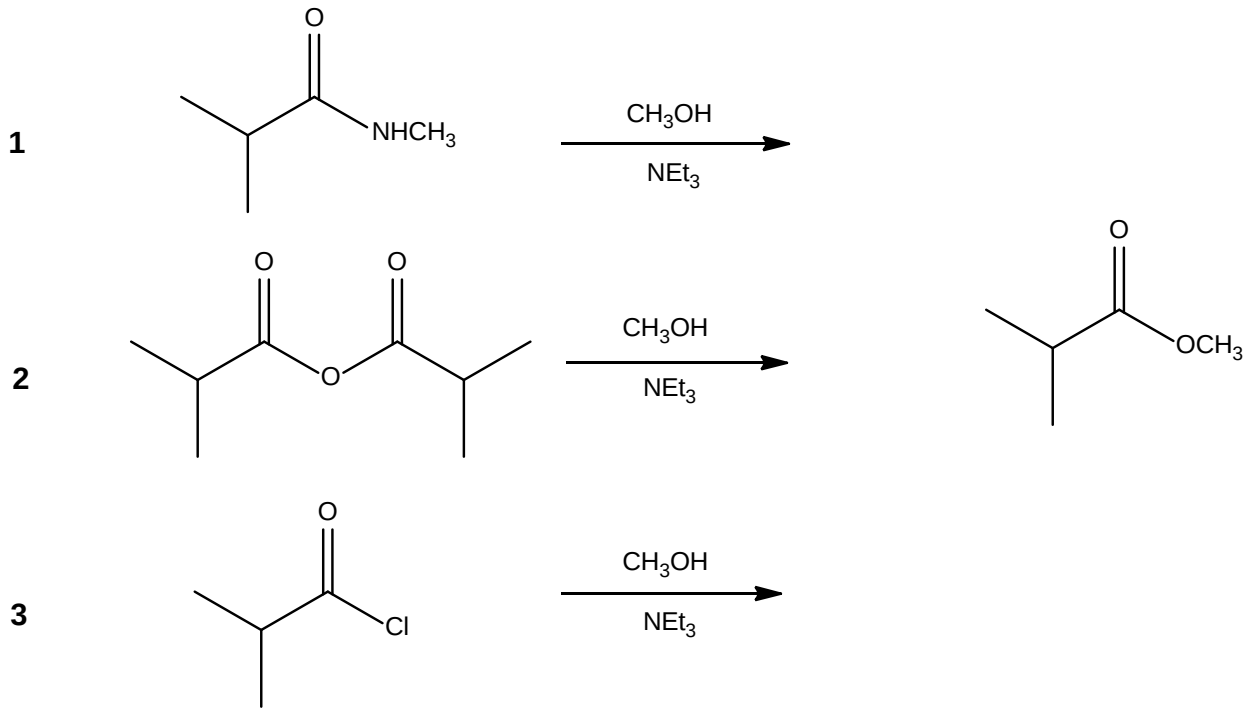
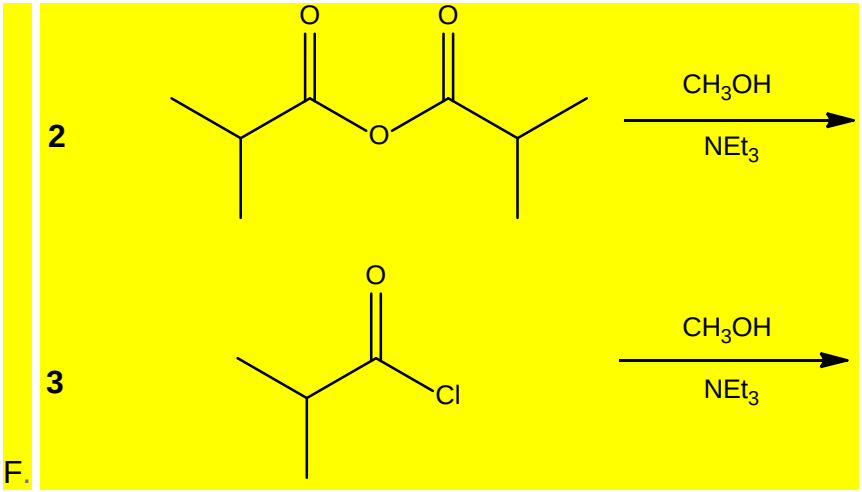
1. Select the method(s) that would produce the ester shown on the right as the major product.



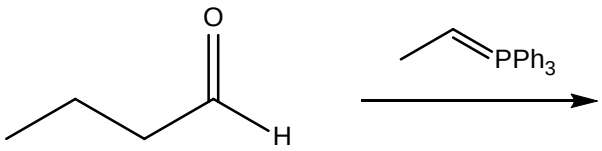
A. 1 only B. 2 only C. 3 only D. 1 or 2 E. 1 or 3 F. 2 or 3

F.

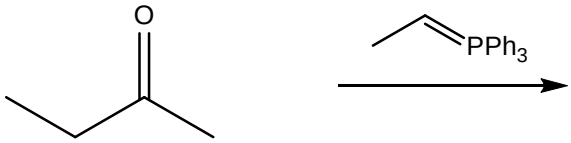


2. Each of the three reactions below will give a mixture of E and Z products. Select the order that has these reactions correctly arranged with respect to increasing % of E product.

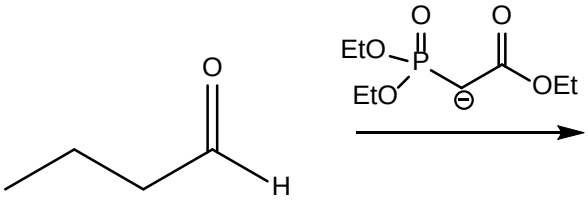
1



2



3



(A) 1 2 3 increasing → *E* product

(B) 1 3 2 increasing → *E* product

(C) 2 1 3 increasing → *E* product

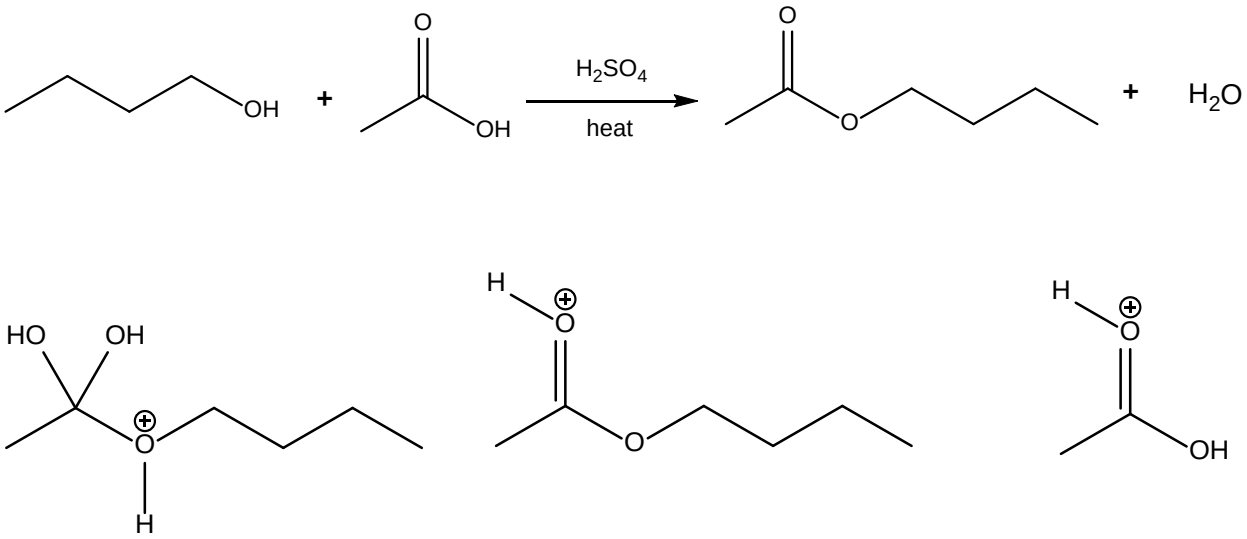
(D) 2 3 1 increasing → *E* product

(E) 3 2 1 increasing → *E* product

(F) 3 1 2 increasing → *E* product

(A) 1 2 3 increasing → *E* product

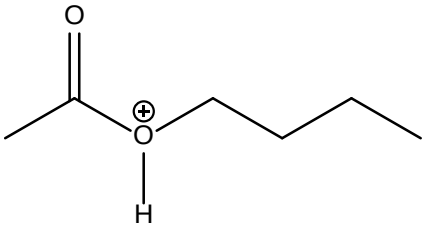
3. Select the compound that is least likely to be an intermediate formed during the course of the following Fischer esterification reaction.



