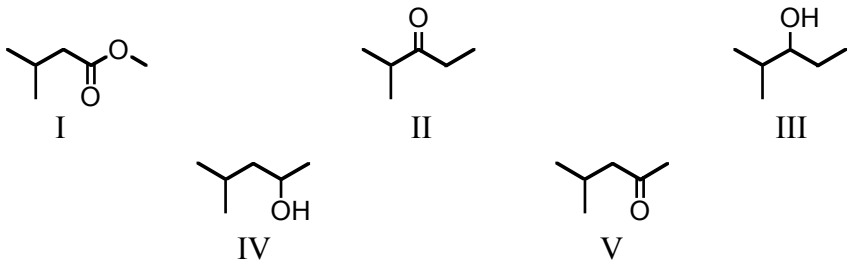
They are:

A) different conformations of the same compound.
B) constitutional isomers.
C) enantiomers.
D) diastereomers.
E) identical.

Ans: D

25. What is the final product of the following reaction sequence?

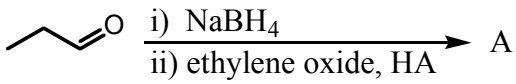


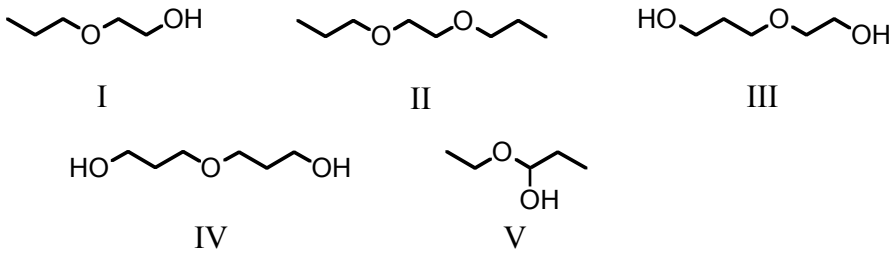


A) I
B) II
C) III
D) IV
E) V

Ans: E

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



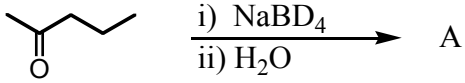


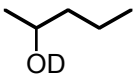
I II III IV V

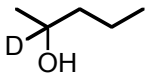
A) I
B) II
C) III
D) IV
E) V

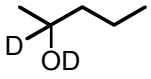
Ans: A

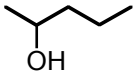
27. What would be the product, A, of the following reaction ?

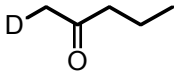


A) 

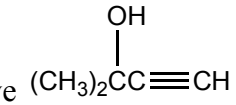
B) 

C) 

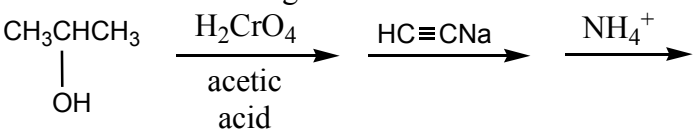
D) 

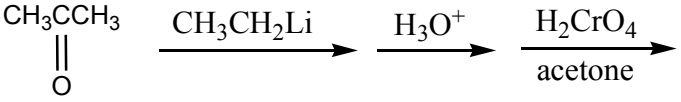
E) 

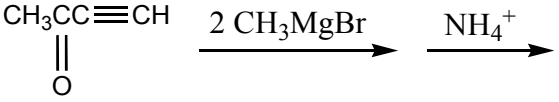
Ans: B

28. 

Which method would give ?

A) 

B) 

C) 

D) More than one of the above

E) None of the above

Ans: D

29. Which Grignard synthesis will produce an optically active product or product mixture?

A) 

B) 

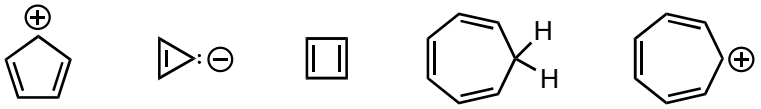
C) 

D) 

E) 

