Organic Chemistry

Carey/Giuliano

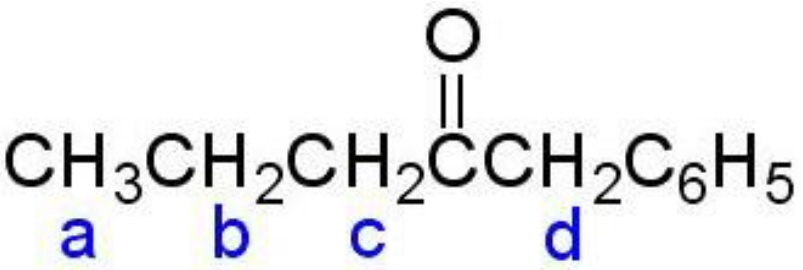
10th edition

Chapter 21

Question 1

Which hydrogens on the molecule below are the most acidic (have the lowest pK_a)?

A) a
B) b
C) c
D) d



Question 2

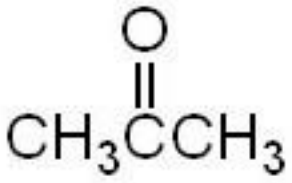
Arrange the compounds below in order of decreasing acidity.

A) 1 > 2 > 3

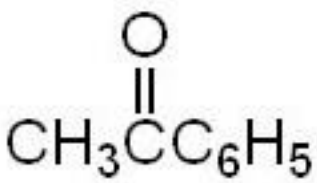
B) 2 > 3 > 1

C) 3 > 2 > 1

D) 3 > 2 > 1



1



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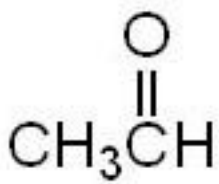
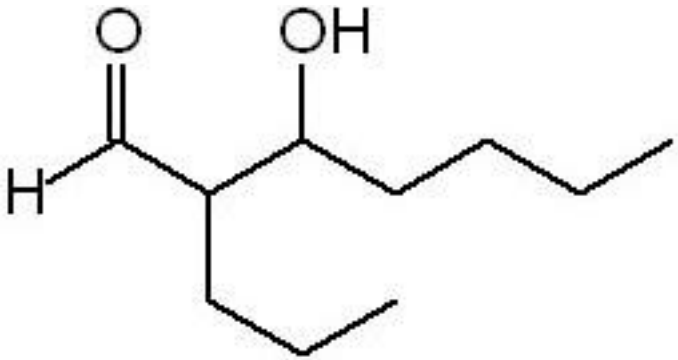


3

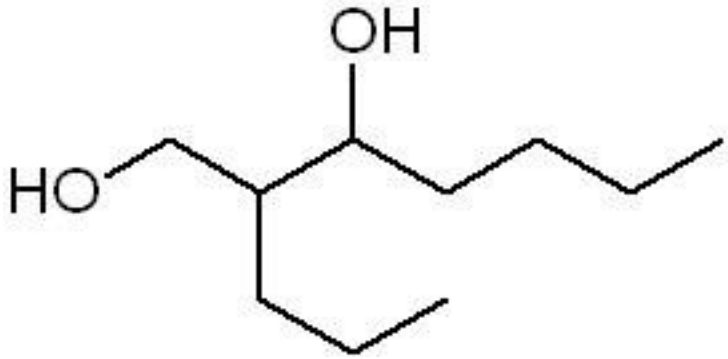
Question 3

Which compound is the aldol addition product of pentanal ($CH_3CH_2CH_2CH_2CHO$)?

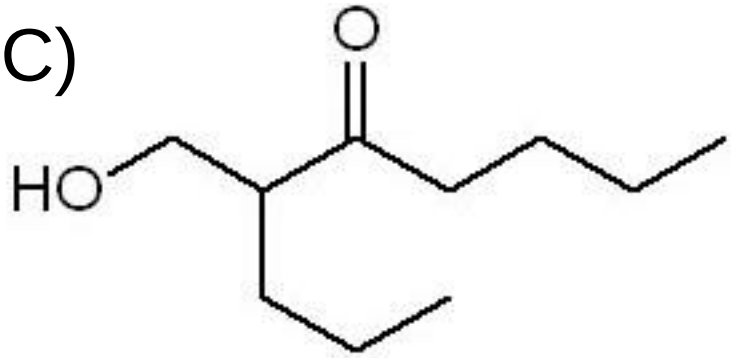
A)



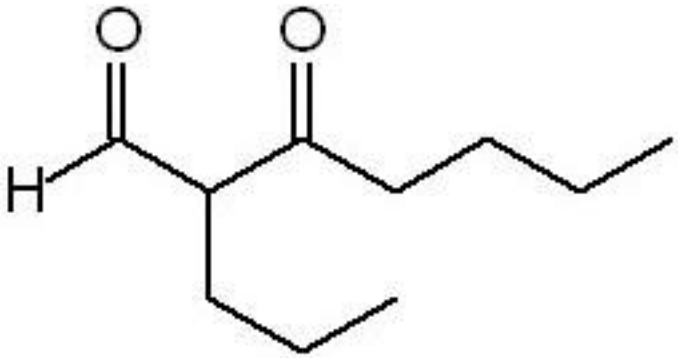
B)



C)

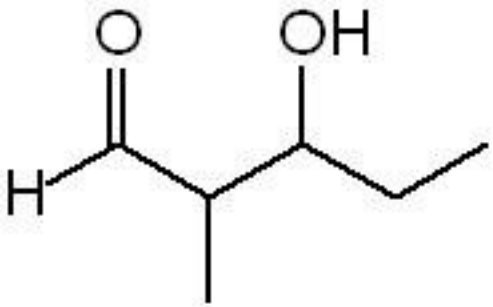


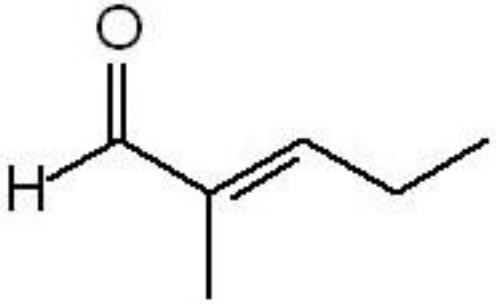
D)

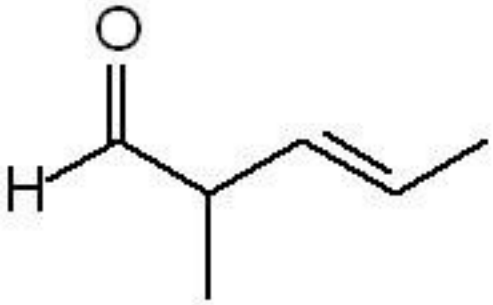


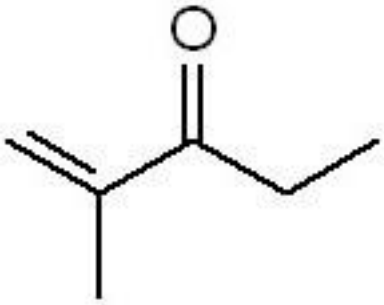
Question 4

Which compound is the aldol addition product of propanal when the reaction is carried out at 80 - 100° C?