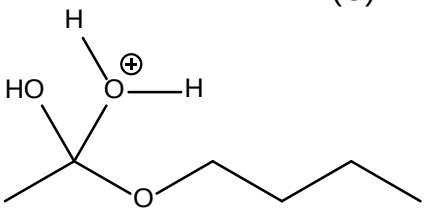
(A)

(B)

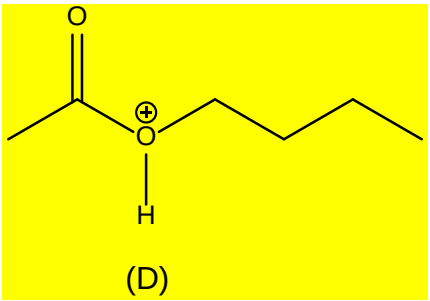
(C)



(D)

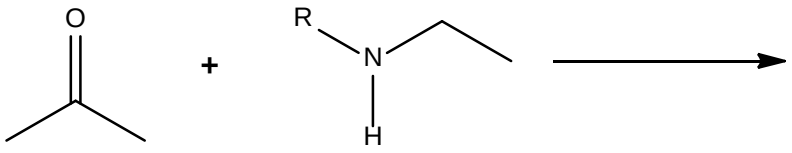


(E)

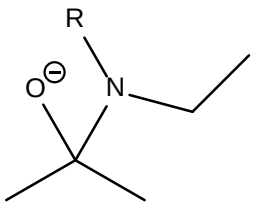


(D)

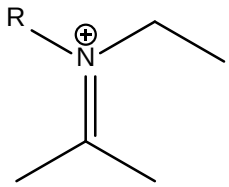
4. Depending on whether R = H or an ethyl group, the following reaction will yield an imine or enamine. The mechanisms for each reaction are very similar and go through several intermediates. Choose the structure that represents the last common intermediate for the two reactions, which undergoes a different mechanistic step depending on whether R = H or ethyl.



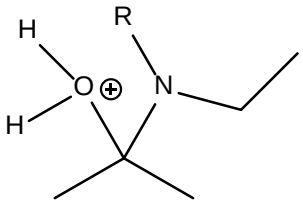
R = H or ethyl



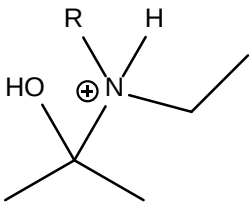
(A)



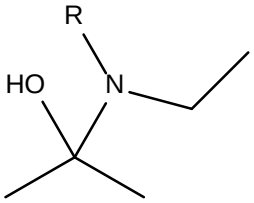
(B)



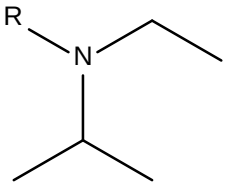
(C)



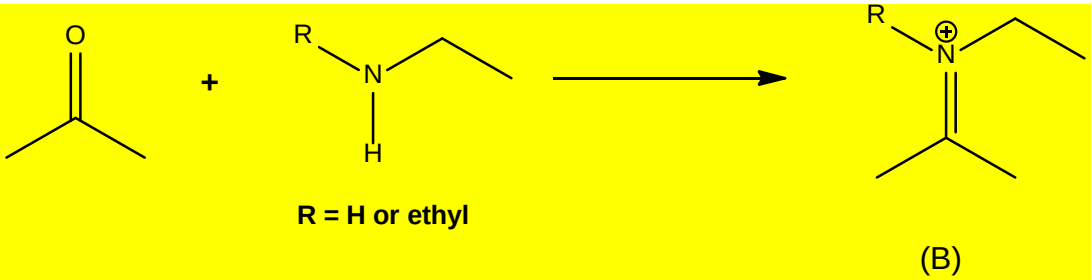
(D)



(E)



(F)

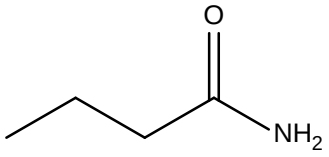


R = H or ethyl

(B)

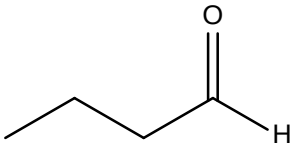
5. Which two reaction sequences will form the same product?

1



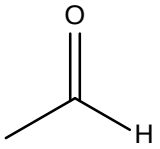
1. $H_3O^{\oplus}$
2. CH_3OH, $H^{\oplus}$
3. C_2H_5MgBr

2



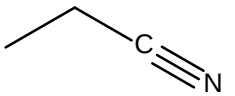
1. C_2H_5MgBr
2. $H^{\oplus}$
3. PCC

3



1. HCN, KCN
2. C_3H_7MgBr
3. $H_3O^{\oplus}$

4

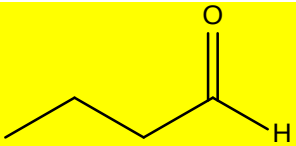


1. C_3H_7MgBr
2. $H_3O^{\oplus}$

A. 1 and 2 B. 1 and 3 C. 1 and 4 D. 2 and 3 E. 2 and 4 F. 3 and 4

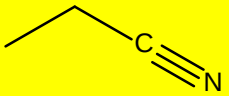
E.

2



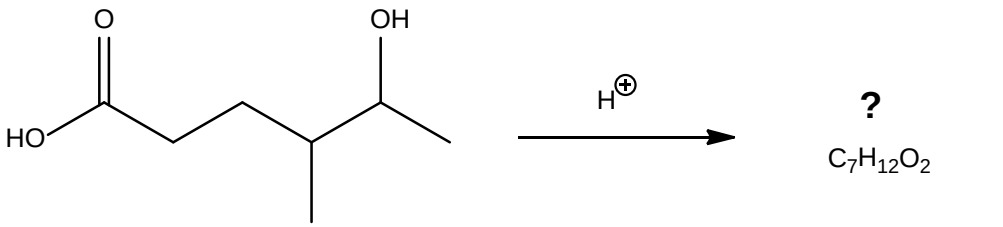
1. C_2H_5MgBr
2. $H^{\oplus}$
3. PCC

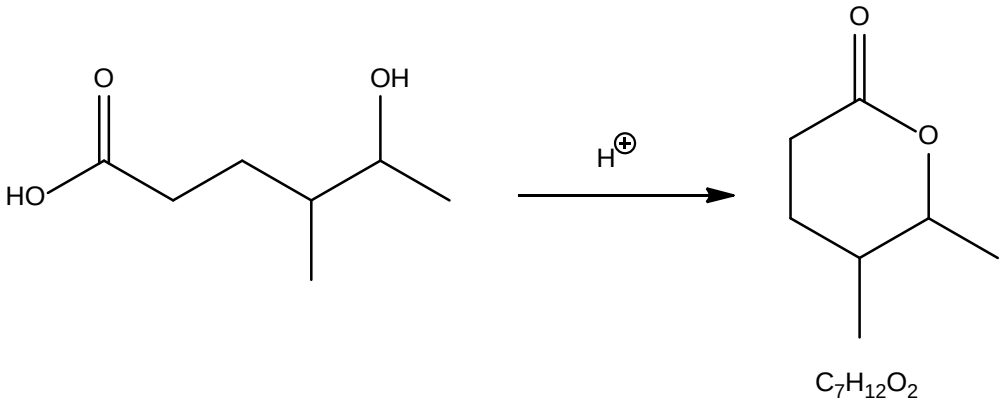
4



1. C_3H_7MgBr
2. $H_3O^{\oplus}$

6. Predict and draw the major product of the following reaction. (5 points)





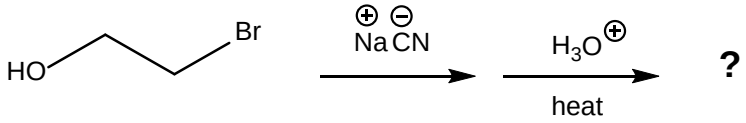
7. The geometry and hybridization of the carbonyl carbon in a carboxylic acid is:

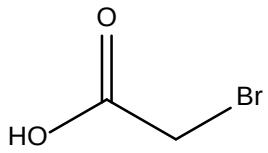
(A) sp^3 ,tetrahedral (B) sp^2 ,trigonal planar (C) sp^2 ,tetrahedral

(D) sp^3 ,trigonal planar (E) sp ,trigonal planar

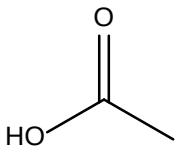
(B) sp^2 ,trigonal planar

8. Select the major product of the following reaction sequence.

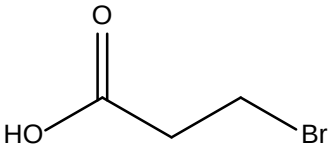




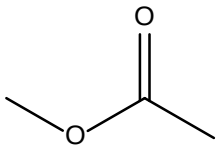
(A)



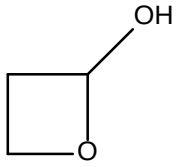
(B)



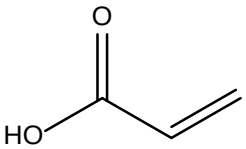
(C)



