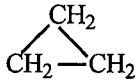
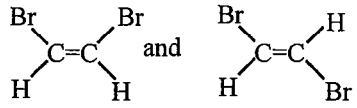
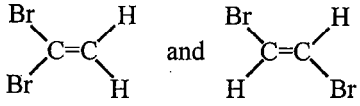
化學

(D)1. Which of the following represent a pair of constitutional isomers?

(A) $CH_3CH_2CH_3$ and 

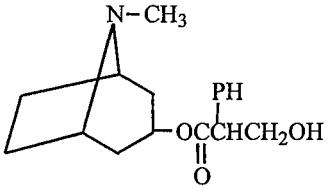
(B) $CH_3CH{=}CH_2$ and $CH_2{=}CHCH_3$

(C) 

(D) 

(E) more than one of these

(E)2. Which of the following functional groups is not in atropine?



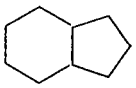
(A) amine (B) ester (C) alcohol (D) benzene ring (E) ketone

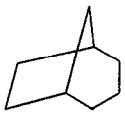
(C)3. Which combination of reagents is the least effective in generating sodium ethoxide, CH_3CH_2ONa?

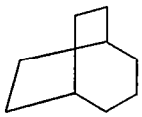
(A) $CH_3CH_2OH + NaH$ (B) $CH_3CH_2OH + NaNH_2$ (C) $CH_3CH_2OH + NaOH$

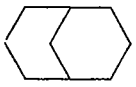
(D) $CH_3CH_2OH + CH_3Li$ (E) $CH_3CH_2OH + HC{\equiv}CNa$

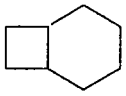
(C)4. Which of the following is bicyclo [3,2,2] nonane?

(A) 

(B) 

(C) 

(D) 

(E) 

(B)5. The most stable conformation of cis-1-tert-butyl-4-methyl-cyclohexane is the one in which :

(A) the tert-butyl group is axial and the methyl group is equatorial.

(B) the methyl group is axial and the tert-butyl group is equatorial.

(C) both groups are axial.

(D) both groups are equatorial.

(E) the twist boat conformation is adopted.

(D)6. Which of the following is true about any (R)-enantiomer?

(A) it is dextrorotatory.

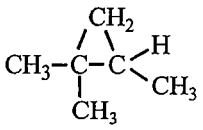
(B) it is levorotatory.

(C) it is an equal mixture of + and − .

(D) it is the mirror image of the (s)-enantiomer.

(E) (R) indicates a racemic mixture.

(B)7. What would you expect to be the chief organic product(s) when tert-butyl bromide reacts with sodium acetylide.

(A) $(CH_3)_3CC{\equiv}CH$ (B) $(CH_3)_2C{=}CH_2$ and $HC{\equiv}CH$ (C) 

(D) $(CH_3)_2CHCH_2C{\equiv}CH$ (E) none of these

(B)8. S_N2 reactions of the type, $Nu:^- + RL \rightarrow R\text{-}Nu + :L^-$, are favored :

(A) when tertiary substrates are used.

(B) by using a high concentration of the nucleophile.

(C) by using a solvent of high polarity.

(D) by the use of weak nucleophiles.

(E) by none of the above.

(B)9. Which nucleophilic substitution reaction would be unlikely to occur?

(A) $Br^- + CH_3\overset{+}{O}H_2 \rightarrow CH_3Br + H_2O$

(B) $NH_3 + CH_3\overset{+}{O}H_2 \rightarrow CH_3 - \overset{+}{N}H_3 + H_2O$

(C) $I^- + CH_3Cl \rightarrow CH_3I + Cl^-$

(D) $CH_3CH_2I + OH^- \rightarrow CH_3CH_2OH + I^-$

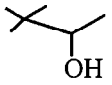
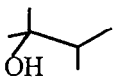
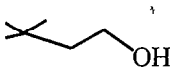
(E) more than one of the above.

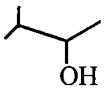
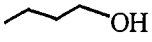
(E)10. You want to synthesize 2-methyl-1-butene from 2-chloro-2-methylbutane. Which reagent would you use?

(A) $NaOH/H_2O$ (B) KOH/H_2O (C) CH_3ONa/CH_3OH (D) CH_3SNa/H_2O

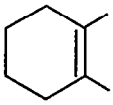
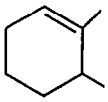
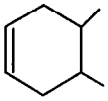
(E) $(CH_3)_3COK/(CH_3)_3COH$

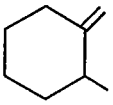
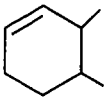
(B)11. Which one of the following alcohols would dehydrate most rapidly when treated with sulfuric acid?

(A)  (B)  (C) 

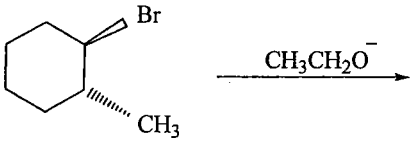
(D)  (E) 

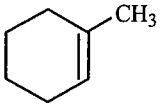
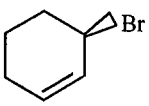
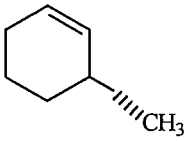
(A)12. Which molecule would have the lowest heat of hydrogenation?

(A)  (B)  (C) 

(D)  (E) 

(C)13. Predict the major product.



(A)  (B)  (C) 

(D) equal amounts of (A) and (C).

(E) reaction will not occur.

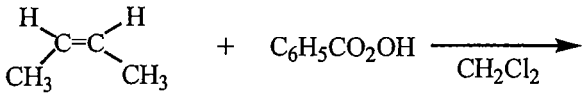
(A)14. The structure of the product, C, of the following sequence of reactions would be :

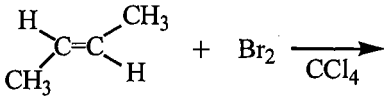
$$C_6H_5C{\equiv}CH \xrightarrow[NH_3(\ell)]{NaNH_2} \xrightarrow{CH_3CH_2Br} \xrightarrow[Ni_2B]{H_2} C$$

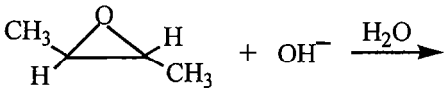
(A) cis-$C_6H_5CH{=}CHCH_2CH_3$ (B) cis-$C_6H_5CH{=}CHCH_3$ (C) trans-$C_6H_5CH{=}CHCH_2CH_3$

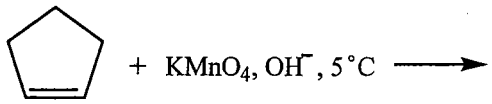
(D) $C_6H_5C{\equiv}CCH_2CH_2Br$ (E) $C_6H_5CH_2CH_2CH_2CH_3$

(E)15. Which reaction is NOT stereospecific?