Answ: E

30. Which of the following would you expect to be aromatic?

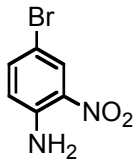


I II III IV V

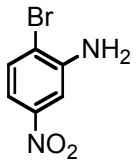
A) I
B) II
C) III
D) IV
E) V

Answ: E

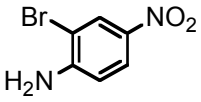
31. 4-Bromo-2-nitroaniline is:



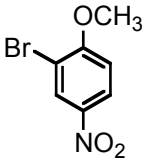
I



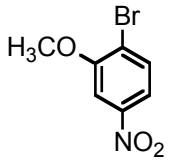
II



III



IV

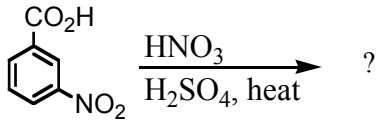


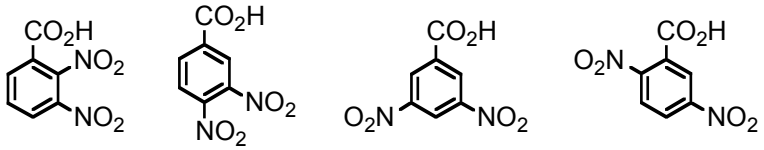
V

A) I
B) II
C) III
D) IV
E) V

Ans: A

32. What would be the major product(s) of the following reaction?

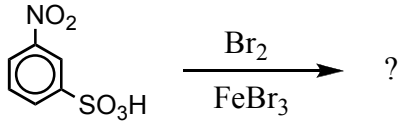


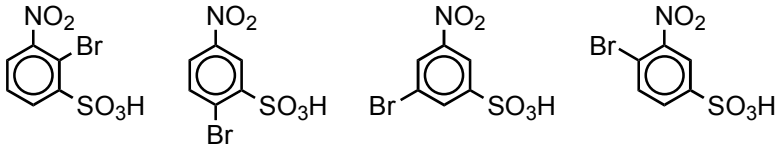


I II III IV

I
II
III
IV
Equal amounts of II and IV
C

33. What would you expect to be the major product obtained from the following reaction?

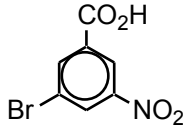




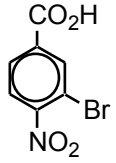
I II III IV

A) I
B) II
C) III
D) IV
E) Equal amounts of II and IV
Ans: C

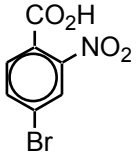
34. Toluene is subjected to the action of the following reagents in the order given: (1) $KMnO_4$,OH^-, heat; then H_3O^+ (2) HNO_3, H_2SO_4 (3) Br_2, $FeBr_3$
What is the final product of this sequence?



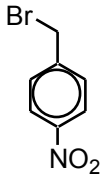
I



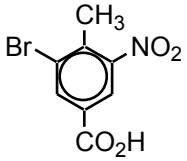
II



III



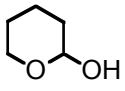
IV



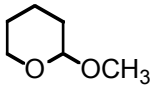
V

A) I
B) II
C) III
D) IV
E) V
Ans: A

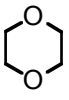
35. Which compound is an acetal?



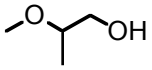
I



II



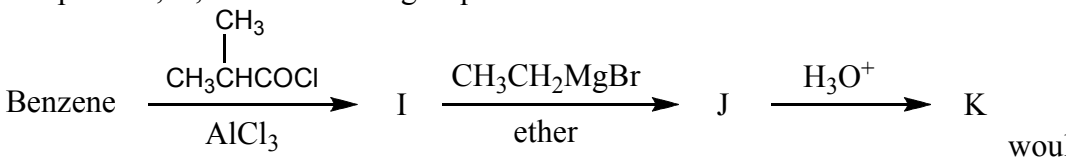
III



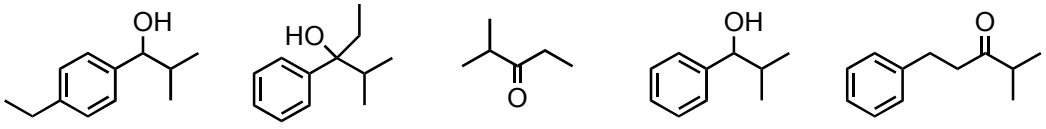
IV

A) I
B) II
C) III
D) IV
E) All of the above
Ans: B

36. The product, K, of the following sequence of reactions



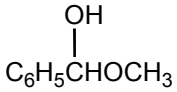
would be:

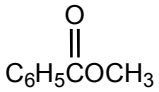


I II III IV V

A) I
B) II
C) III
D) IV
E) V
Ans: B

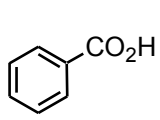
37. Dissolving benzaldehyde in methyl alcohol establishes an equilibrium with what compound?

A) 

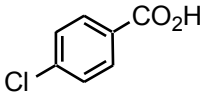
B) 

C) $C_6H_5C(OCH_3)_3$
D) Answers A) and B)
E) Answers B) and C)
Ans: A

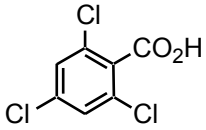
38. Which of the following would be the strongest acid?



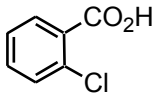
I



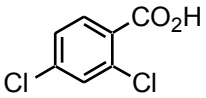
II



III



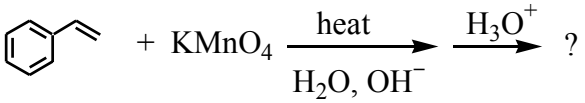
IV

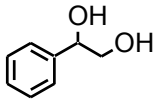


V

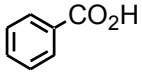
A) I
B) II
C) III
D) IV
E) V
Ans: C

39. Predict the major organic product of the reaction sequence below:

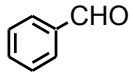




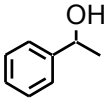
I



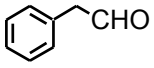
II



III



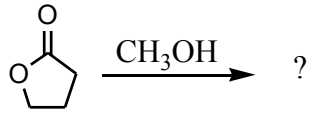
IV

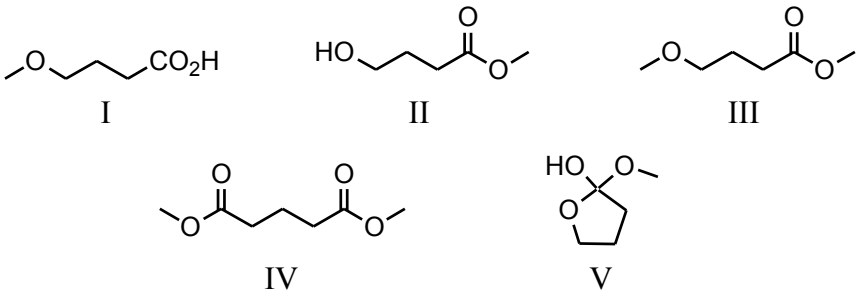


V

A) I
B) II
C) III
D) IV
E) V
Ans: B

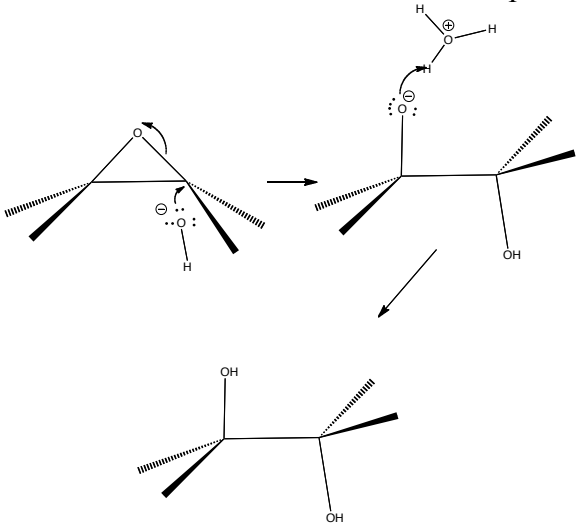
40. What is the product of this reaction?





A) I
B) II
C) III
D) IV
E) V
Ans: B

41. Draw the accurate mechanism of epoxide ring opening via attack of OH^-.



42. Draw the accurate mechanism for the ozonolysis of an alkene