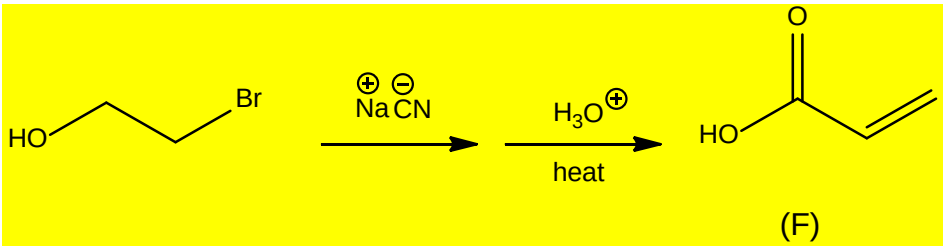
(D)



(E)

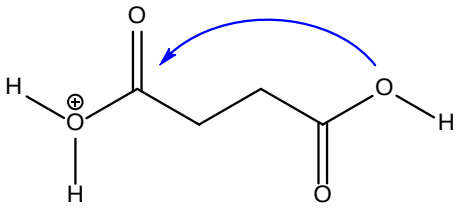


(F)

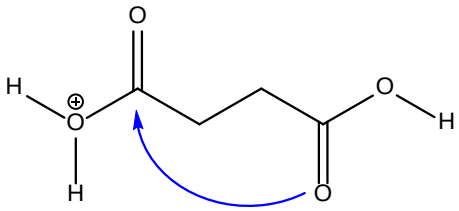


(F)

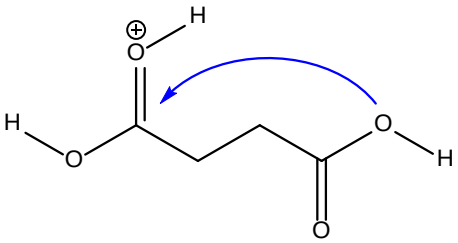
9. Assuming that a mechanism follows the pathway involving the lowest energy intermediates possible, which of the following illustrates a step in the acid-catalyzed anhydride formation from a dicarboxylic acid?



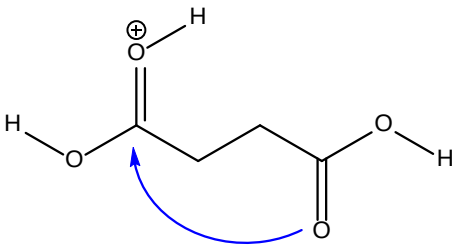
(A)



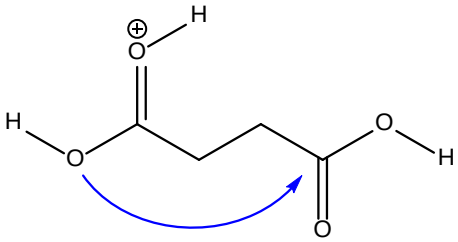
(B)



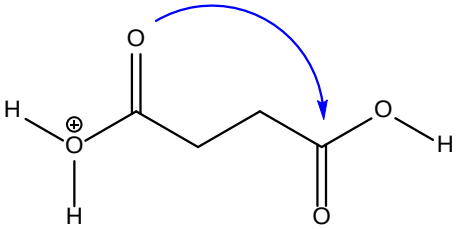
(C)



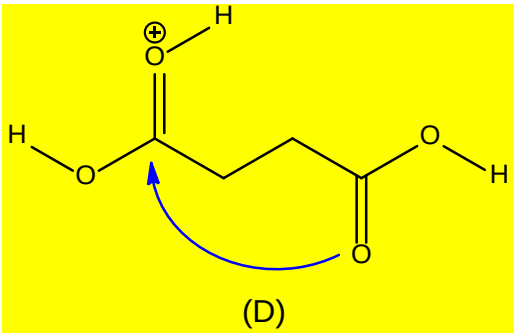
(D)



(E)

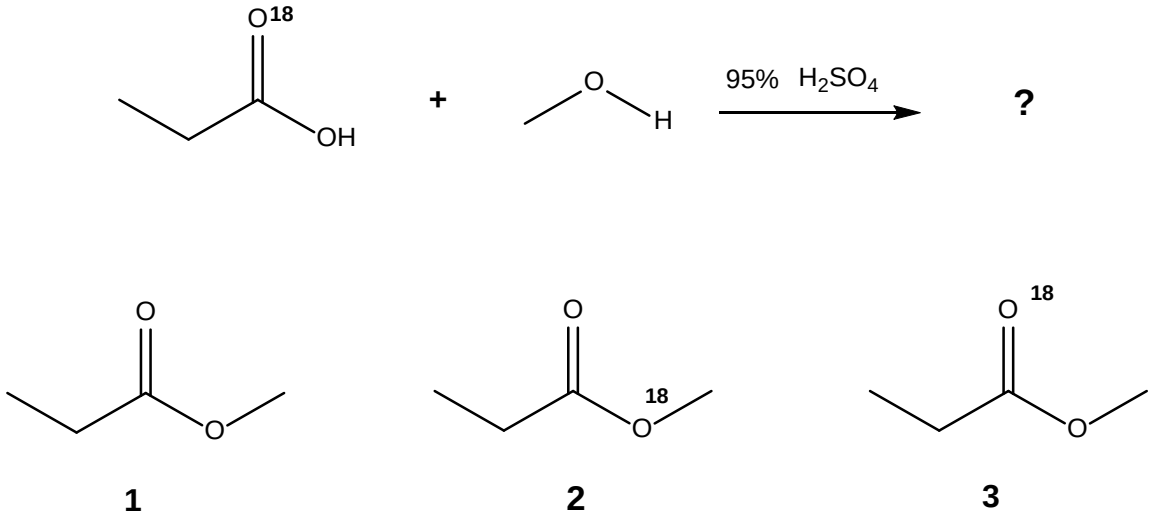


(F)



(D)

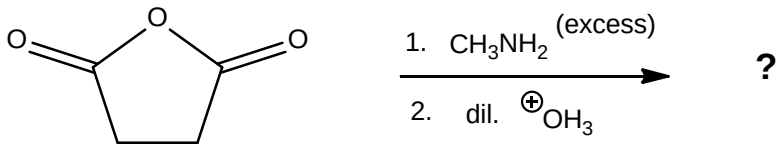
10. Choose the major product(s) of the following reaction which utilizes radiolabeling. (WS6 online quiz; q6)

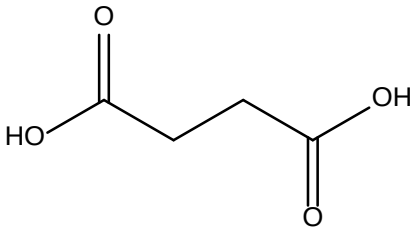


(A) 1 only (B) 2 only (C) 3 only (D) 1 + 2 (E) 1 + 3 (F) 2 + 3

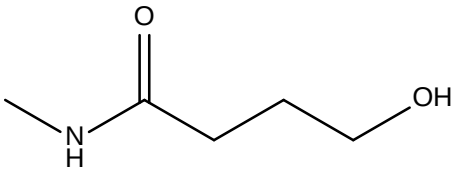
(E) 1 + 3

11. Choose the major product of the following reaction.

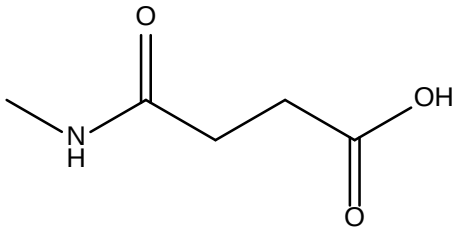




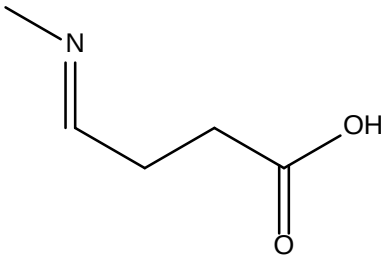
(A)



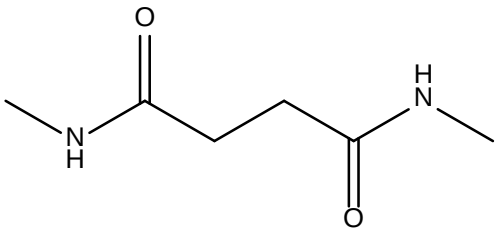
(B)



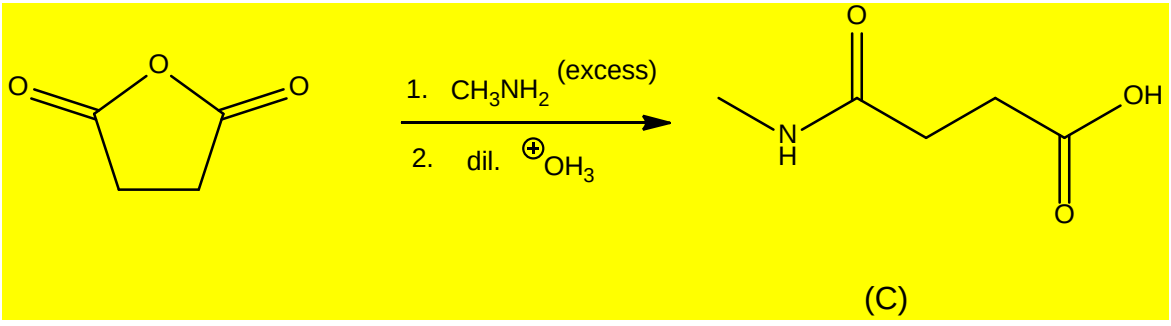
(C)



(D)

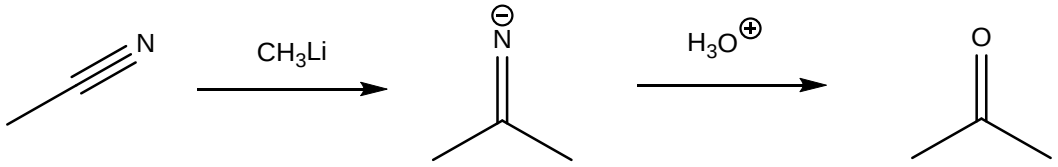


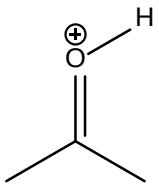
(E)



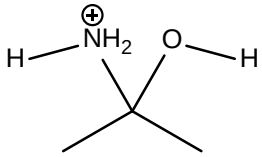
(C)

12. Select the intermediate that is least likely formed during the course of the second reaction of the following synthesis of acetone.