A) 

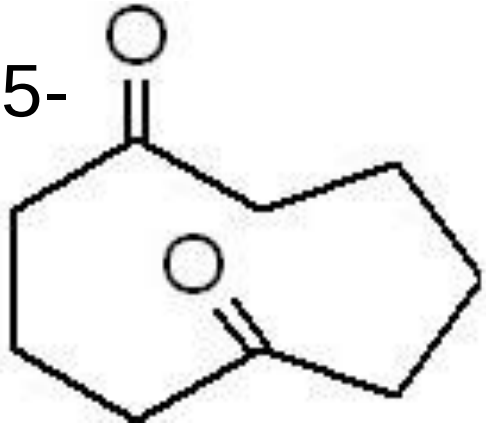
B) 

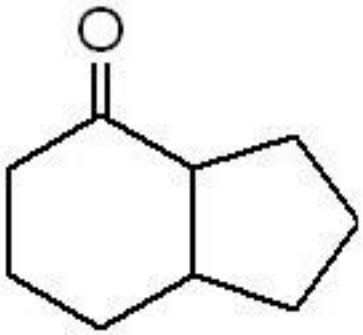
C) 

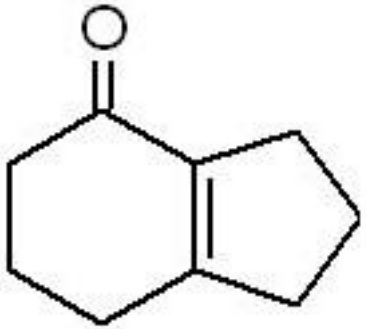
D) 

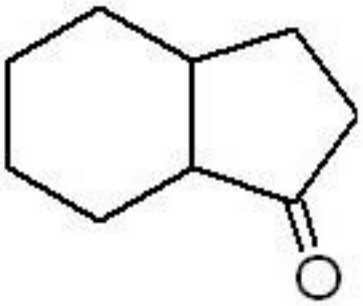
Question 5

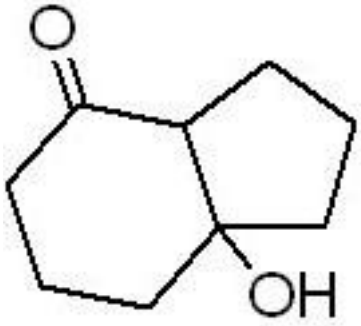
The intramolecular aldol addition of 1,5-cyclononanedione will produce:



A) 

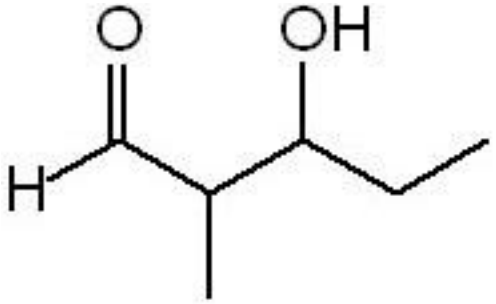
B) 

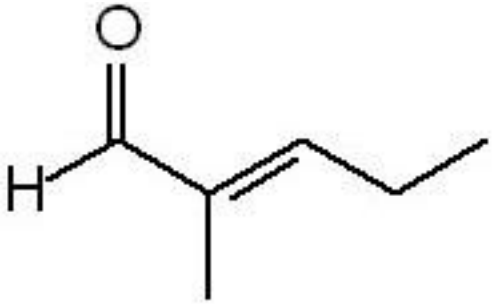
C) 

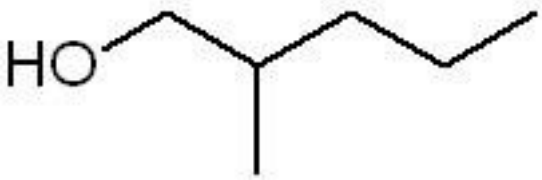
D) 

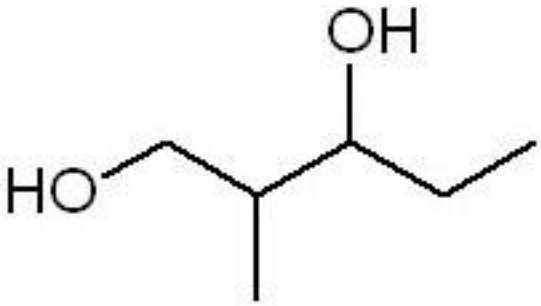
Question 6

If the aldol addition product of propanal is subjected to catalytic hydrogenation conditions (H_2,Ni), which product will be isolated?

A) 

B) 

C) 

D) 

Question 7

Which of the following statements (a-c) about mixed aldol reactions is false?

A) The reaction can produce multiple products.

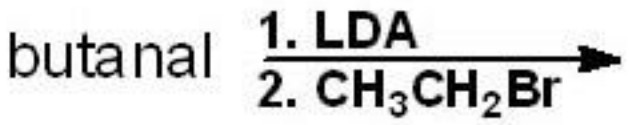
B) One of the reactants should react faster than the other with the nuclephile for the reaction to be useful.

C) Aromatic aldehydes yield β-hydroxy ketones or aldehydes.

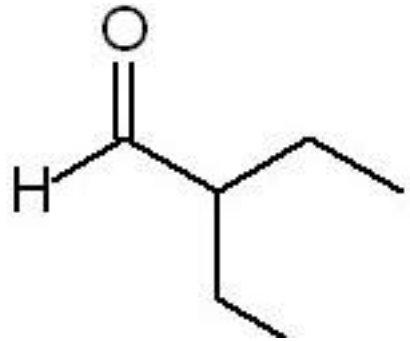
D) All statements above (a-c) are true

Question 8

What is the product isolated when butanal is treated with LDA followed by addition of ethyl bromide?



A)



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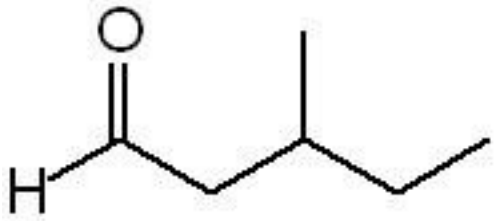

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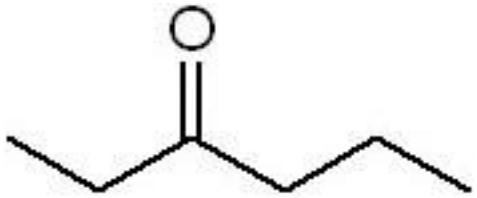
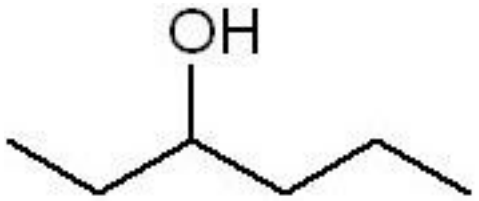
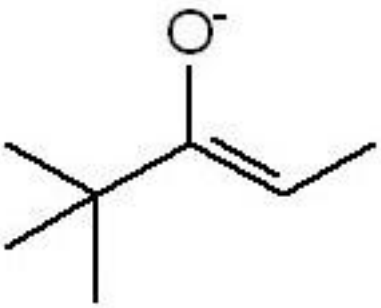


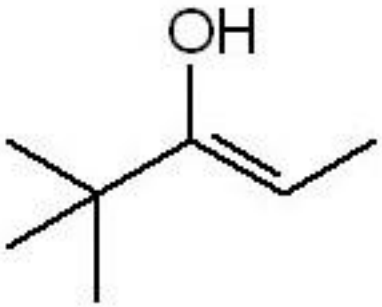
D)

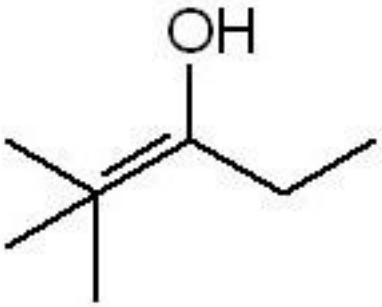


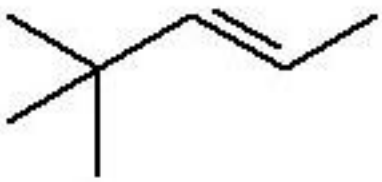
Question 9

Which structure is the enol form of 2,2-dimethyl-3-pentanone?