(A) 

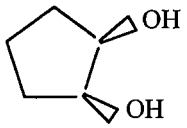
(B) 

(C) 

(D) 

(E) $CH_3CH_2COCH_3 + H_2 \xrightarrow{Pt}$

(A)16. What sequence of reactions could be used to prepare the compound below from cyclopentane?



(A) 1.Cl_2, hυ 2.t-BuOK, t-BuOH 3.OsO_4 4.$NaHSO_3$, H_2O

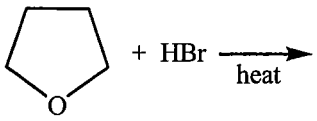
(B) 1.t-BuOK, t-BuOH 2.Cl_2, hυ 3.NaOH, H_2O

(C) 1.Cl_2, hυ 2.t-BuOK, t-BuOH 3.H_2O_2

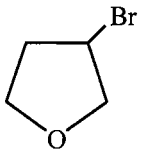
(D) 1.NaOH, H_2O 2.Br_2 3.2$NaNH_2$, $NH_{3(\ell)}$ 4.$KMnO_4$, NaOH, H_2O, 5 °C

(E) 1.Cl_2, hυ 2.t-BuOK, t-BuOH 3.RCO_2OH 4.H_2O, H^+

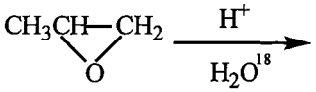
(D)17. The product(s) of the following reaction



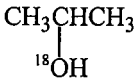
(A) $CH_3CH_2OCH_2CH_3$ (B) $CH_3CH_2CH_2CH_2Br$ (C) $CH_3CH_2CH_2CH_2OH$

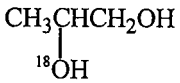
(D) $BrCH_2CH_2CH_2CH_2OH$ (E) 

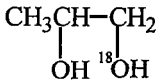
(C)18. Select the structure of the major product formed in the following reaction.

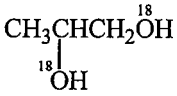


(A) 

(B) 

(C) 

(D) 

(E) 

(C)19. Which is the best method to prepare tert-butyl methyl ethers?

(A) $CH_3ONa + (CH_3)_3CBr$

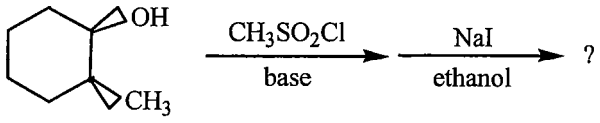
(B) $CH_3ONa + (CH_3)_2CHCH_2Br$

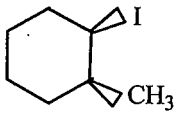
(C) $CH_3CH{=}CH_2 + H_2SO_4$ then CH_3OH

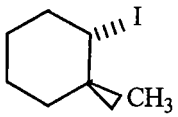
(D) $CH_3OH + (CH_3)_3CBr$

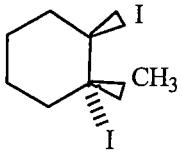
(E) $CH_3OH + (CH_3)_3COH$, H_2SO_4, 140°C

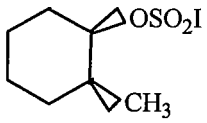
(B)20. What would be the major product of the following reaction?



(A) 

(B) 

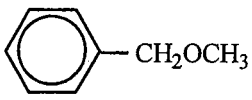
(C) 

(D) 

(E) an equimolar mixture of (A) and (B)

(A)21. Which of these ethers is least likely to undergo significant cleavage by hot aqueous H_2SO_4?

(A) CH_3OCH_3 (B) $CH_3OCH(CH_3)_2$ (C) $(CH_3)_2CHOCH(CH_3)_2$

(D) $(CH_3)_3COC(CH_3)_3$ (E) 

(B)22. cis-3-Hexene is treated magnesium monoperoxyphthalate and the product is then subjected to acid-catalyzed hydrolysis. What is the final product?

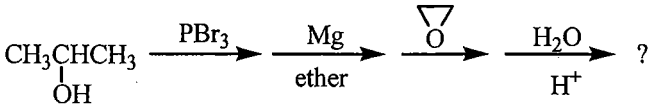
(A) (R)- and (S)-3-hexene.

(B) (3R,4R)- and (3S,4S)-3,4-hexanediol.

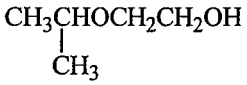
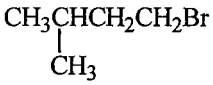
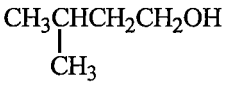
(C) meso-3,4-hexanediol.

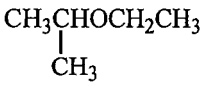
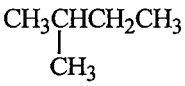
(D) (3R,4S)-3,4-epoxyhexane.

(E) (3R,4R)-3,4-epoxyhexane.

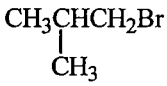
(C)23. 

What is the final product?

(A) 
(B) 
(C) 

(D) 
(E) 

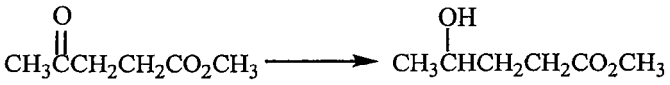
(E)24. You task is to synthesize 2-phenyl-2-hexanol through a Grignard synthesis. Which pair(s) of compounds list below would you choose as starting materials?

(A) $CH_3CH_2CH_2CH_2Br$ and $C_6H_5COCH_3$ (B)  and $C_6H_5COCH_3$

(C) $CH_3CH_2CH_2CH_2COCH_3$ and C_6H_5Br (D) (A) and (B)

(E) (A) and (C)

(A)25. Select the correct reagent(s) for the following reaction :



(A) $LiAlH_4$; then H^+ (B) $NaBH_4$; then H^+ (C) H_2 with Pt/c (D) (A) and (B) (E) (A), (B) and (C)

(E)26. Which of these compounds cannot be used to prepare the corresponding Grignard reagent?