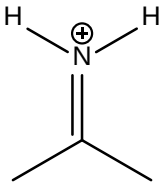




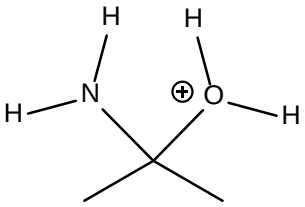
(A)



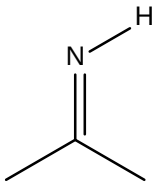
(B)



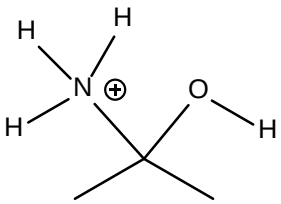
(C)



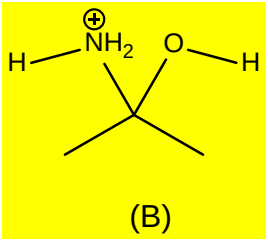
(D)



(E)

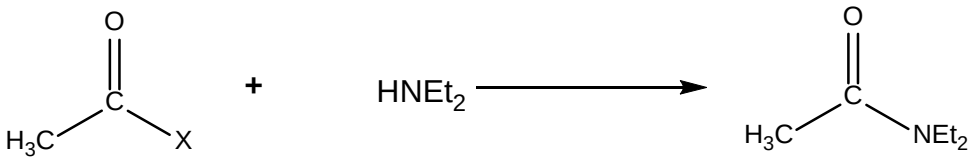


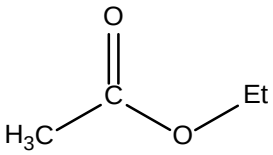
(F)



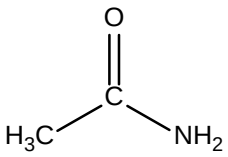
(B)

13. Choose the order that has the following compounds correctly arranged with respect to increasing reactivity in the following reaction. Class quiz

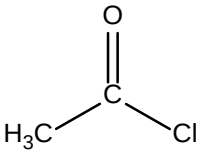




1



2



3

(A) 1 2 3 increasing reactivity

(B) 1 3 2 increasing reactivity

(C) 2 1 3 increasing reactivity

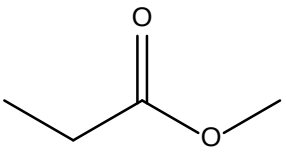
(D) 2 3 1 increasing reactivity

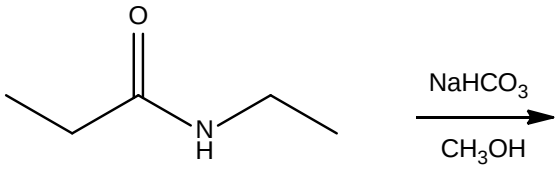
(E) 3 2 1 increasing reactivity

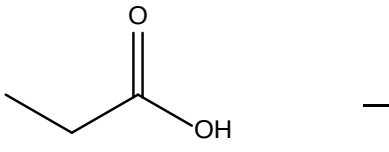
(F) 3 1 2 increasing reactivity

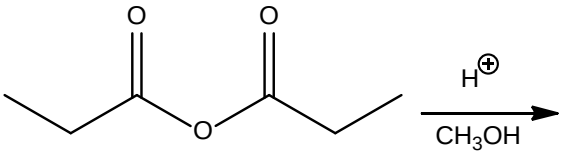
(C) 2 1 3 increasing reactivity

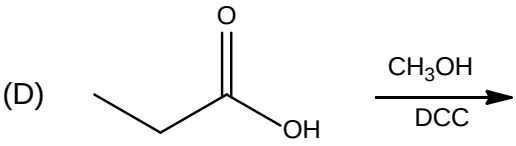
14. Select the worst method to produce the following ester. (WS7 online quiz; q4)

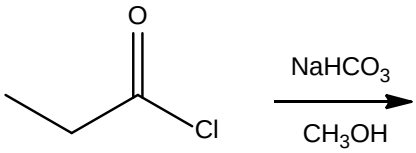


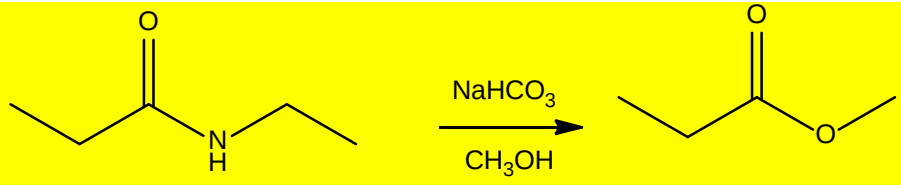
(A) 

(B) 

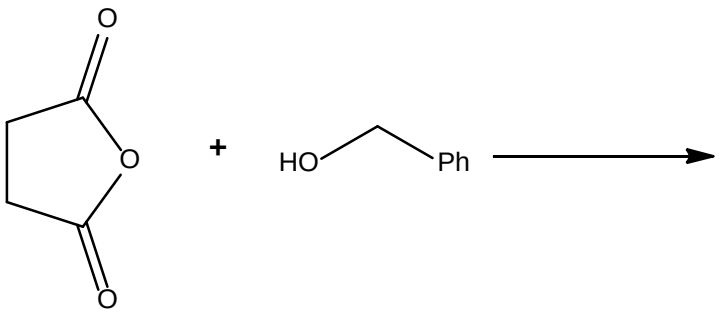
(C) 

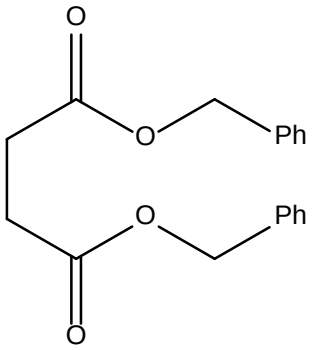
(D) 

(E) 

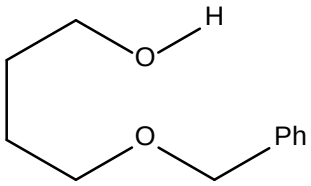
(A) 

15. Choose the correct product of the following reaction. Text 17.30

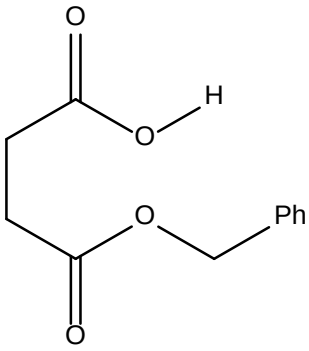




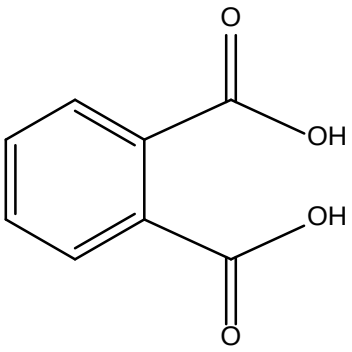
(A)



(B)



(C)