A) 

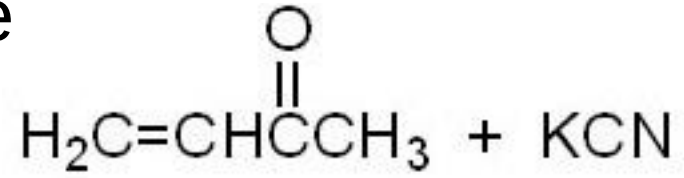
B) 

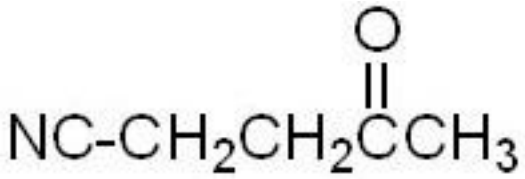
C) 

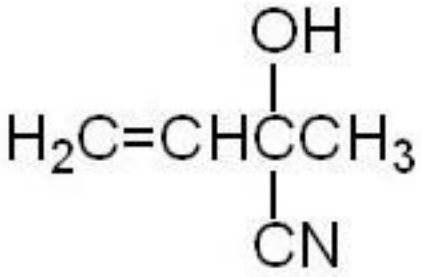
D) 

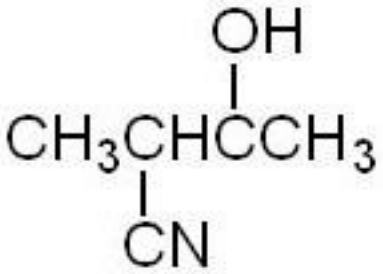
Question 10

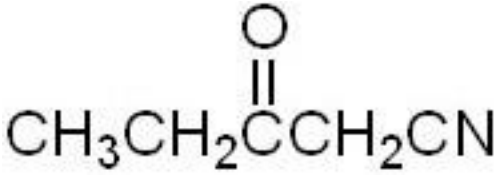
The reaction between 3-buten-2-one and potassium cyanide in ethanol-acetic acid will produce



A) 

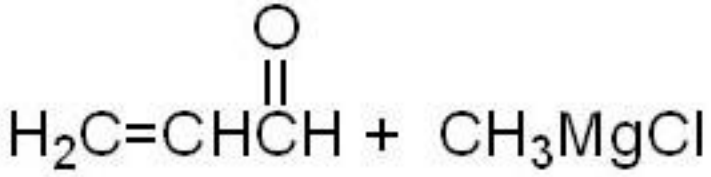
B) 

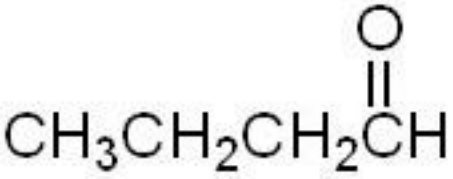
C) 

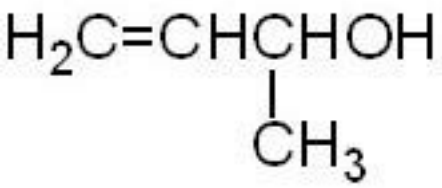
D) 

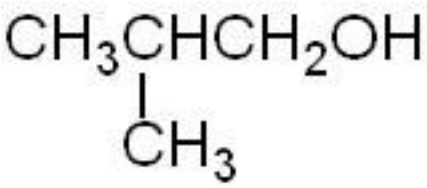
Question 11

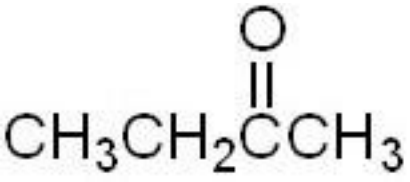
What is the product of the reaction between methylmagnesium bromide and 2-propenal?



A) 

B) 

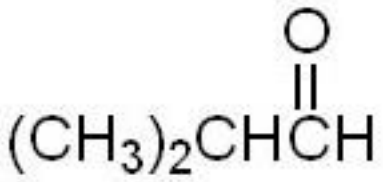
C) 

D) 

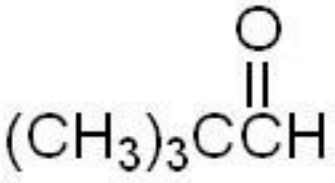
Question 12

Choose the compound with the greater enol content.

A) 2-methylpropanal



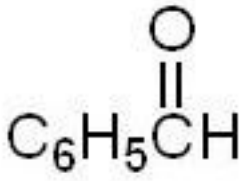
B) 2,2-dimethylpropanal



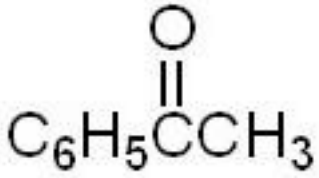
Question 13

Choose the compound with the greater enol content.

A) benzaldehyde

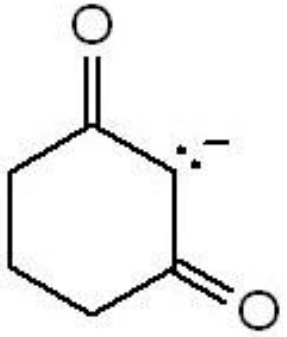


B) acetophenone

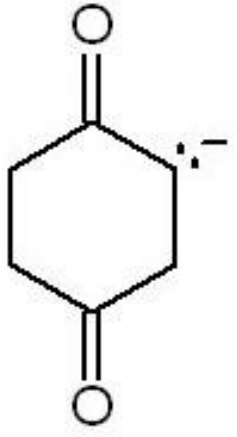


Question 14

When enolate A is compared to enolate B, which of the following statements is true?



A



B

A) A is more stable than B.

B) B is more stable than A.

C) A and B have the same stability.

D) No comparison of stability can be made.

Question 15

The reaction of an α,β-unsaturated ketone with HCN occurs by conjugate addition. What is the product?

A) a cyanohydrin

B) an acyl cyanide

C) an α,β-unsaturated nitrile

D) a β-cyanoketone

Question 16

Which of the following reagents does **not** add to an α,β-unsaturated ketone in a 1,4-conjugate addition?

A) HCN

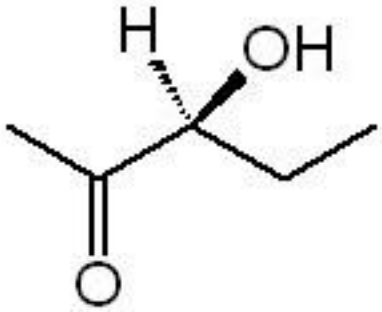
B) $(CH_3)_2CuLi$

C) CH_3MgBr

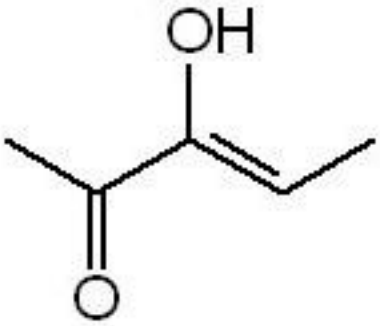
D) $CH_3CH_2NH_2$

Question 17

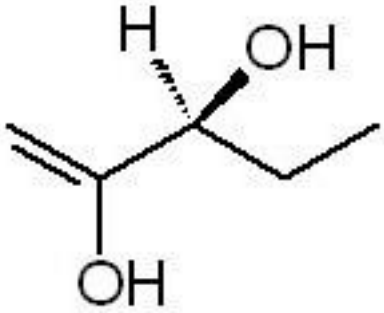
Which structure is the enol form of the compound at the right?



A)



B)



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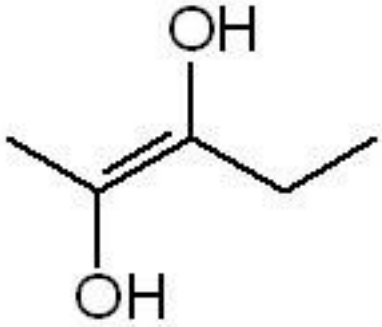
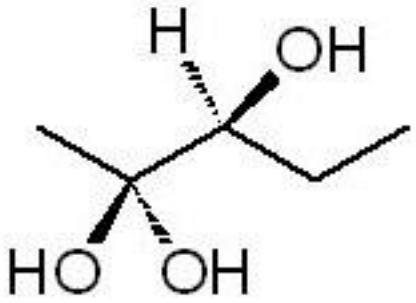
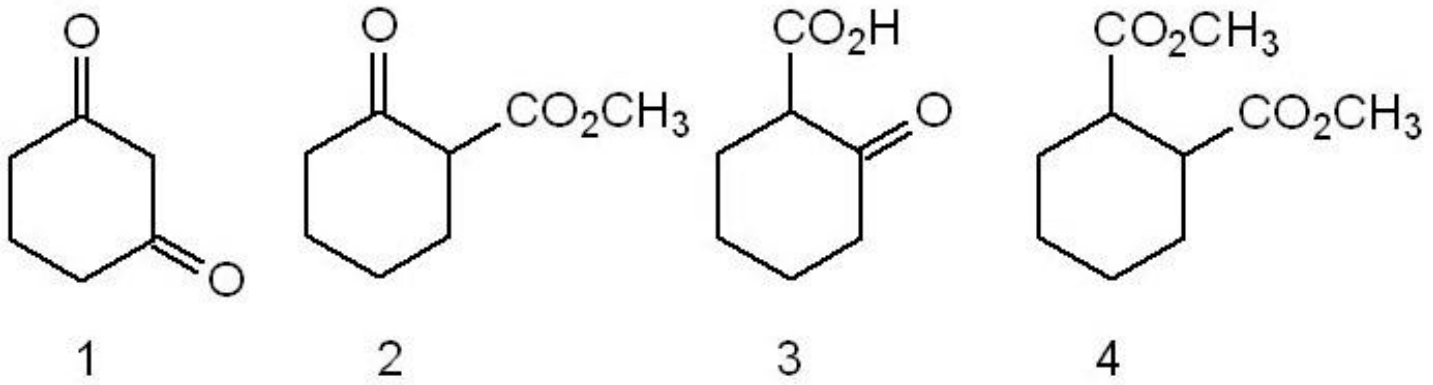


D)



Question 18

Which of the compounds below will undego decarboxylation upon heating?



