Your Name: _____ Student #: _____

Your course TA (Steve, Jenn-C, Jenn-P): _____

Exercise	key
1	
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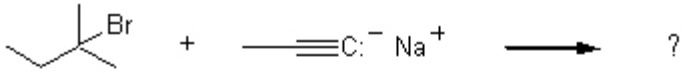
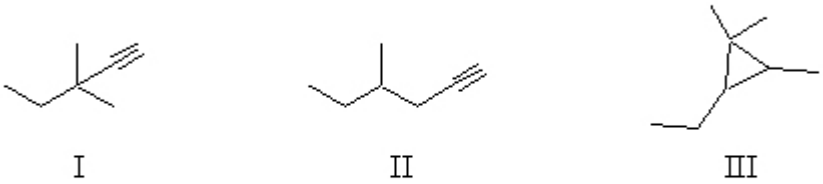
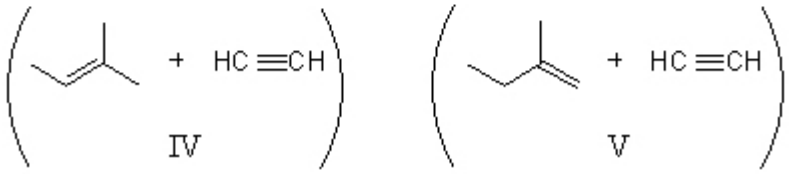
1. Deliver only the solution key in the above table. You can keep the text. The solution key will be posted today on the web.

2. You must respond to all exercises. Blank pages are at the end.

1. What would you expect to be the chief organic product(s) when 2-bromo-2-methylpentane reacts with sodium propynide, i.e., (This **exercise #1 is wrongly formulated. The whole class will receive credit no matter which response has been returned)**







A. I

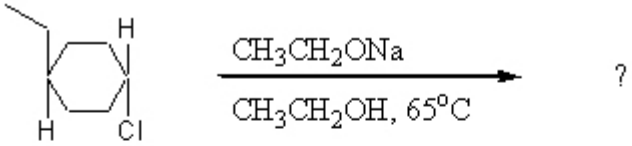
B. II

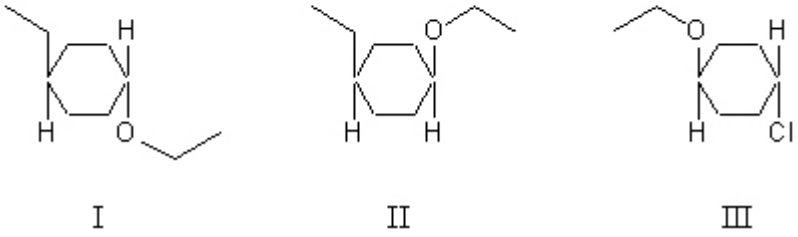
C. III

D. IV

E. V

2. What major product(s) are likely to be obtained from the following reaction?





A. I, by predominantly S_N2

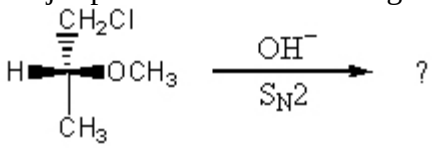
B. II, by predominantly S_N2

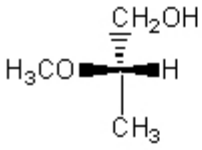
C. An equimolar mixture of I and II, by predominantly S_N1.

D. III, by substitution of the alkyl group, rather than substitution of the chloro group

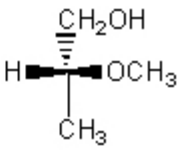
E. Actually, none of these products are likely to be obtained as major products, because elimination will probably predominate, leading to the formation of an alkene.