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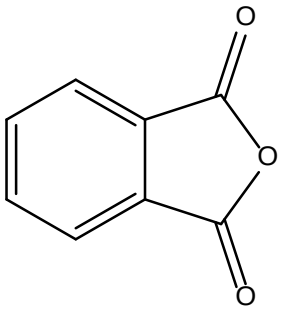
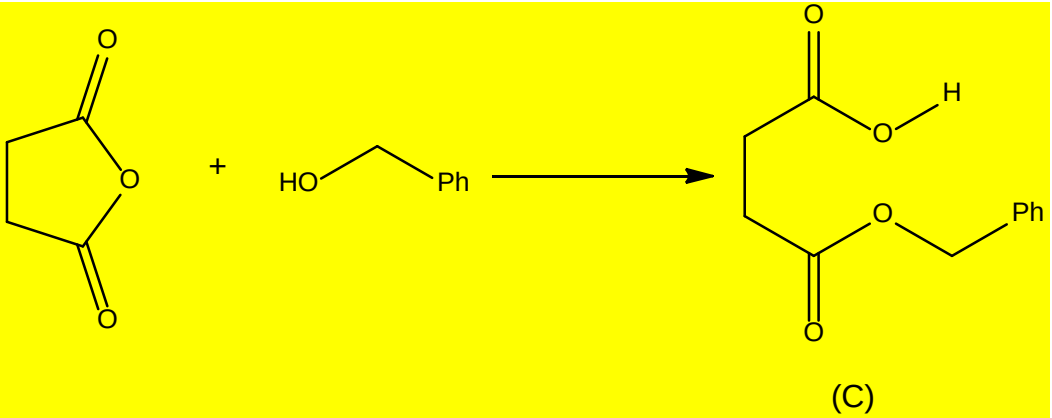


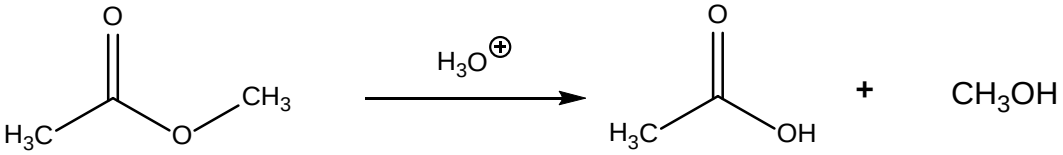
(E)

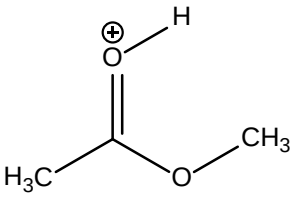


(C)

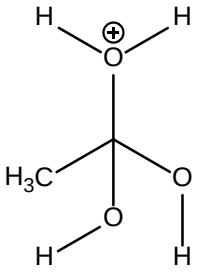
16. Choose the structure that is not an intermediate in acid catalyzed ester hydrolysis.

Text 17.9

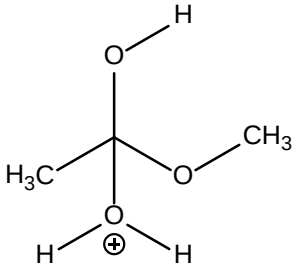




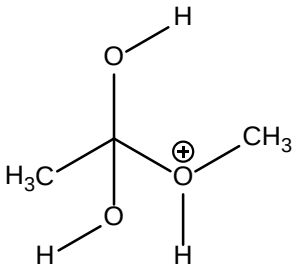
(A)



(B)



(C)



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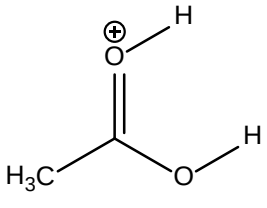
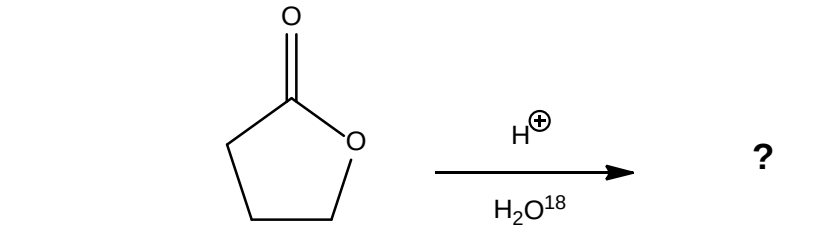
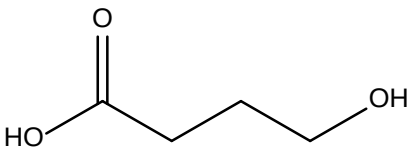


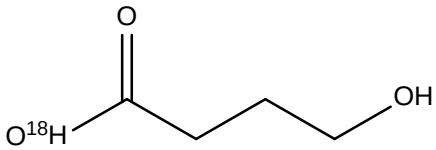
(E)

17. Choose the major product(s) formed from the following reaction, which utilizes isotope labeling. (WS7 online quiz; q6)

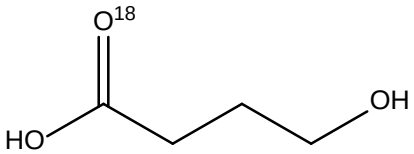




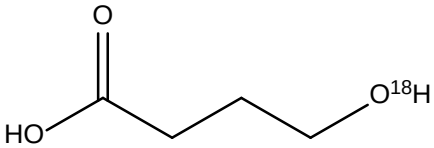
i



ii



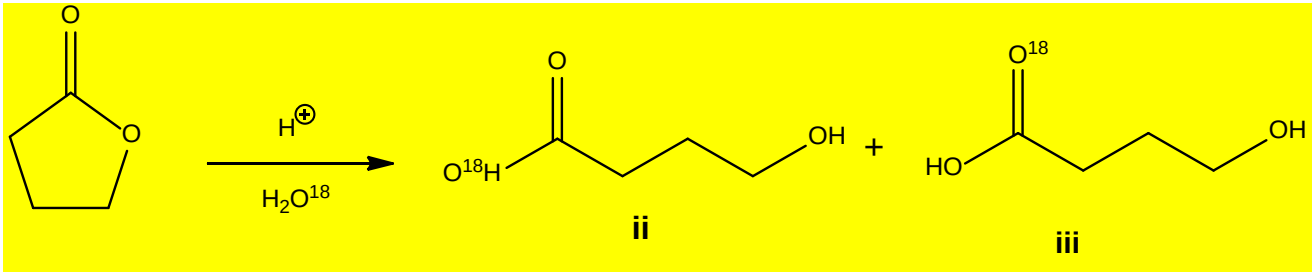
iii



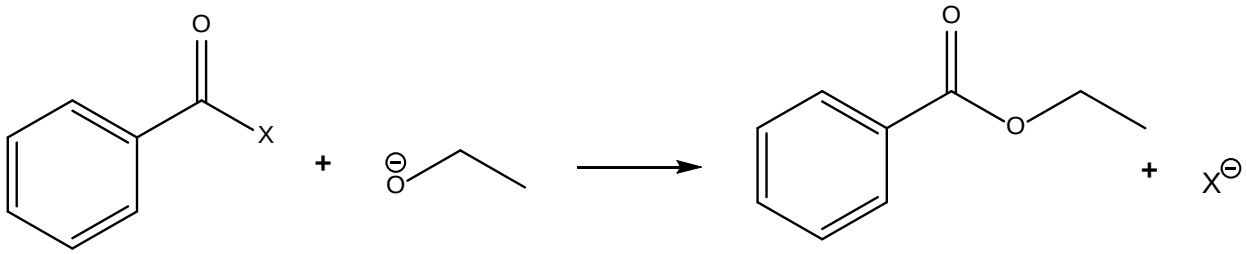
iv

(A) i (B) ii (C) i + ii (D) ii + iii (E) ii + iv (F) iii + iv

(D)



18. Choose the order that has the following benzoyl compounds correctly arranged with respect to *increasing* reactivity. class quiz



X = OCH_3 **1**

X = Cl **2**

X = SCH_3 **3**

(A) 1 2 3 increasing reactivity

(B) 1 3 2 increasing reactivity

(C) 2 1 3 increasing reactivity

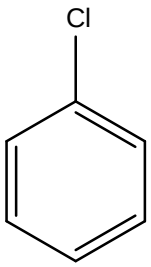
(D) 2 3 1 increasing reactivity

(E) 3 2 1 increasing reactivity

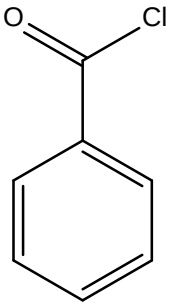
(F) 3 1 2 increasing reactivity

(B) 1 3 2 increasing reactivity

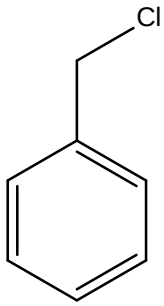
19. Choose the compound that corresponds to the name benzoyl chloride. Text 17.18



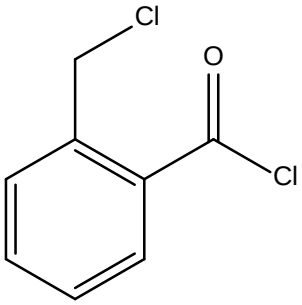
(A)



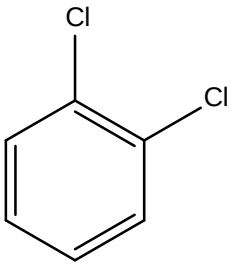
(B)



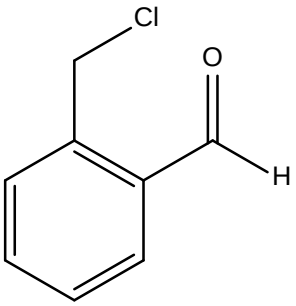
(C)