(A) $CH_3OCH_2CH_2CH_2Br$ (B) $(CH_3)_3CCl$ (C) $CH_2{=}CHCH_2Br$ (D) $(CH_3)_2NCH_2CH_2Br$

(E) CH_3COCH_2I

(C)27. Which of these reactions will not produce a 1° alcohol?

(A) $CH_3CH_2\overset{O}{\overset{\|}{C}}OCH_2CH_2CH_3$ + $LiAlH_4$, ether; then H_3O^+

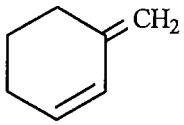
(B) $(CH_3)_2CHCH_2CH_2MgBr$ + $\underset{\diagdown O \diagup}{CH_2-CH_2}$; then H_3O^+

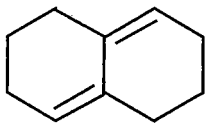
(C) $C_6H_5COCH_3$ + $NaBH_4$; then H_3O^+

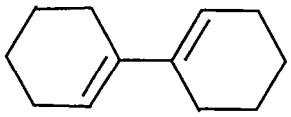
(D) $CH_3CH_2CH_2CH_2Li$ + HCHO; then H_3O^+

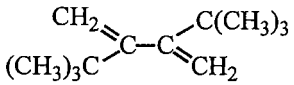
(E) $CH_3(CH_2)_5COOH$ + $LiAlH_4$, ether; then H_3O^+

(C)28. Which of these conjugated dienes can undergo a Diels-Alder reaction?

(A) 

(B) 

(C) 

(D) 

(E) none of these

(C)29. What would be the best synthesis?

$CH_2{=}CHCH_3 \xrightarrow{?} \underset{Br}{\overset{|}{CH_2}}\underset{Br}{\overset{|}{CH}}CH_2Cl$

(A) 1.Br_2, CCl_4 2.Cl_2, hυ (B) 1.NBS, CCl_4 2.Cl_2, CCl_4 (C) 1.Cl_2, 400℃ 2.Br_2, CCl_4

(D) 1. Cl_2, CCl_4 2.NBS, CCl_4 (E) 1.HCl 2.Br_2, hυ

(A)30. A compound with the molecular formula C_8H_9ClO gave the following 'HNMR spectrum :

δ3.7(t), δ4.2(t), δ7.1(m)

There was no evidence of an –OH band in the IR spectrum. The most likely structure for the compound is

(A) $C_6H_5OCH_2CH_2Cl$ (B) $\underset{Cl}{\overset{|}{C_6H_5OCHCH_3}}$ (C) p-$ClC_6H_4OCH_2CH_3$

(D) o-$ClC_6H_5OCH_2CH_3$ (E) p-$CH_3C_6H_4CH_2Cl$

(B)31. In ^{13}CNMR spectroscopy, the signal due to this type of carbon occurs furthest downfield.

(A) $-C\equiv N$ (B) $>C=O$ (C) $-\overset{|}{\underset{|}{C}}-X$

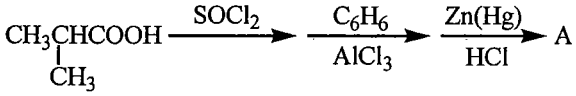
(D) $-\overset{|}{\underset{|}{C}}-O$ (E) $-C\equiv C-$

(E)32. What is the molecular formula of this compound?

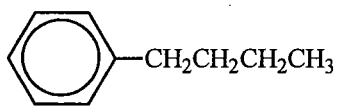
m/Z	intensity
78(M)	10.00
79	1
80	3.3
81	0.3

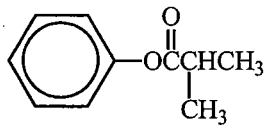
(A) C_6H_6 (B) C_3H_5Cl (C) C_6H_8 (D) C_6H_9 (E) C_3H_7Cl

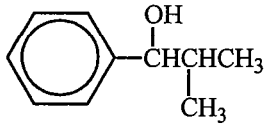
(E)33. The product, A, of the following reaction sequence,

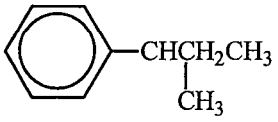


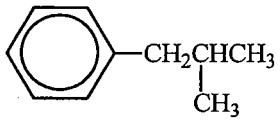
would be :

(A) 

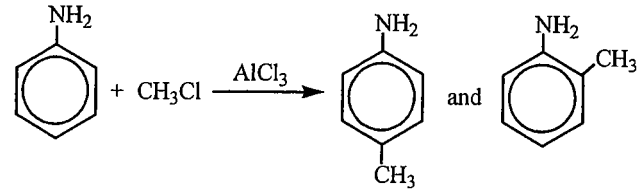
(B) 

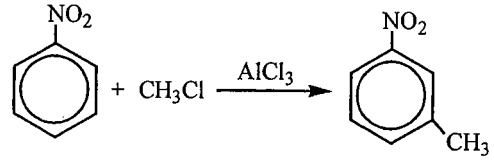
(C) 

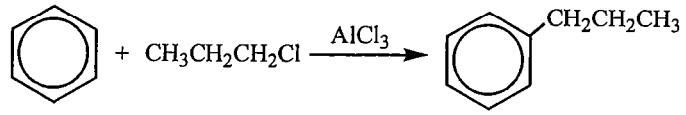
(D) 

(E) 

(E)34. Which of the following reactions would give the product(s) indicated in substantial amounts (i.e., in greater than 50% yield)?

(A) 

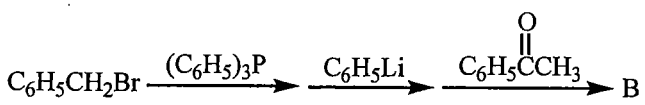
(B) 

(C) 

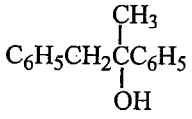
(D) all of these

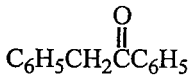
(E) none of these

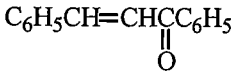
(E)35. The product, B, of the following reaction sequence,

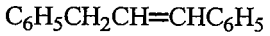


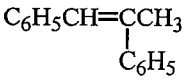
would be :

(A) 

(B) 

(C) 

(D) 

(E) 

(E)36. Which of the following reactions would yield benzaldehyde?