3. The major product of the following reaction would be:





I



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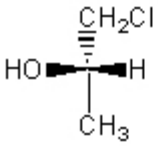
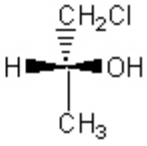


III



IV

A. I

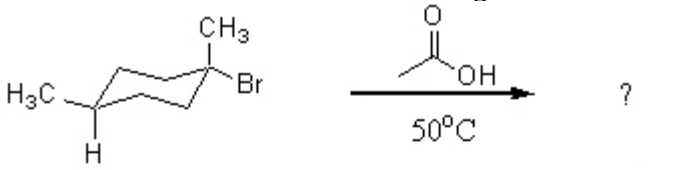
B. II

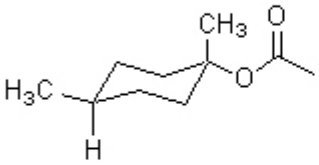
C. III

D. IV

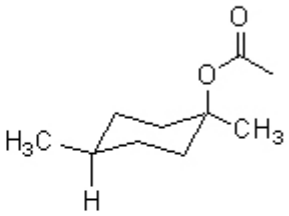
E. An equimolar mixture of I and II.

4. Which would be formed in the following reaction?





I



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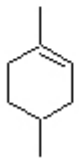

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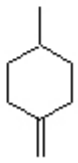


IV

A. I

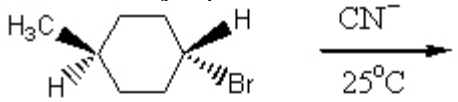
B. II

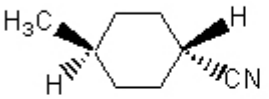
C. III

D. IV

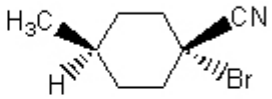
E. All of the above

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





I



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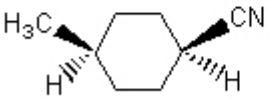

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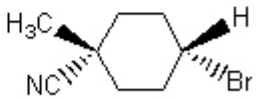


IV

A. I

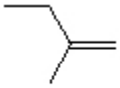
B. II

C. III

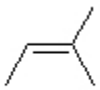
D. IV

E. Equal amounts of I and III

6. Neopentyl alcohol, $(CH_3)_3CCH_2OH$, cannot be dehydrated to an alkene without rearrangement. What is the chief product of dehydration?



I



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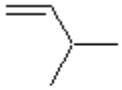

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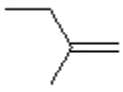

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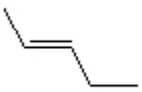


V

A. I

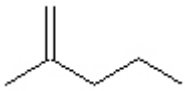
B. II

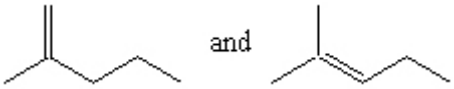
C. III

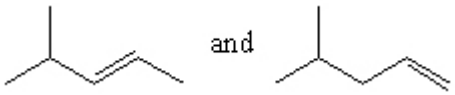
D. IV

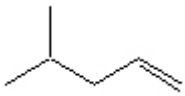
E. V

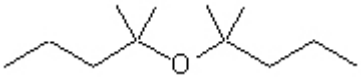
7. Which product(s) would be produced by acid-catalyzed dehydration of 2-methyl-2-pentanol?

A. 

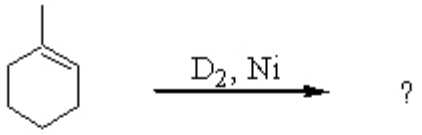
B. 

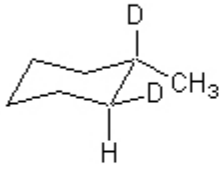
C. 

D. 

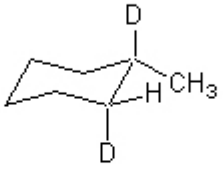
E. 