A) 3 only

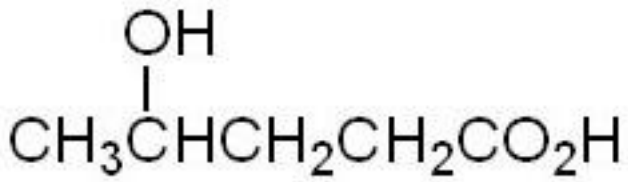
B) 1 and 3

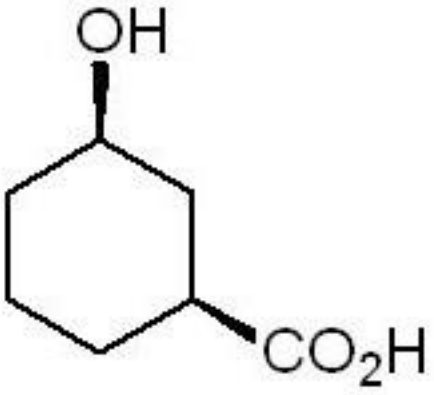
C) 2 and 3

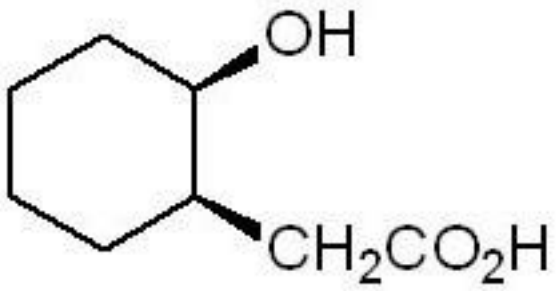
D) 2, 3, and 4

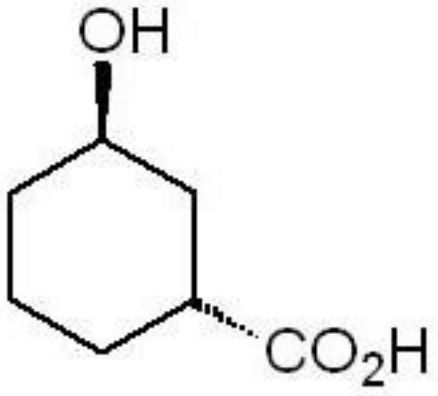
Question 19

Which compound cannot form a lactone?

A) 

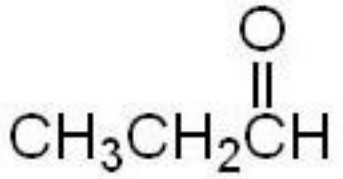
B) 

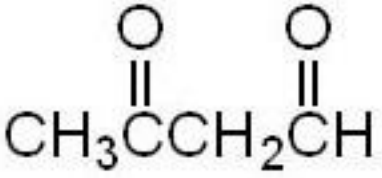
C) 

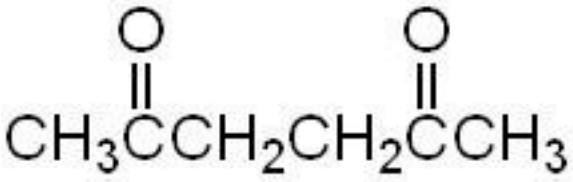
D) 

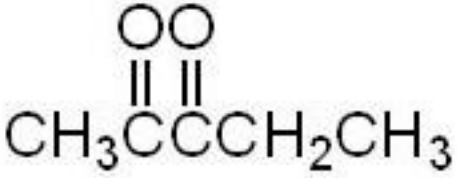
Question 20

Which compound has the lowest pK_a?

A) 

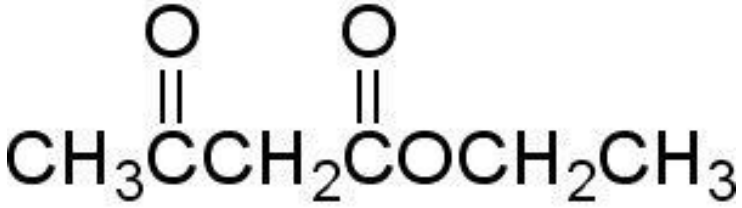
B) 

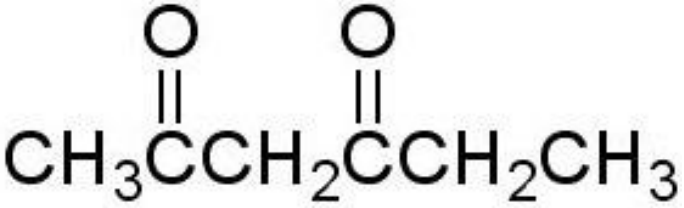
C) 

D) 

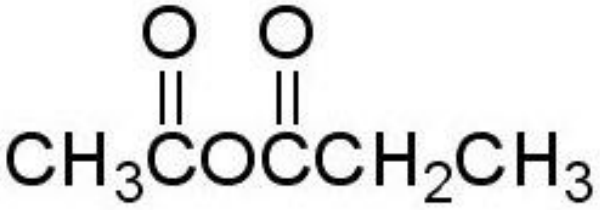
Question 21

What is the structure of ethyl acetoacetate (acetoacetic acid)?

A) 

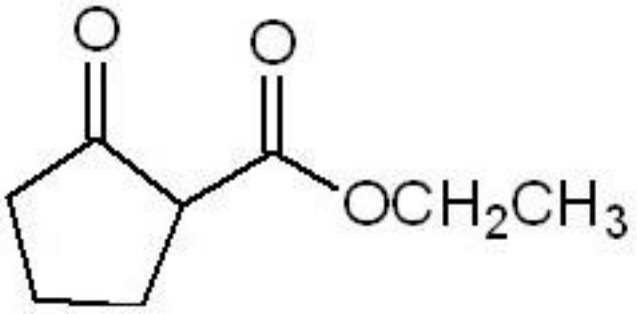
B) 

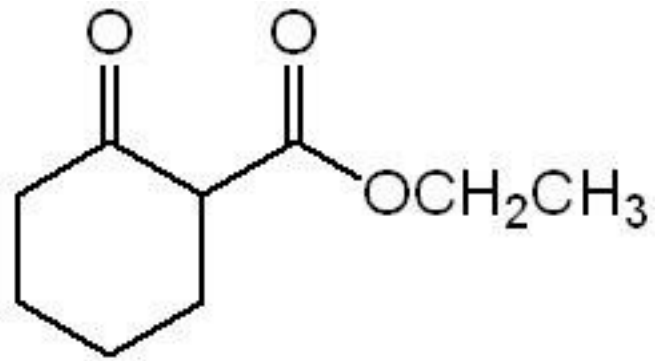
C) 

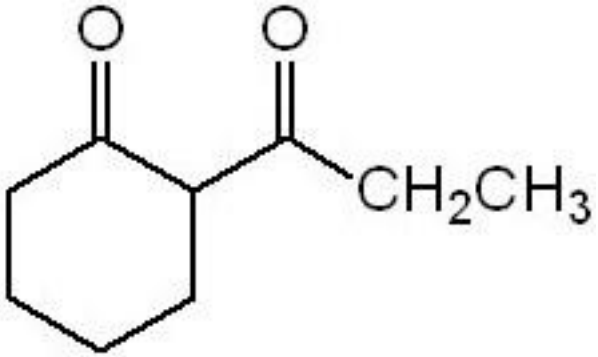
D) 

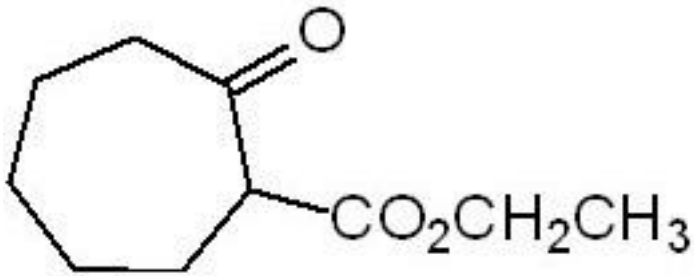
Question 22

What is the structure of the Dieckmann cyclization product of $CH_3CH_2O_2CCH_2CH_2CH_2CH_2CH_2CO_2CH_2CH_3$?