(A) $C_6H_5CH_2Cl \xrightarrow[H_2O,\ \Delta]{OH^-}$

(B) $C_6H_5CH(OCH_3)_2 \xrightarrow[H_2O]{H^+}$

(C) $C_6H_5COOH \xrightarrow[2.\ H_2O]{1.\ LiAlH_4}$

(D) $C_6H_5COCl \xrightarrow[-78\ ^\circ C]{DIBAH}$

(E) more than one of these

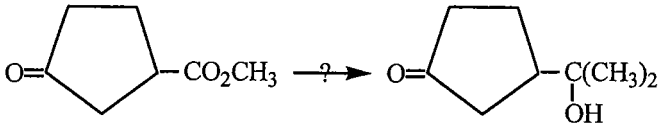
(E)37. Which of the reactions listed below would serve as a synthesis of acetophenon.

(A) $C_6H_5COCl + (CH_3)_2CuLi$ (B) $C_6H_6 + CH_3COCl, AlCl_3$

(C) $C_6H_5CN + CH_3Li$; then H_3O^+ (D) answers (A) and (B) only.

(E) answers (A), (B) and (C).

(C)38. Which sequence of reactions would be utilized to convert



(A) $1.2CH_3MgBr$ $2.H_3O^+$

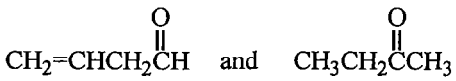
(B) 1.  , H^+ $2.LiAlH_4$, ether $3.2CH_3MgBr$ $4.H_3O^+$

(C) 1.  , H^+ $2.2CH_3MgBr$ $3.H_3O^+$

(D) 1.  , H^+ $2.H_2$,Pt $3.CH_3OH, H^+$

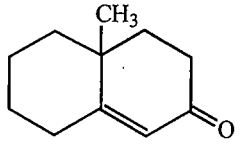
(E) none of the above.

(C)39. Which reagent will not differentiate between the two compounds

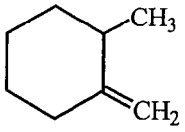


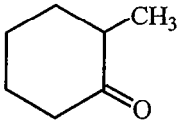
(A) Br_2, CCl_4 (B) $Ag(NH_3)_2^+$ (C) $C_6H_5NHNH_2$ (D) $KMnO_4, OH^-$ (E) none of these

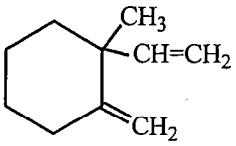
(B)40. The Robinson annulation reaction which produces

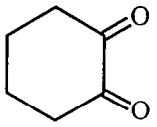


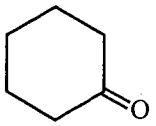
Uses which of the following as starting materials?

(A) CH_2=CHCHO + 

(B) CH_2=CHCCH$_3$ + 

(C) HCHO + 

(D) CH_3CH=CHCCH$_3$ + 

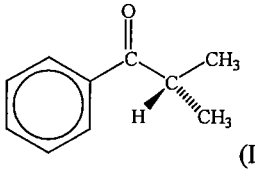
(E) CH_3CH=CHCCH$_3$ + 

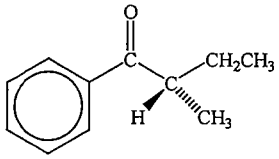
(B)41. Which compound would be most reactive toward nucleophilic acyl substitution?

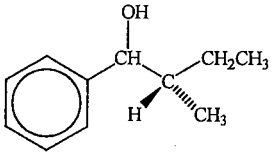
(A) CH_3CO^- (B) CH_3CCl^- (C) CH_3COCCH_3

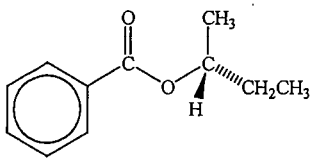
(D) CH_3CNH_2 (E) CH_3COCH_3

(B)42. Which can be racemized in base?

(A) 

(B) 

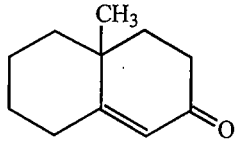
(C) 

(D) 

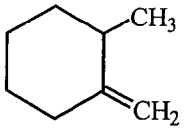
(C)43. Which substituent makes benzene unable to undergo Friedel-Craft alkylation?

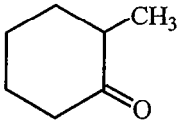
(A)−OH (B)−OCH_3 (C)−NH_2 (D) −OCCH$_3$

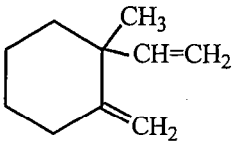
(B)40. The Robinson annulation reaction which produces

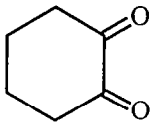


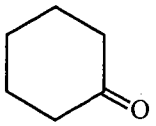
Uses which of the following as starting materials?

(A) CH_2=CHCHO + 

(B) CH_2=CHCCH$_3$ + 

(C) HCHO + 

(D) CH_3CH=CHCCH$_3$ + 

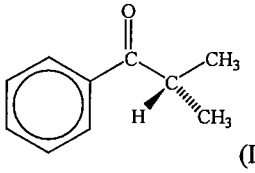
(E) CH_3CH=CHCCH$_3$ + 

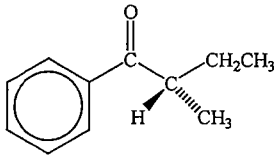
(B)41. Which compound would be most reactive toward nucleophilic acyl substitution?

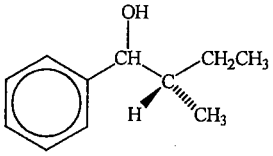
(A) CH_3CO^- (B) CH_3CCl^- (C) CH_3COCCH_3

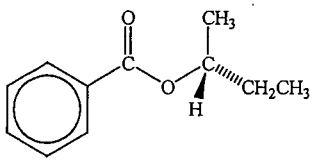
(D) CH_3CNH_2 (E) CH_3COCH_3

(B)42. Which can be racemized in base?