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





I



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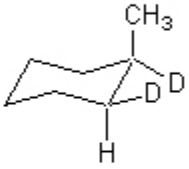

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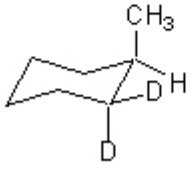
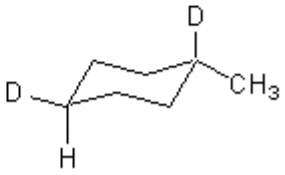


IV



V

A. I

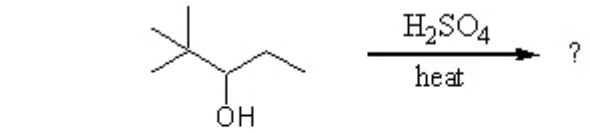
B. II

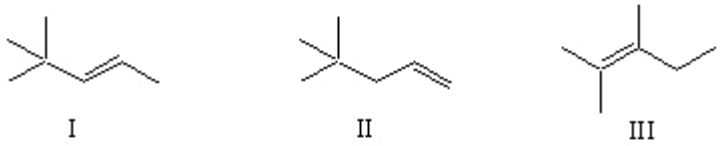
C. III

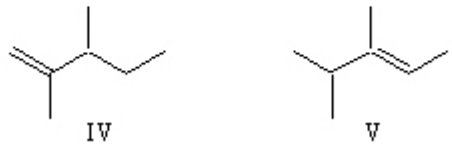
D. IV

E. V

9. Which alkene would you expect to be the major product of the following dehydration?







A. I

B. II

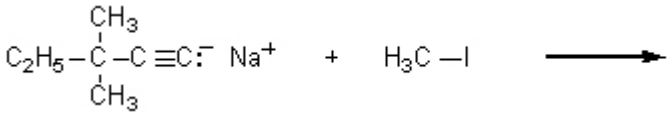
C. III

D. IV

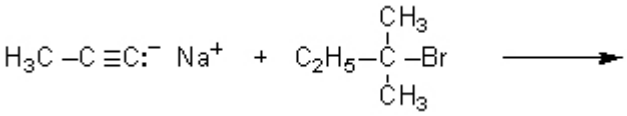
E. V

10. Which of the following methods could be used to synthesize 4,4-dimethyl-2-hexyne?

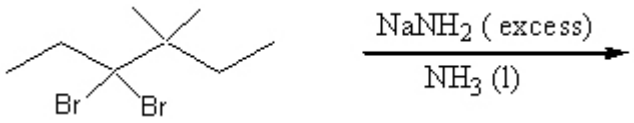
A.



B.



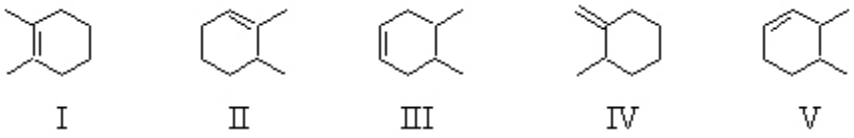
C.



D. More than one of these

E. None of these

11. Which molecule would have the lowest heat of hydrogenation?



A. I

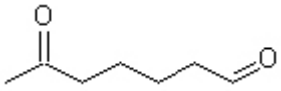
B. II

C. III

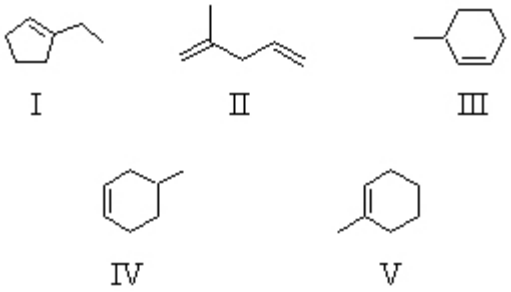
D. IV

E. V

12. Compound **C** has the molecular formula C_7H_{12}. On catalytic hydrogenation, 1 mol of **C** absorbs 1 mol of hydrogen and yields a compound with the molecular formula C_7H_{14}. On ozonolysis and subsequent treatment with zinc and acetic acid, **C** yields only:



The structure of **C** is:



A. I

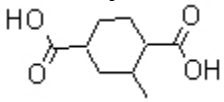
B. II

C. III

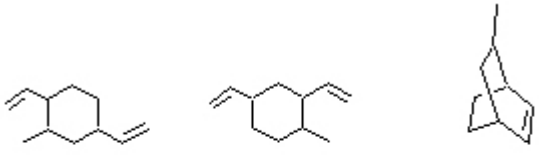
D. IV

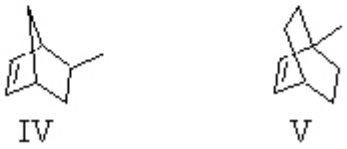
E. V

13. Determine a possible structure for an alkene, **X**, formula C_9H_{14}, on the basis of the following information: **X** adds one mole of hydrogen on catalytic hydrogenation. On treatment with hot basic $KMnO_4$ followed by acidification, **X** yields the following dicarboxylic acid.



A possible structure for **X** might be:





A. I

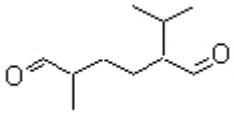
B. II

C. III

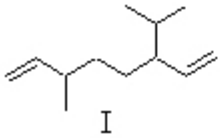
D. IV

E. V

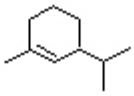
14. An alkene with the molecular formula $C_{10}H_{18}$ is treated with ozone and then with zinc and acetic acid. The product isolated from these reactions is:



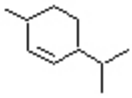
What is the structure of the alkene?



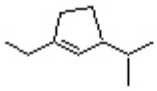
I



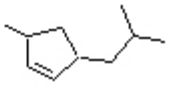
II



III



IV



V

A. I

B. II

C. III

D. IV

E. V

15. What compound would yield an equimolar mixture of $CH_3CH_2CH_2CHO$ and CH_3CHO upon treatment with O_3, followed by Zn/HOAc?