A) 

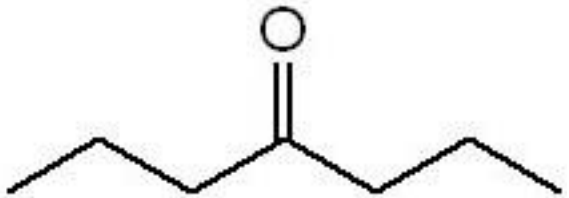
B) 

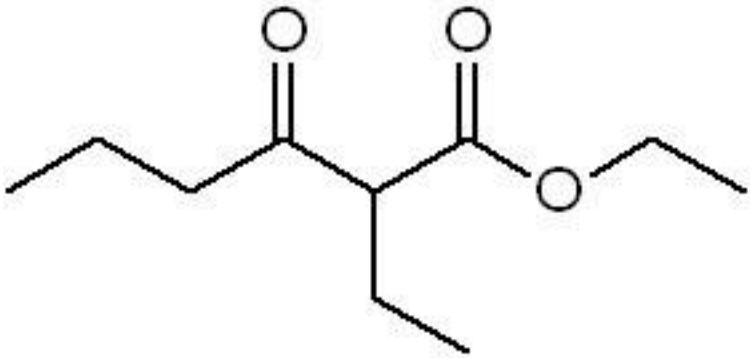
C) 

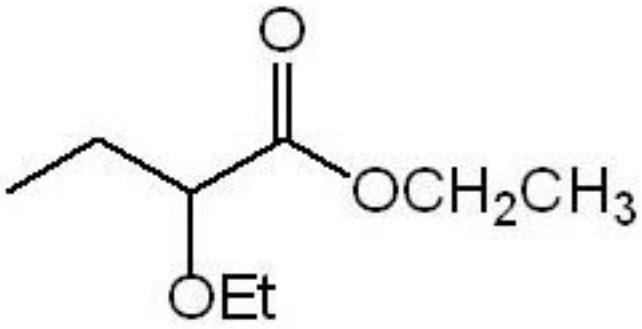
D) 

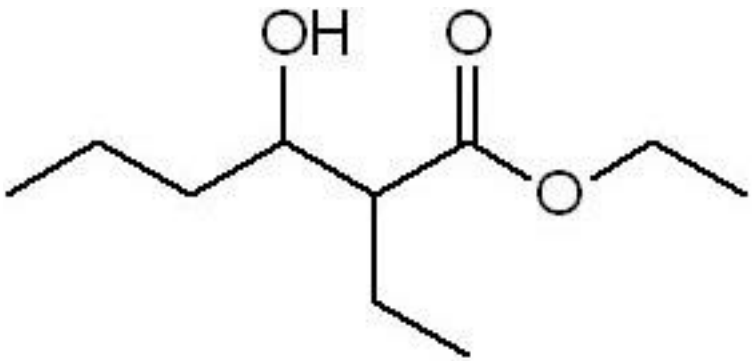
Question 23

What is the product obtained when ethyl butanoate reacts with $NaOCH_2CH_3$ followed by H_3O^+?

A) 

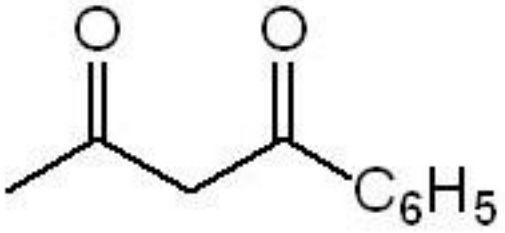
B) 

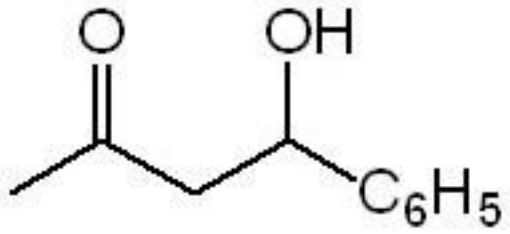
C) 

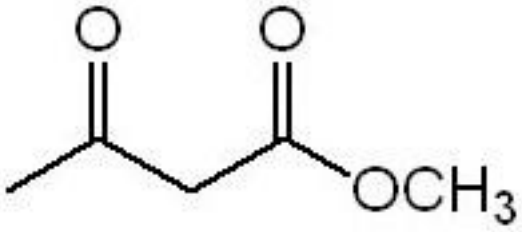
D) 

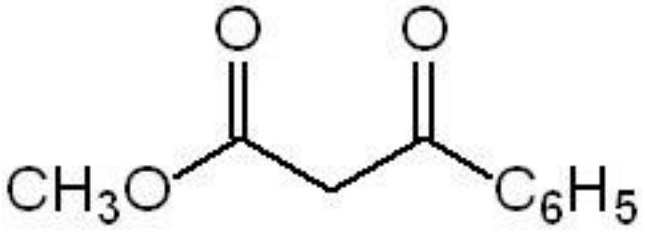
Question 24

What is the product of the reaction of acetone with methyl benzoate in the presence $NaOCH_2CH_3$ followed by H_3O^+?

A) 

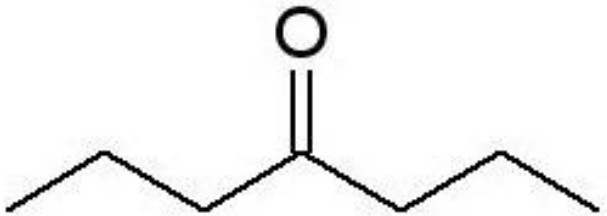
B) 

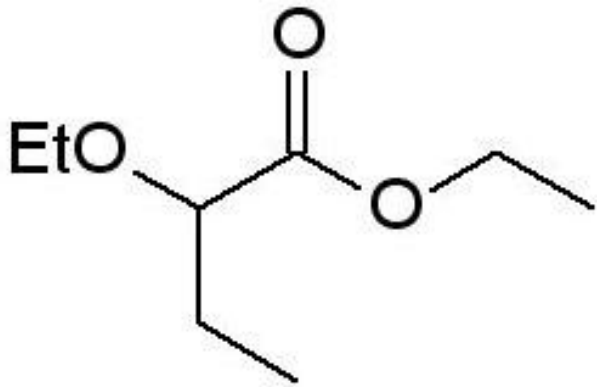
C) 

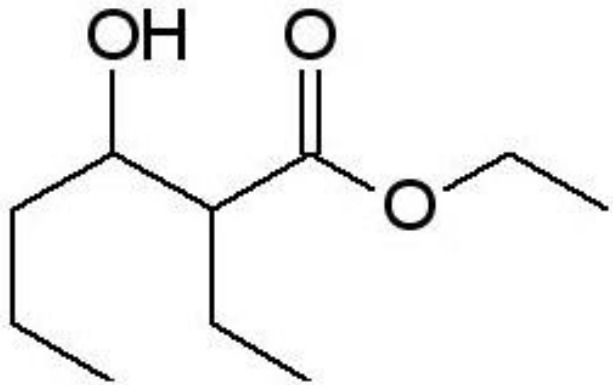
D) 