(A) 

(B) 

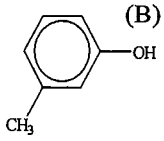
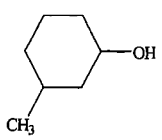
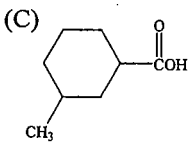
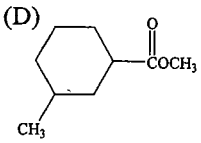
(C) 

(D) 

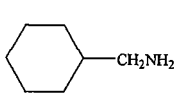
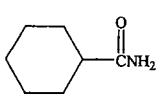
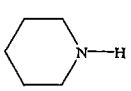
(C)43. Which substituent makes benzene unable to undergo Friedel-Craft alkylation?

(A)−OH (B)−OCH_3 (C)−NH_2 (D) −OCCH$_3$

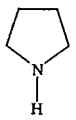
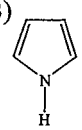
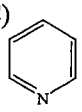
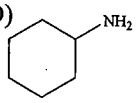
(C)44. Which is soluble in $NaHCO_3$?

(A)  (B)  (C)  (D) 

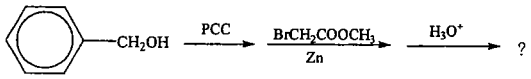
(B)45. Which is insoluble in $HCl_{(aq)}$?

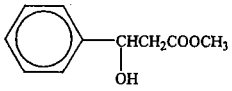
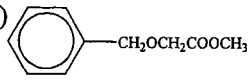
(A)  (B)  (C)  (D) 

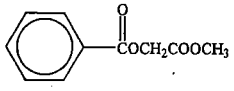
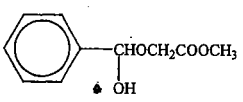
(B)46. Which is the weakest base?

(A)  (B)  (C)  (D) 

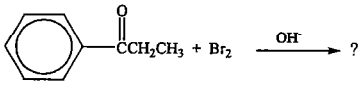
47. Predict the major product of the following reactions.

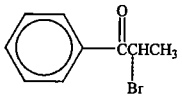
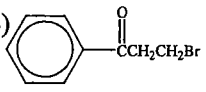
(1) 

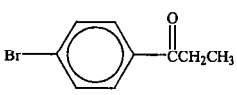
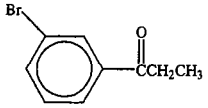
(A)  (B) 

(C)  (D) 

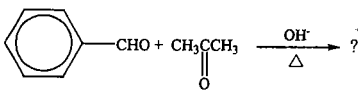
【解】(A)

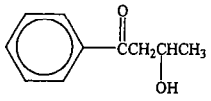
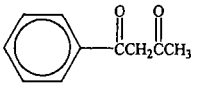
(2) 

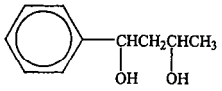
(A)  (B) 

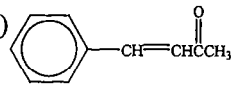
(C)  (D) 

【解】(A)

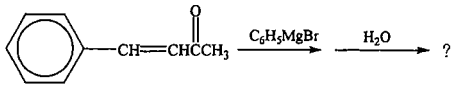
(3) 

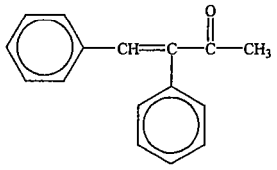
(A)  (B) 

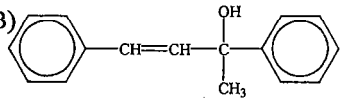
(C) 

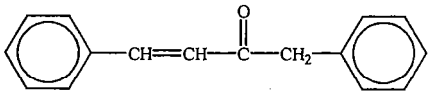
(D) 

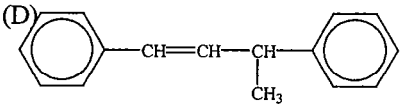
【解】(D)

(4) 

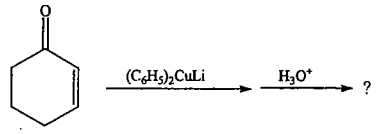
(A) 

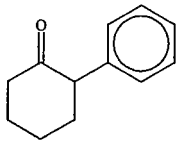
(B) 

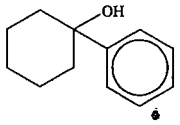
(C) 

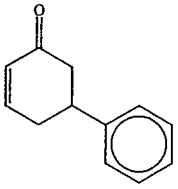
(D) 

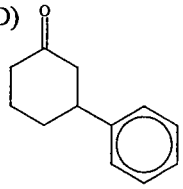
【解】(B)

(5) 

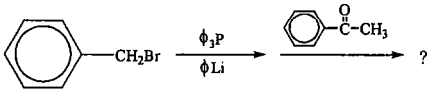
(A) 

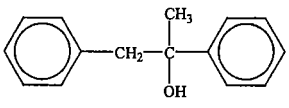
(B) 

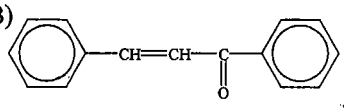
(C) 

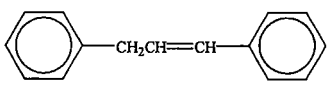
(D) 

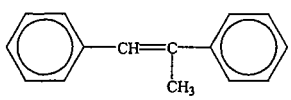
【解】(D)

(6) 

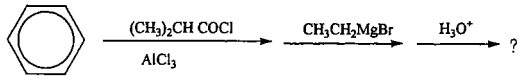
(A) 

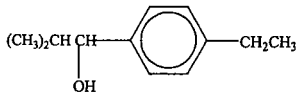
(B) 

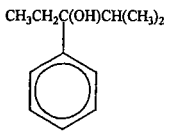
(C) 

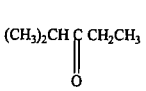
(D) 

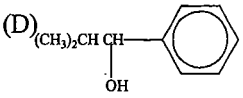
【解】(D)

(7) 

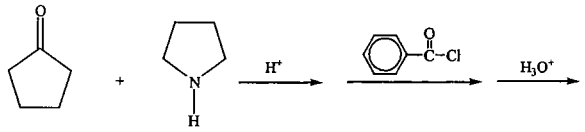
(A) 

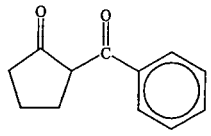
(B) 

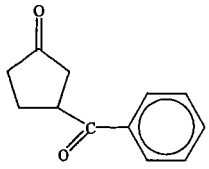
(C) 