A. 1-Hexene

B. cis-2-Hexene

C. trans-2-Hexene

D. More than one of these

E. None of these

16. What is the chief product of the reaction of IBr with 2-methyl-2-pentene?

A. 2-bromo-3-iodo-2-methylpentane

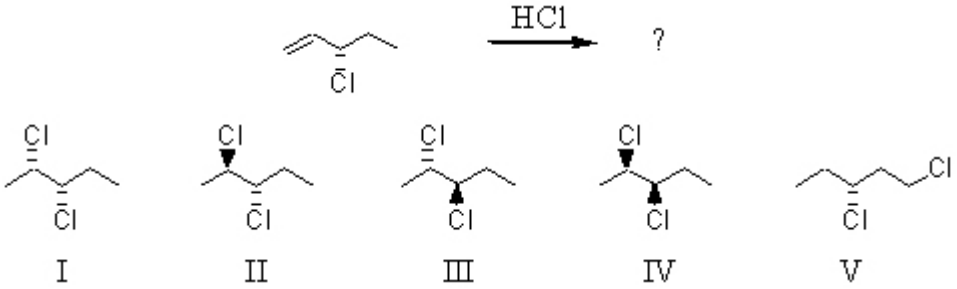
B. 3-bromo-2-iodo-2-methylpentane

C. 1-bromo-2-iodo-2-methylpentane

D. 2-bromo-1-iodo-2-methylpentane

E. All of the above

17. Addition of hydrogen chloride to the following molecule would produce:



A. I and II

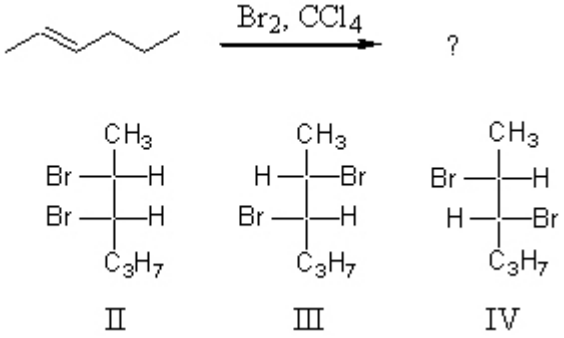
B. II and III

C. I and IV

D. V

E. All of the above are equally likely to be formed

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



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

19. Which is the best way to prepare 3-methoxypentane via the Williamson method?

A. $CH_3OH + CH_3CH_2CHOHCH_2CH_3 + H_2SO_4$, 140°C

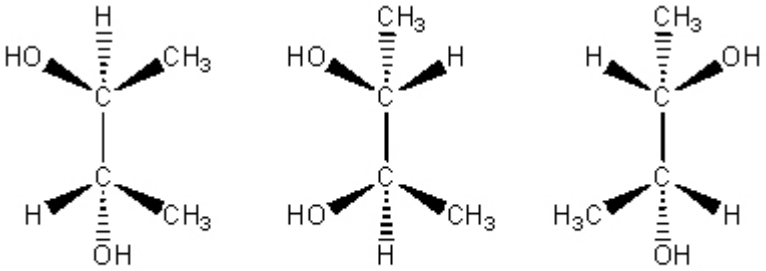
B. $CH_3OH + (CH_3)_2CHCH_2CH_2OH + H_2SO_4$, 140°C

C. $CH_3ONa + (CH_3CH_2)_2CHBr$

D. $CH_3I + (CH_3CH_2)_2CHONa$

E. $CH_3I + (CH_3)_2CHCH_2CH_2ONa$

20. 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

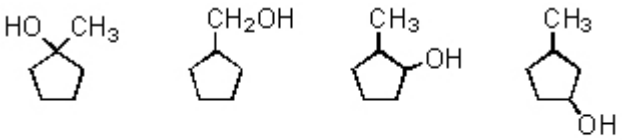
B. An equimolar mixture of II and III

C. I alone

D. II alone

E. III alone

21. Oxymercuration-demercuration of 3-methylcyclopentene produces this/these product(s):



I II III IV

A. I

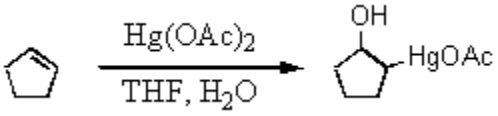
B. II

C. III

D. IV

E. Both III and IV

22. What is the electrophilic species involved in the initial step of the reaction below?



A. $^{+}$OH

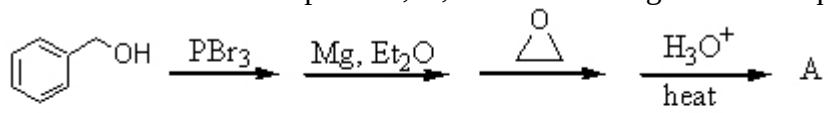
B. $^{+}$HgOAc

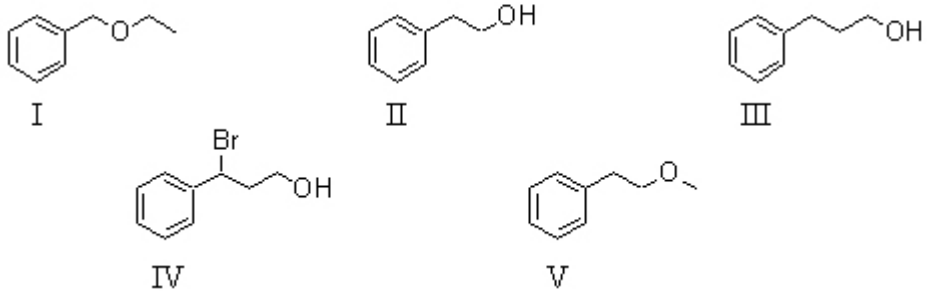
C. H_3O^{+}

D. THF

E. the THF/H_2O complex

23. What would be the final product, A, in the following reaction sequence?





A. I

B. II

C. III

D. IV

E. V

Answer Key

1. D
2. E
3. B
4. E
5. C
6. B
7. B
8. A
9. C
10. D
11. A
12. E
13. C
14. C
15. D
16. A
17. A
18. A
19. D
20. E
21. E
22. B
23. C