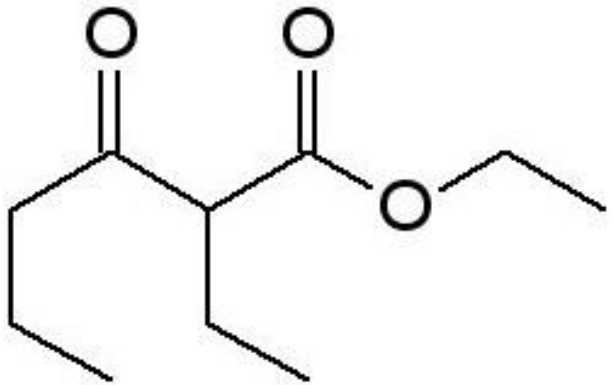
Question 25

Treatment of methyl acetoacetate with $NaOCH_2CH_3$ followed by ethyl bromide will produce

A) 

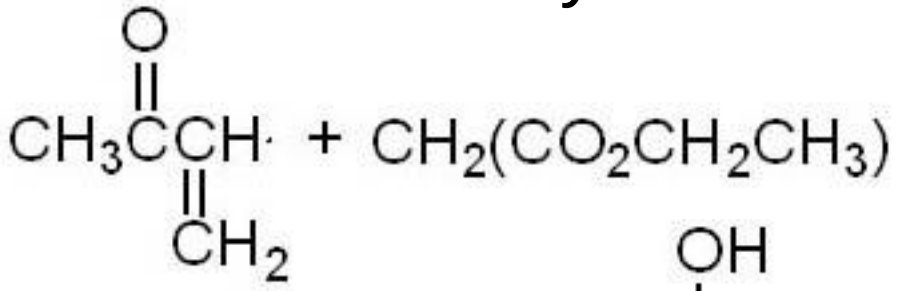
B) 

C) 

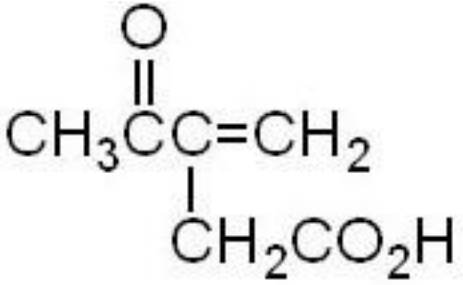
D) 

Question 26

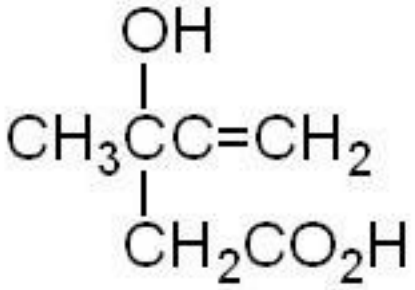
Which compound is isolated when the product of Michael addition of the compounds at the right is acidified and decarboxylated?



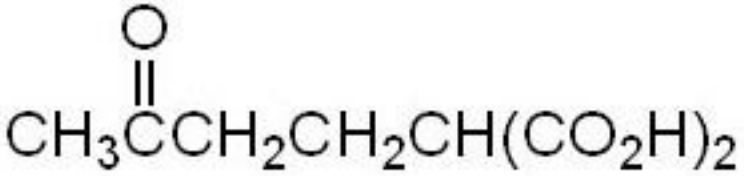
A)



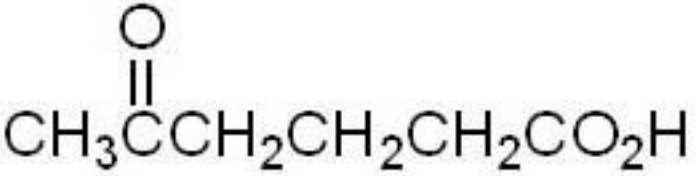
B)



C)

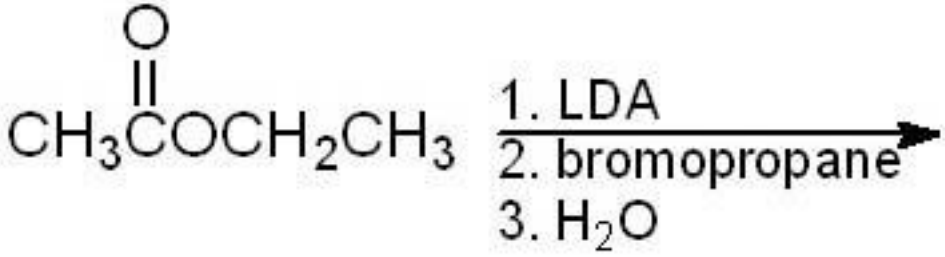


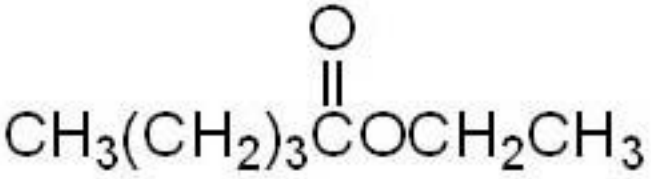
D)

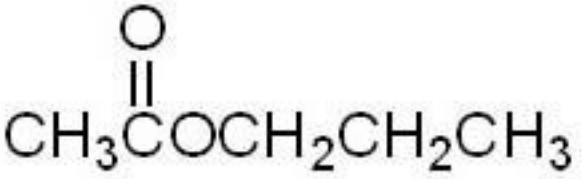


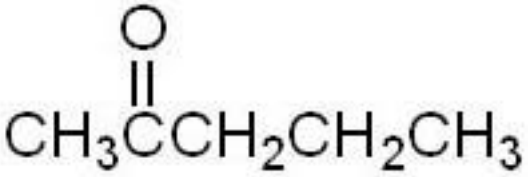
Question 27

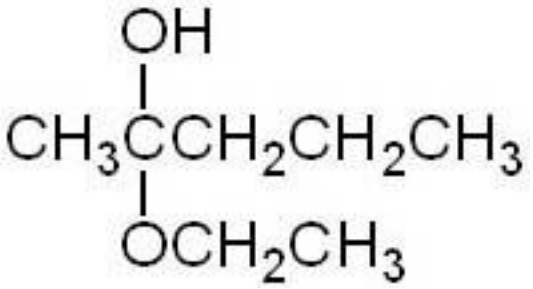
Identify the product of the reaction shown at the right.



A) 

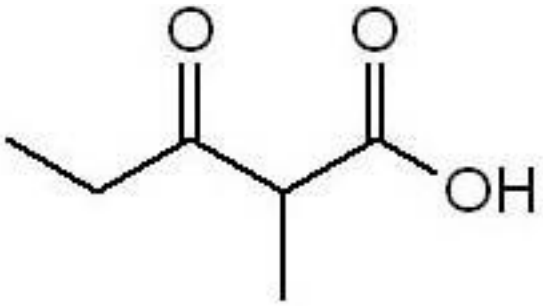
B) 

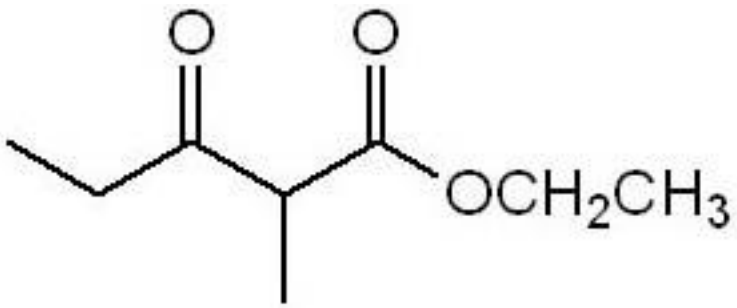
C) 

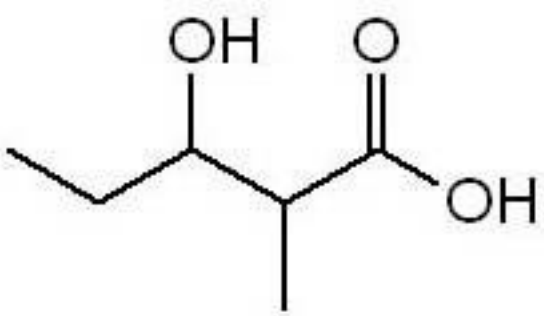
D 

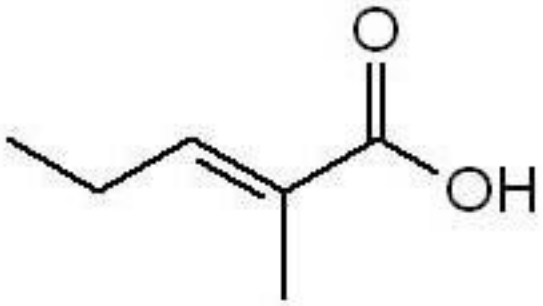
Question 28

What is the condensation product of methyl propanoate followed by acidification?