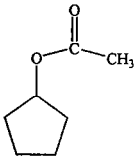
(D) 

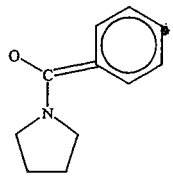
【解】(B)

(8) 

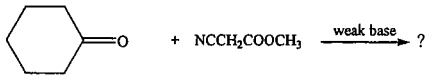
(A) 

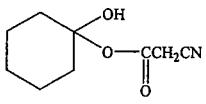
(B) 

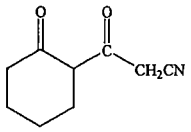
(C) 

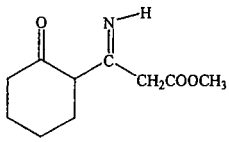
(D) 

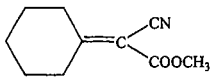
【解】(A)

(9) 

(A) 

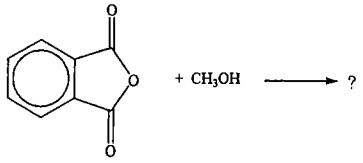
(B) 

(C) 

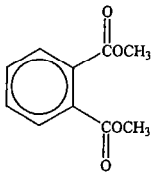
(D) 

【解】(D)

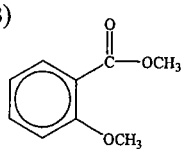
(10)



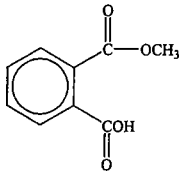
(A)



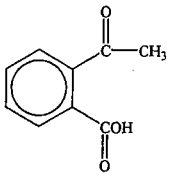
(B)



(C)



(D)



【解】(C)

(C)48. How would you carry out the following conversion?

$(CH_3)_2CHC{\equiv}CH \longrightarrow (CH_3)_2CHCH_2CH_2OH$

(A) 1. H_2SO_4, H_2O, $HgSO_4$ 2. H_2, Pt

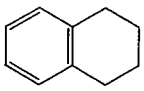
(B) 1. H_2, Lindlar Pd 2. H_2O, H_2SO_4

(C) 1. H_2, Pd－Lindlar 2. B_2H_6 3. H_2O_2, OH^-

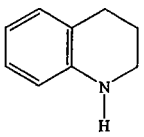
(D) 1. HRr 2. H_2, Pt 3. NaOH, H_2O

(B)49. Which of the following compound undergoes bromination of its aromatic ring at the fastest rate?

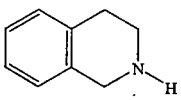
(A)



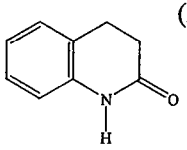
(B)



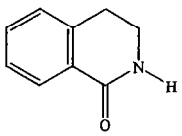
(C)



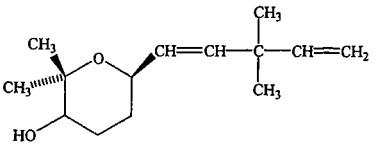
(D)



(E)



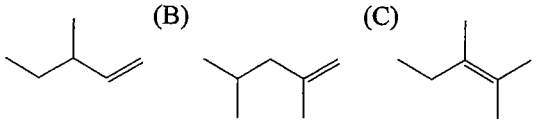
(D)50. The sesquiterpene A has been isolated from plant. How many stereoisomers of this structure are possible?



(A)2 (B)4 (C)6 (D)8 (E)16

(C)51. Which of the following alkene give a chiral alkane on catalytic hydrogenation?

(A) (B) (C)



(D)all of them (E)none of them

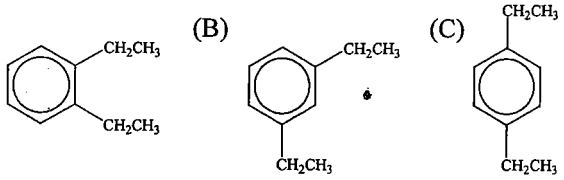
(E)52. Which one of the following alkyl nalides would be expected to give the lowest ratio of substitution to elimination on treatment with sodium ethoxide in ethanol?

(A)1－Bromopentane (B)2－Bromopentane (C)3－Bromopentane

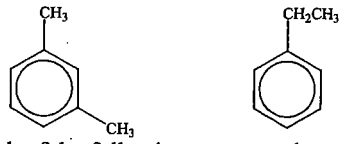
(D)1－Bromo－2－methylbutane (E)2－Bromo－2－methylbutane

(A)53. Which of the following compound would give a ^{13}CNMR spectrum which consists of a total of five peaks, three in the 120~140 ppm and two in the region 10~30 ppm?

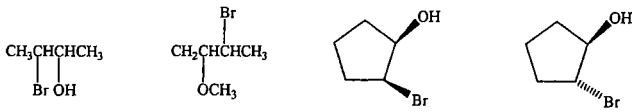
(A) (B) (C)



(D) (E)

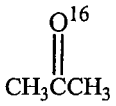
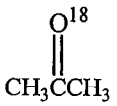


(C)54. Which of the following compounds would readily form an epoxide on treatment with base.



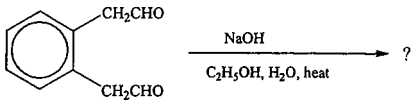
1 2 3 4

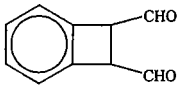
(A)1, 2 (B)1, 3 (C)1, 4 (D)2, 4 (E)3, 4

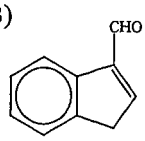
(E)55. What reagent would you use to convert  to  ?

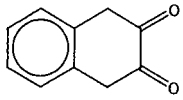
(A)$^{18}O_2$, Ni (B)CrO_3^{18} in pyridine (C)$H_2O_2^{18}$, NaOH (D)$^{18}O_3$, Zn (E)H_2O^{18} with a trace of HCl

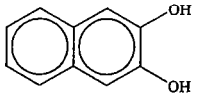
(B)56. What is the principal product of the following reaction?