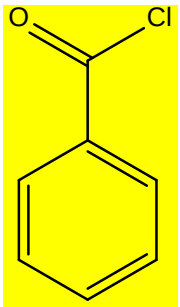
(D)



(E)



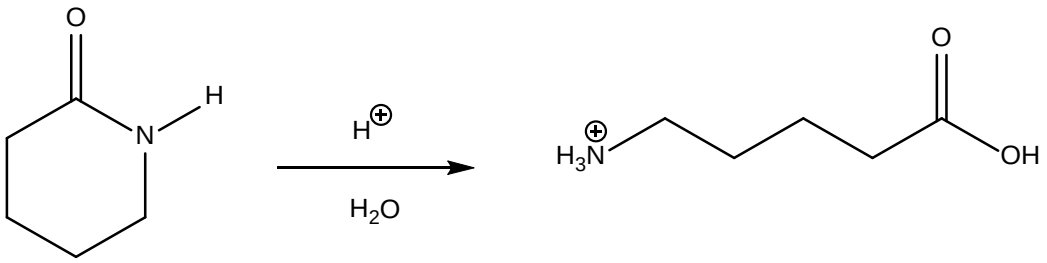
(F)

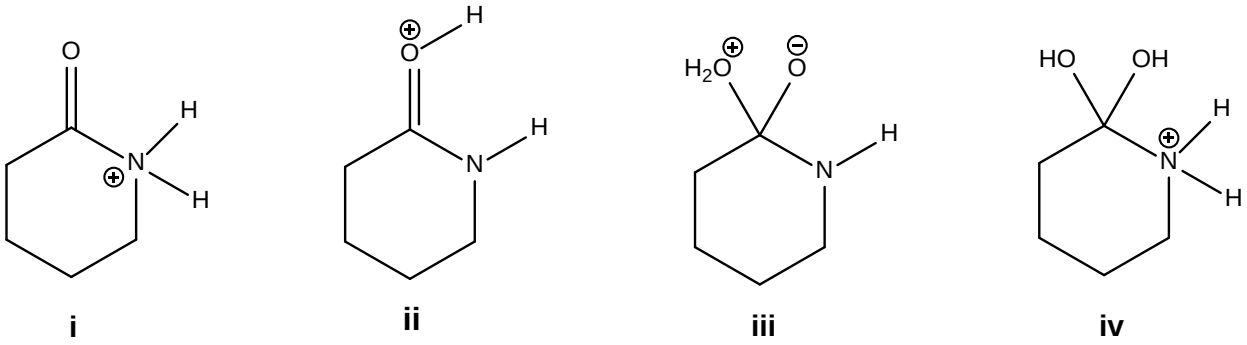


(B)

20. Choose the intermediate(s) in the acid catalyzed hydrolysis of the following amide.

Class quiz



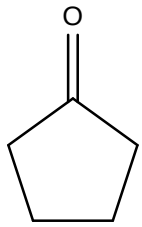


(A) i + ii (B) ii + iii (C) iii + iv (D) i + iii (E) ii + iv (F) i + iv

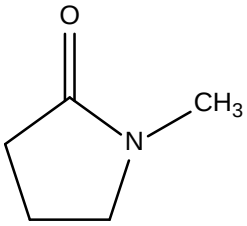
(E) ii + iv

21. Arrange the following compounds in order of their reactivity toward $LiAlH_4$.

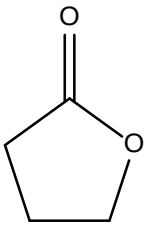
Class quiz



1



2



3

(A) 1 2 3 increasing reactivity

(B) 1 3 2 increasing reactivity

(C) 2 1 3 increasing reactivity

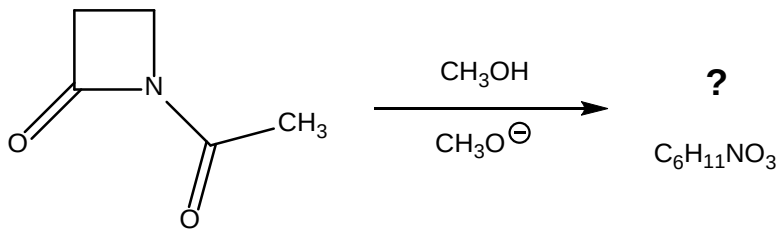
(D) 2 3 1 increasing reactivity

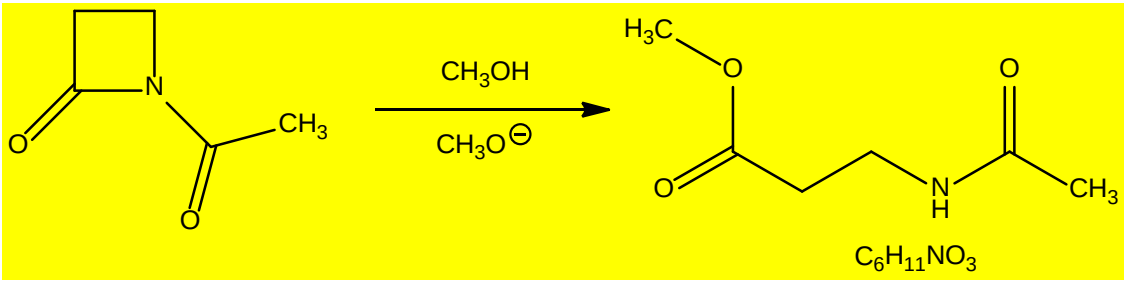
(E) 3 2 1 increasing reactivity

(F) 3 1 2 increasing reactivity

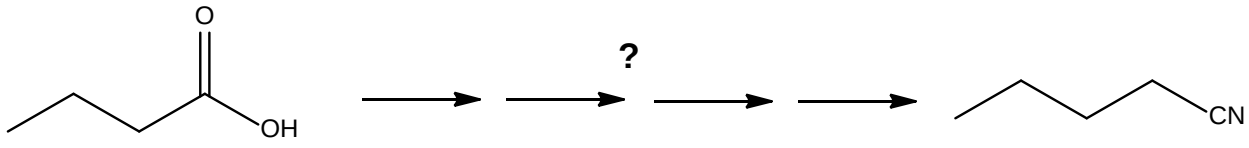
(D) 2 3 1 increasing reactivity

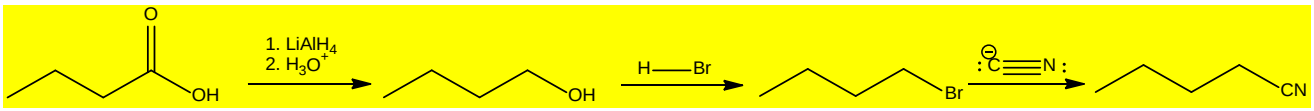
22. Predict the major product of the following reaction. 5 pts