A) 

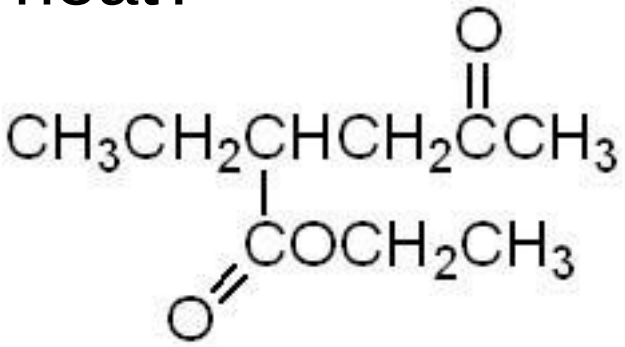
B) 

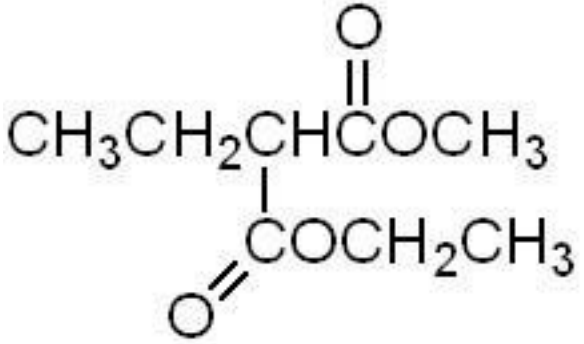
C) 

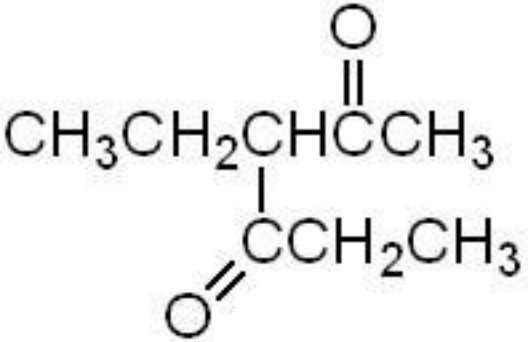
D) 

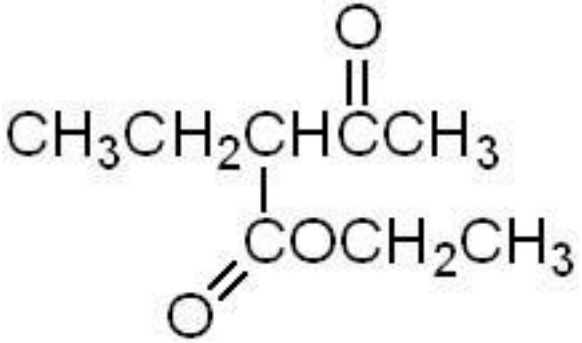
Question 29

Which compound will yield a ketone and CO_2 following saponification, acidification, and heat?

A) 

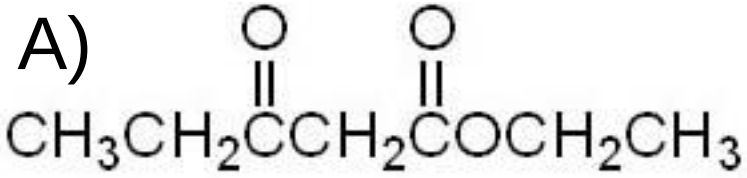
B) 

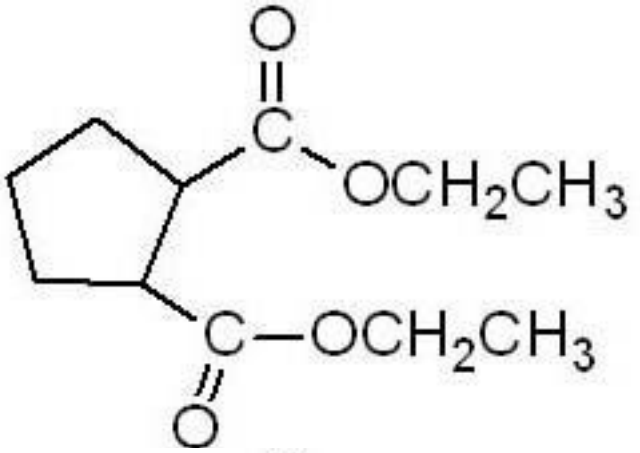
C) 

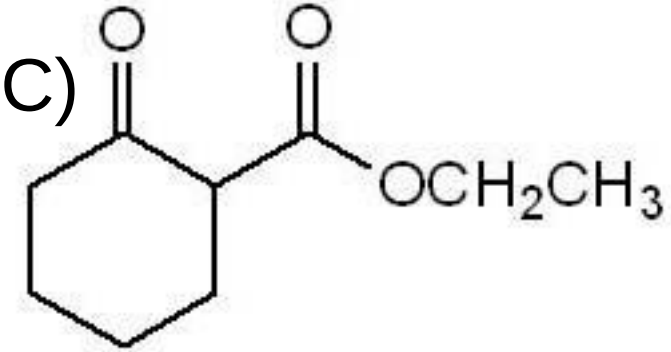
D) 

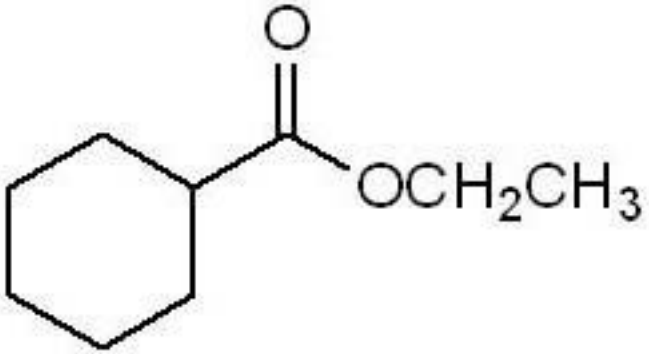
Question 30

Dieckmann cyclization of $CH_3CH_2O_2C(CH_2)_5CO_2CH_2CH_3$ will yield

A) 

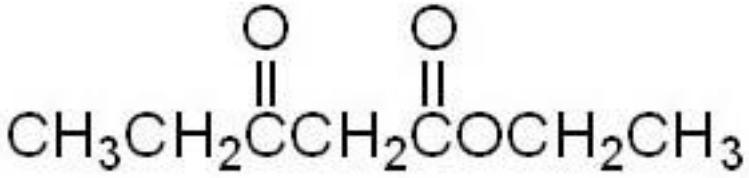
B) 

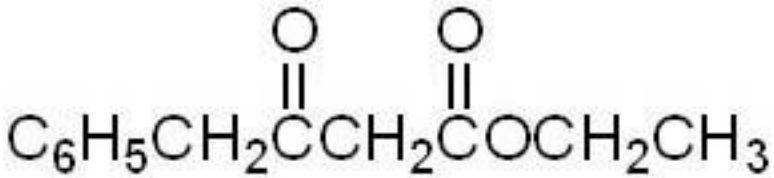
C) 

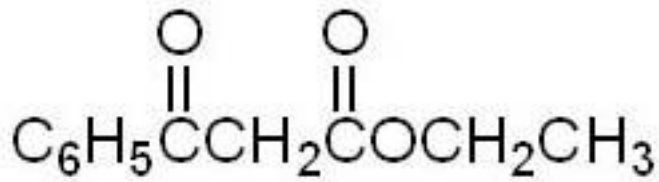
D) 

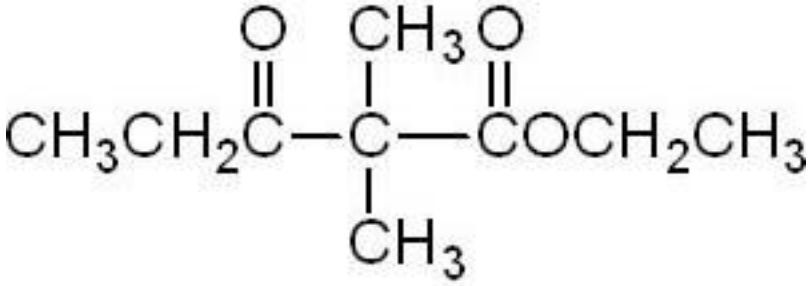
Question 31

Which compound can be prepared by a mixed Claisen condensation?