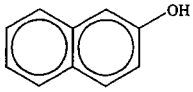


(A) 

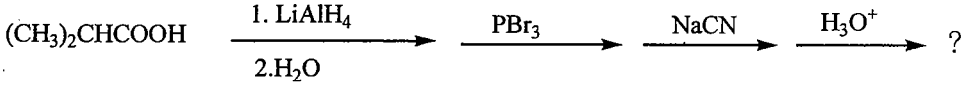
(B) 

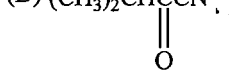
(C) 

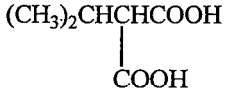
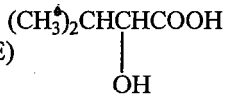
(D) 

(E) 

(C)57. The product A of the following sequence of reaction is



(A) $(CH_3)_2CHCH_2CH_2NH_2$ (B)  (C) $(CH_3)_2CHCH_2COOH$

(D)  (E) 

(A)58. Which of the following will not result in the formation of an amide?

(A)$C_6H_5COCl + (CH_3CH_2)_3N$ (B)$(CH_3CO)_2O + C_6H_5NH_2$ (C)$ClCH_2CO_2C_2H_5 + NH_{3(aq)}$

(D)$C_6H_5COOC_2H_5 + CH_3NH_2$ (E)All of above

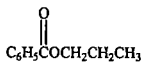
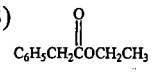
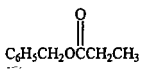
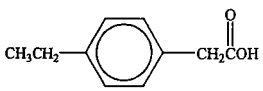
(C)59. A compound B has the following spectroscopic properties:

composition : $C_{10}H_{12}O_2$

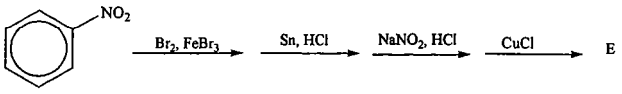
IR : $1735cm^{-1}$

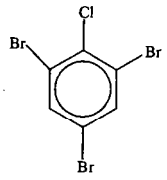
^{1}HNMR : δ1.2(3H, t), δ2.3(2H, q), δ4.5(2H, S), δ7.3(5H, m)

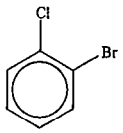
What is the structure of compound B?

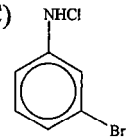
(A)  (B)  (C)  (D) 

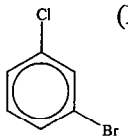
(D)60. What is the final product, E, of the series of reaction shown below?

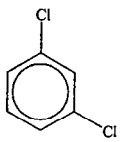


(A) 

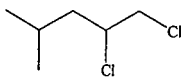
(B) 

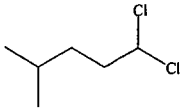
(C) 

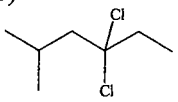
(D) 

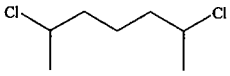
(E) 

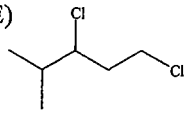
(E)61. Which compound has nonequivalent methyl groups?

(A) 

(B) 

(C) 

(D) 

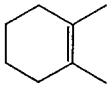
(E) 

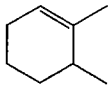
(D)62. You task is to convert 2－chloropentane into 1－pentene. Which reagent would you choose?

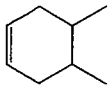
(A)$NaOH/H_2O$ (B)KOH/CH_3OH (C)CH_3ONa/CH_3OH (D)$(CH_3)_3COK/(CH_3)_3COH$

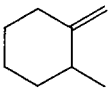
(E)CH_3CH_2ONa/CH_3CH_2OH

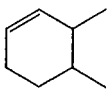
(A)63. Which molecule would have the lowest heat of hydrogenation?

(A) 

(B) 

(C) 

(D) 

(E) 

(D)64. Which RX can undergo both S_N1 and S_N2 reactions in nonacidic solvents?

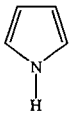
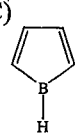
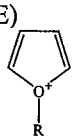
(A)$CH_3CH_2CH_2Br$ (B)$C_6H_5CH_2CH_2CH_2Br$ (C)CH_3Br (D) $H_2C{=}CHCHCH_3$ (Br) (E)None of these

(C)65. Which of these dienes is the most reactive in the Diels-Alder reaction?

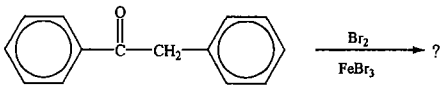
(A)1, 3－butadiene (B)1, 4－pentadiene (C)Cyclopentadiene (D)1, 2－pentadiene

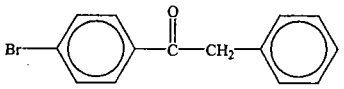
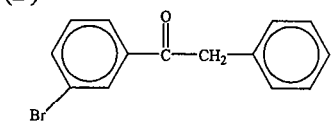
(E)1, 4－Cyclohexadiene

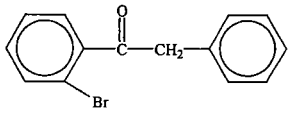
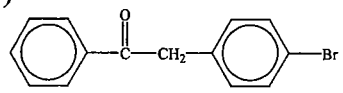
(C)66. Which compound would you not expect to be aromatic?

(A)  (B)  (C)  (D)  (E) 

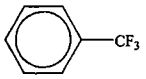
(D)67. The major product of the following reaction would be



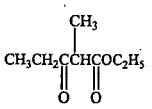
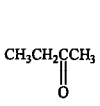
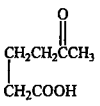
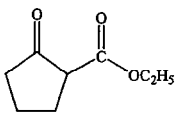
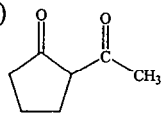
(A)  (B) 

(C)  (D) 

(D)68. Which of these molecule can be a reactant in a Friedel-Craft reaction?

(A)aniline (B)nitrobenzene (C)  (D)bromobenzene (E)p－bromo－nitrobenzene

(C)69. Which compound could be prepared using a Michael reaction?

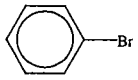
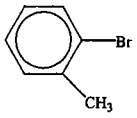
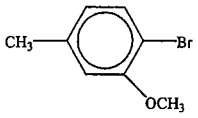
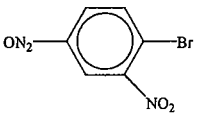
(A)  (B)  (C)  (D)  (E) 

(A)70. Which of these is not a reversible process?