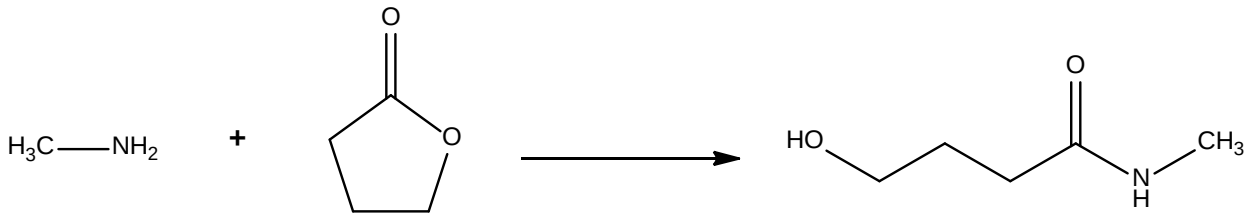


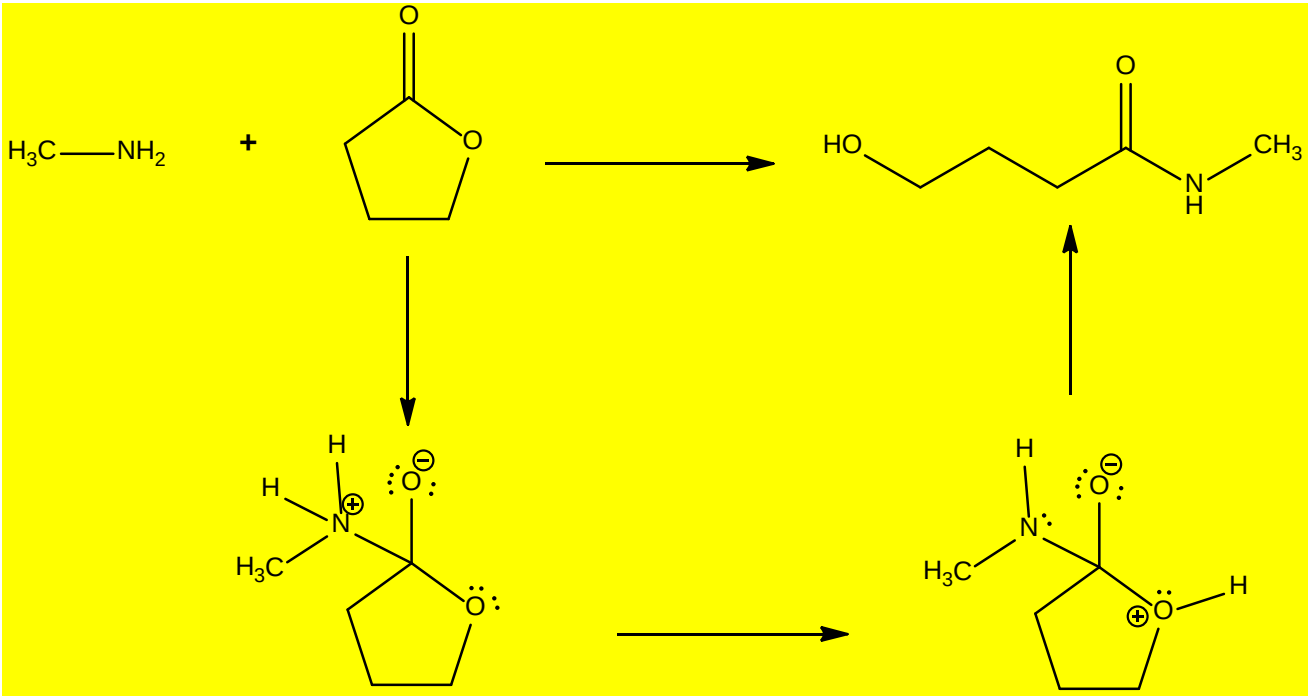
23. Give reagents that could be used to accomplish the following transformation. The number of arrows does not necessarily correspond to the number of required steps, but more than one reaction will be necessary. Your answer only needs to show the reagents. 5 pts (WS7 pt 2; q1)



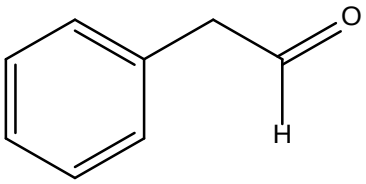


24. Using the curved arrow formalism show how the bond making and bond breaking occurs in the following reaction. 5 pts

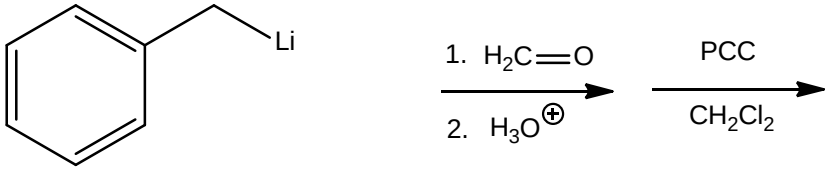




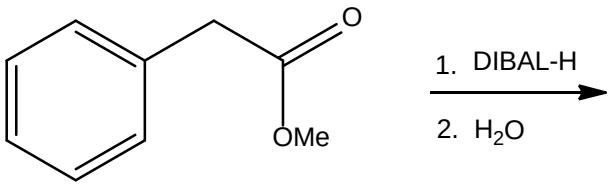
25. Choose all of those reaction sequences that would be successful syntheses of the following aldehyde.



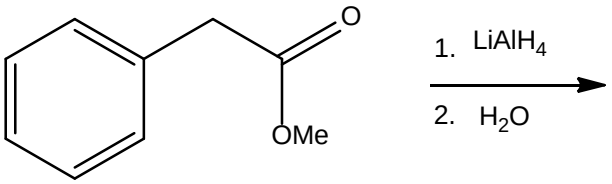
(1)



(2)



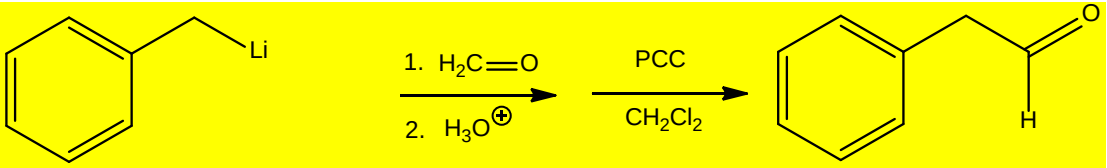
(3)



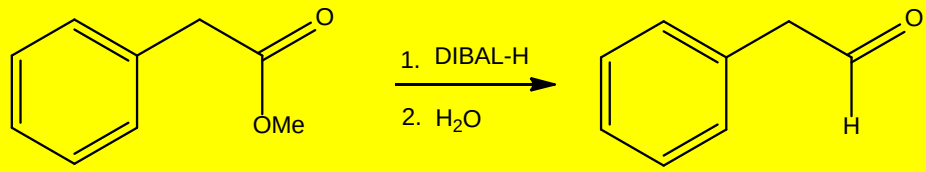
(A) 1 (B) 2 (C) 3 (D) 1 + 2 (E) 2 + 3

(D)

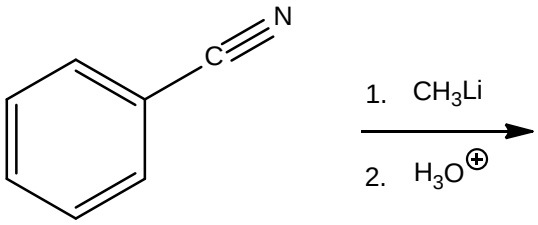
(1)

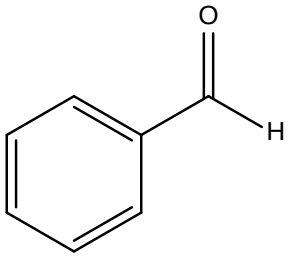


(2)

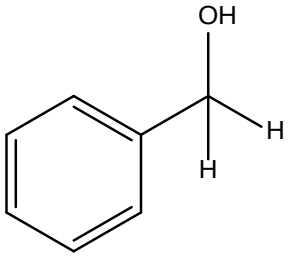


26. Choose the major product of the following reaction.

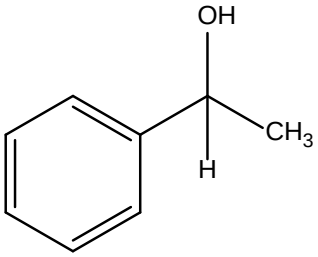




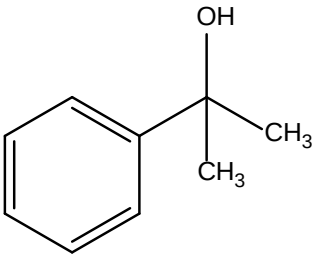
(A)



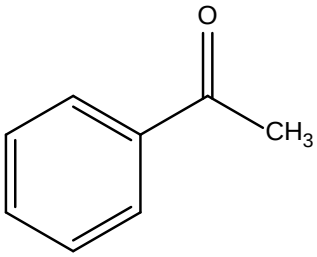
(B)



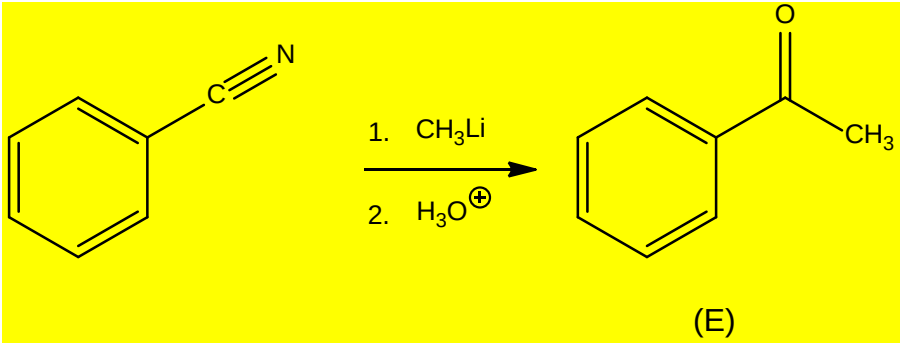
(C)



(D)

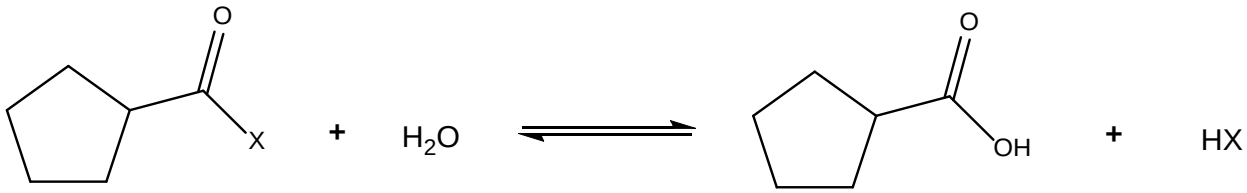


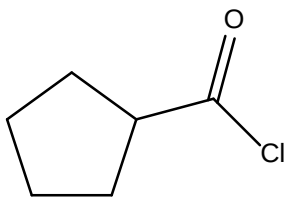
(E)



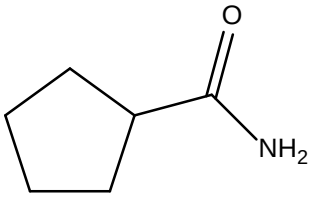
(E)

27. Choose the order that has the following carbonyl groups correctly arranged with respect to increasing reactivity with water.