A) 

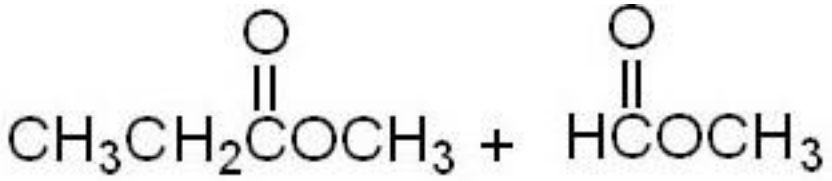
B) 

C) 

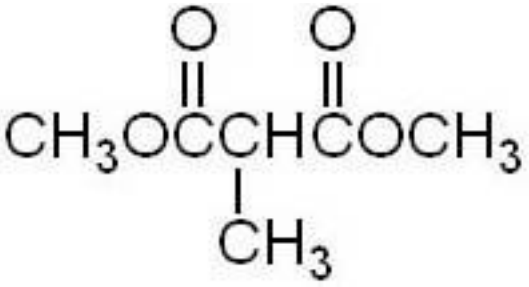
D) 

Question 32

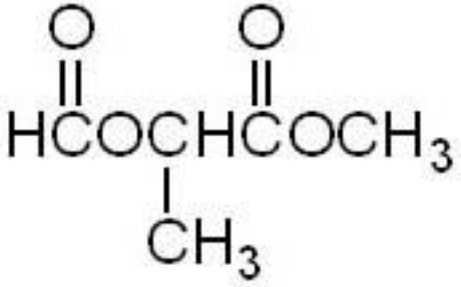
What is the product when the compounds shown below are reacted in the presence of $NaOCH_2CH_3$ followed by H_3O^+?



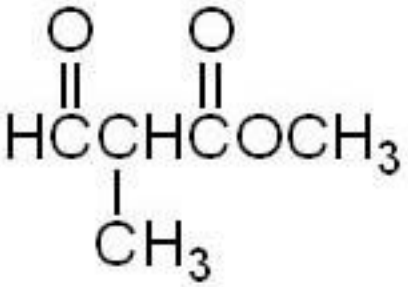
A)



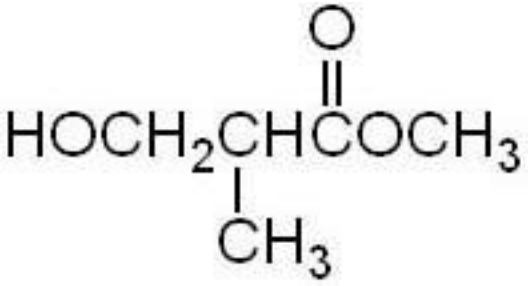
B)



C)



D)



Question 33

Which alkyl halide is best to alkylate ethyl acetoacetate (acetoacetic ester)?

A) bromopropane

B) 1-bromo-2-methylpropane

C) 2-bromobutane

D) 2-bromo-2-methylpropane

Question 34

Which set of reactions will produce $C_6H_5CO_2H$ as the major organic product?

A) C_6H_5MgBr + CO_2 followed by H_3O^+

B) C_6H_5Br + KCN followed by basic hydrolysis

C) C_6H_5MgBr + KCN followed by acid hydrolysis

D) all of the above

Question 35

Which of the following compounds is the strongest acid?

A) $CH_3CH_2CO_2H$

B) $CH_3CH_2O_2CCH_2CO_2CH_2CH_3$

C) $CH_3CH_2O_2CCH_2CH_2CO_2CH_2CH_3$

D) $CH_3CO_2CH_2CH_3$

Question 36

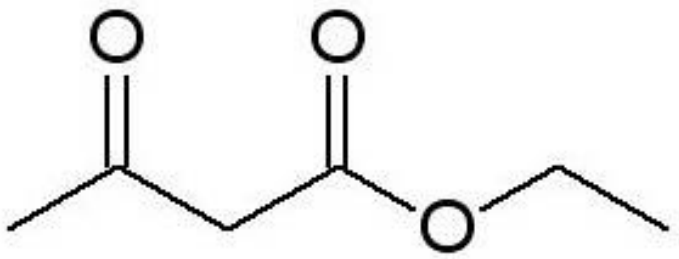
Select the best starting material for the synthesis of the compound shown at the right through a Claisen condensation reaction?

A) 3-pentanone

B) methyl acetate

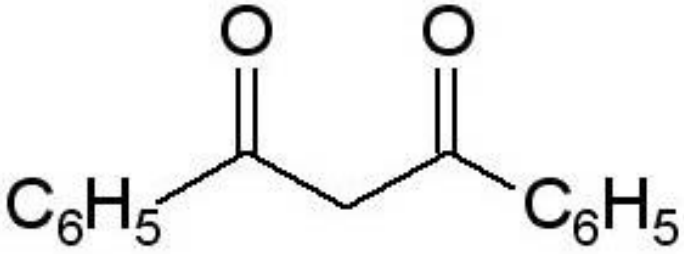
C) ethyl acetate

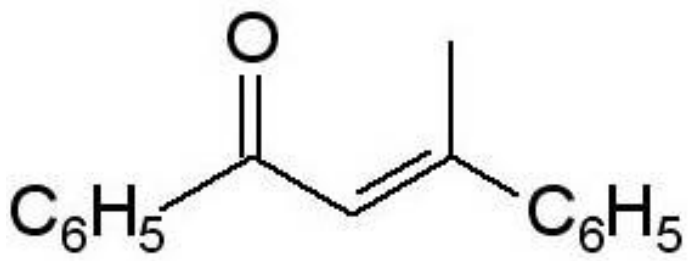
D) ethyl formate

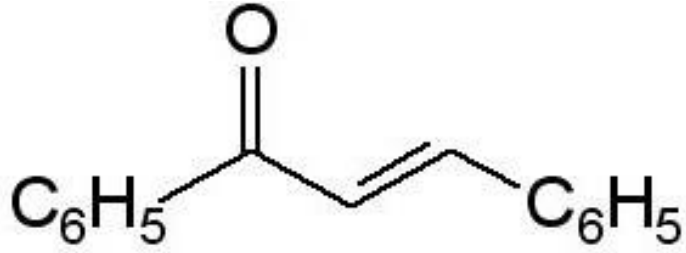


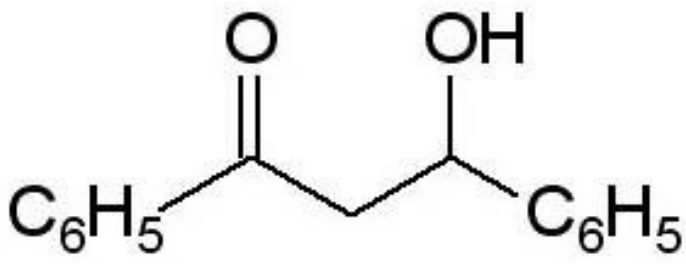
Question 37

What is the product formed in the condensation of ethyl benzoate with acetophenone?

A) 

B) 

C) 

D) 

Question 38

Which of the bases below would completely deprotonate ethyl propanoate?

A) LDA (lithium diisopropyl amide)

B) $NaOCH_2CH_3$

C) KOH

D) $NaHCO_3$

Question 39

Which one of the compounds below has the following ^{1}H-NMR: δ 1.18 (triplet, 3H), δ 2.59 (quartet, 2H), δ 7.64 (broad singlet, 5H).

A) C_6H_5-CH_2COCH_3

B) C_6H_5-$CO_2CH_2CH_3$

C) C_6H_5-$CH_2CH_2COCH_3$

D) C_6H_5-$COCH_2CH_3$

Question 40

Which of the alkyl halides below would be the best choice for the synthesis of butanoic acid from diethyl malonate?

A) bromopropane

B) chloropropane

C) iodoethane

D) fluoroethane

Answer Key – Chapter 21

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