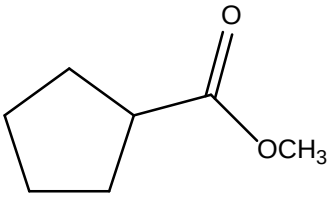




1



2



3

(A) 1 2 3 increasing reactivity

(B) 1 3 2 increasing reactivity

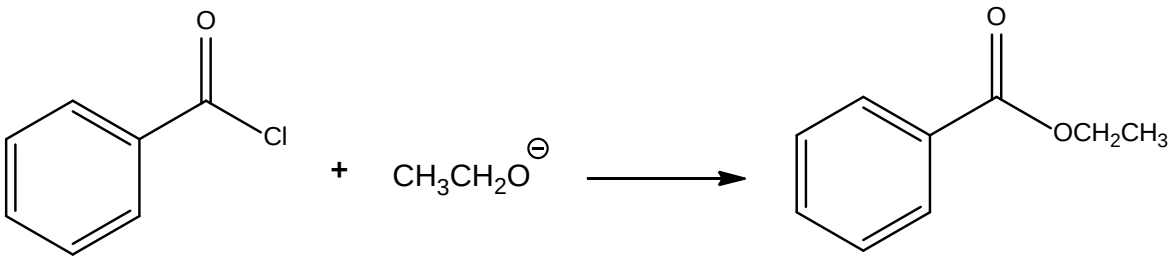
(C) 2 1 3 increasing reactivity

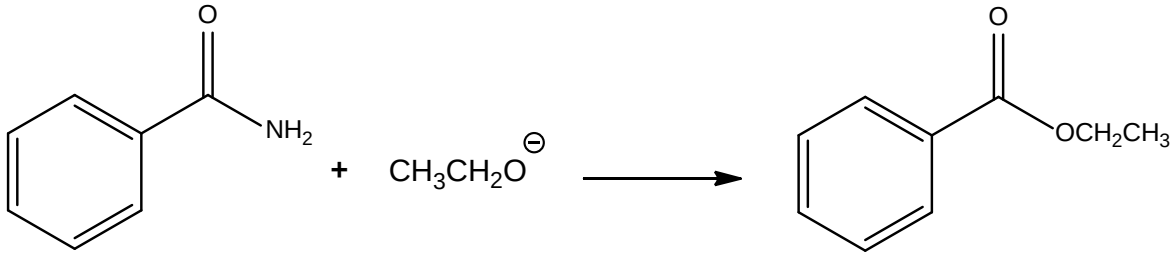
(D) 2 3 1 increasing reactivity

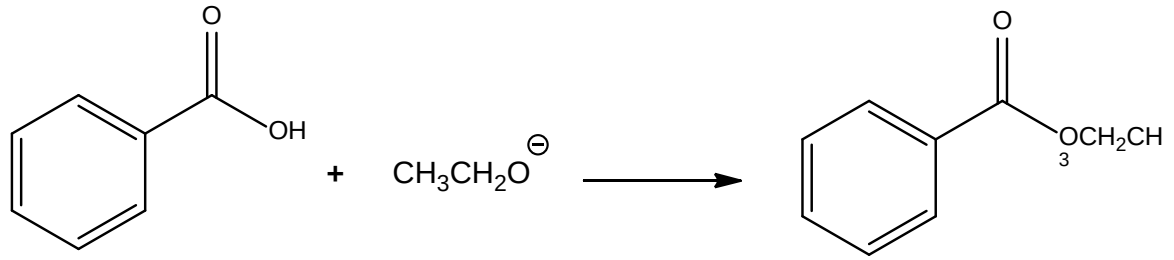
(E) 3 2 1 increasing reactivity

(D) 2 3 1 increasing reactivity

28. Choose the reactions that would not work for the preparation of an ester according to the following reaction scheme.

(1) 

(2) 

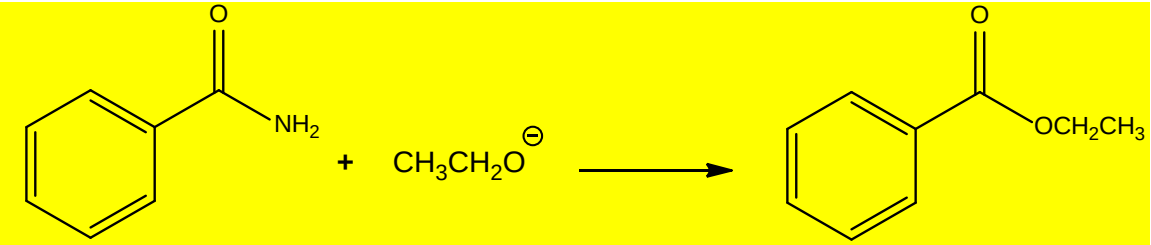
(3) 

(A) 1 (B) 2 (C) 3 (D) 1 + 2 (E) 2 + 3

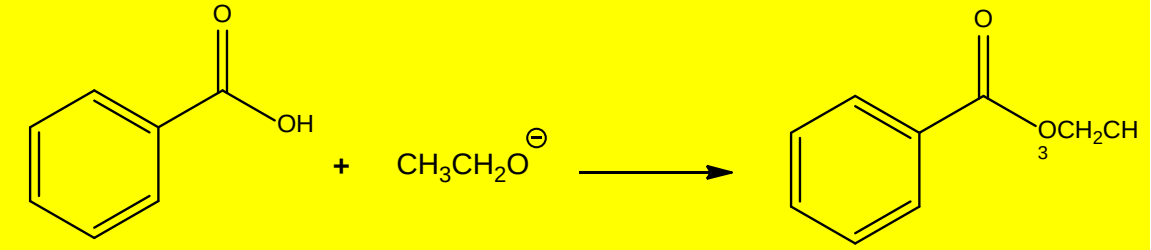
(See next page)

(E)

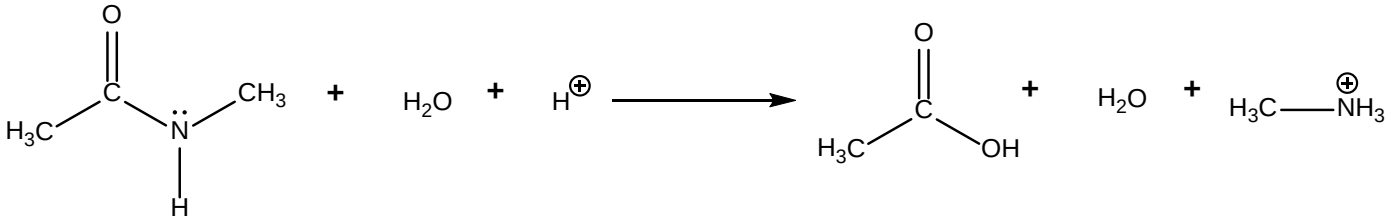
(2)

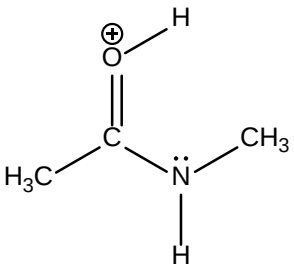


(3)

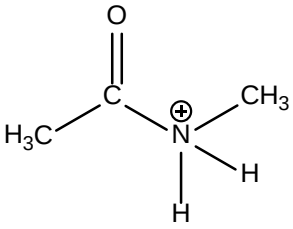


29. Choose the species that is most likely not to be an intermediate in the acid catalyzed hydrolysis of the following amide to the carboxylic acid.

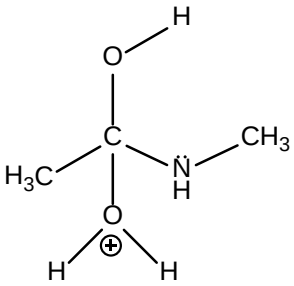




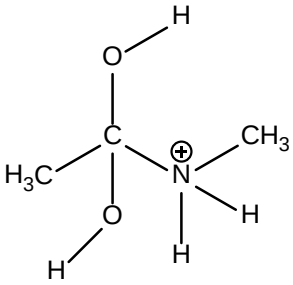
(A)



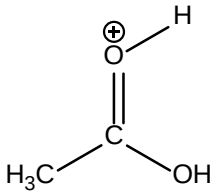
(B)



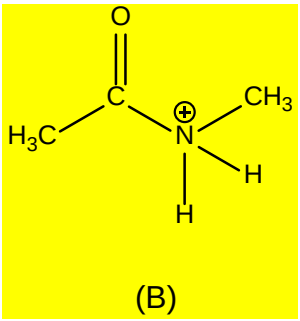
(C)



(D)



(E)



(B)

30. Predict the major products of the following reaction. 5 pts