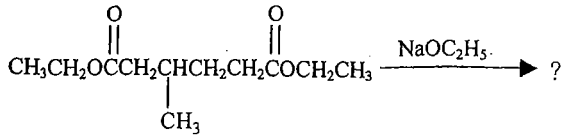
(A)Base-promoted ester hydrolysis (B)Acid-catalyzed ester hydrolysis (C)claisen condensation

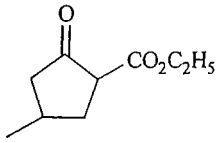
(D)Acetal formation

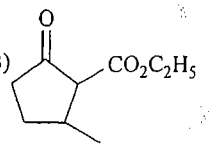
(D)71. Which of the following would be most likely to undergo a nucleophilic substitution reaction with aqueous NaOH by an addition-elimination mechanism?

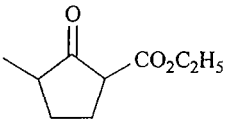
(A)  (B)  (C)  (D) 

(D)72. What is the reaction product of the following equation ?



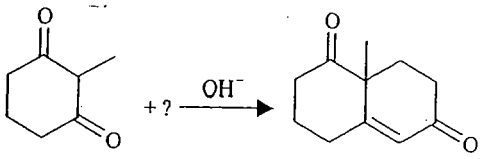
(A) 

(B) 

(C) 

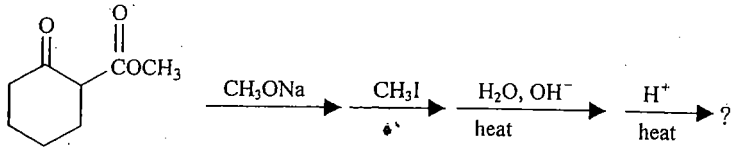
(D)(A)and (B) (E)(A), (B), and (C)

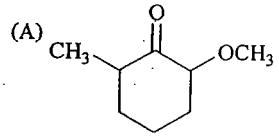
(B)73. The Robinson annulation reaction is shown below. What is the missing material in the first step ?

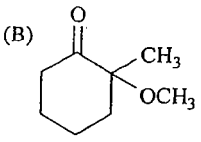


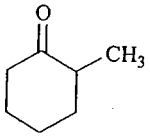
(A)$CH_3CH{=}CHCHO$ (B)$CH_2{=}CHCOCH_3$ (C)$CH_2{=}CHCH_2CHO$ (D)$CH_3COCH_2CH_3$
(E)$CH_3CH{=}CHCOCH_2CH_3$

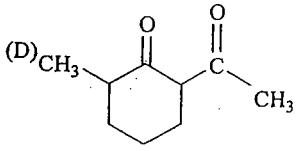
(C)74. What product would you expect from the following reaction :

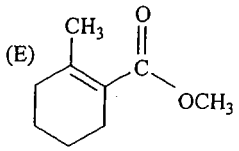


(A) 

(B) 

(C) 

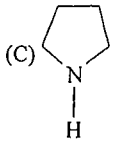
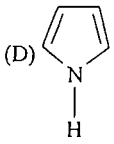
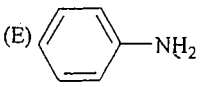
(D) 

(E) 

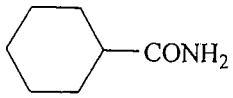
(A)75. Which compound would you expect to have the highest boiling point ?

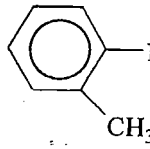
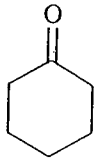
(A)$CH_3CON(CH_3)_2$ (B)$CH_3CH_2CH_2COOH$ (C)$CH_3CH_2CH_2CH_2CH_2OH$ (D)$CH_3CH_2COOCH_3$
(E)$CH_3CH_2COCH_3$

(C)76. Which is the most basic amine ?

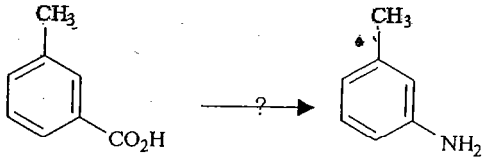
(A)$(CH_3)_3N$ (B)CH_3NH_2 (C)  (D)  (E) 

(E)77. Which is NOT a good way to prepare primary amines ?

(A)$CH_3CH_2CH_2CN$ $\xrightarrow[2.\ H_2O]{1.\ LiAlH_4}$ (B)  $\xrightarrow[2.H_2O]{1.\ LiAlH_4}$

(C)  $\xrightarrow[2.\ OH^-]{1.\ Fe\ /\ HCl}$ (D)  $\xrightarrow[2.\ H_2\ /\ Ni]{1.\ NH_3}$ (E)CH_3I $\xrightarrow{NH_3}$

(A)78. How could one carry out this synthesis ?

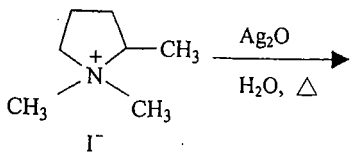


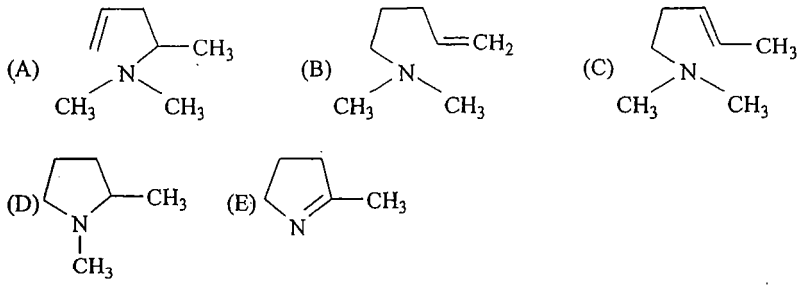
(A) 1. $SOCl_2$ 2. NH_3 3. Br_2, NaOH (B) 1. CH_3Li 2. NH_3 3. H_2 / Ni

(C) 1. PCl_5 2. NH_3 3. $NaNO_2$, HCl (D) 1. PCl_5 2. CH_3NH_2 3. $KMnO_4$, OH^-, heat

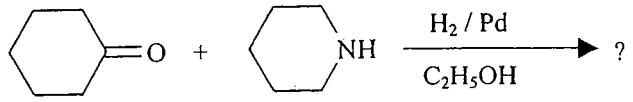
(E) 1. None of these

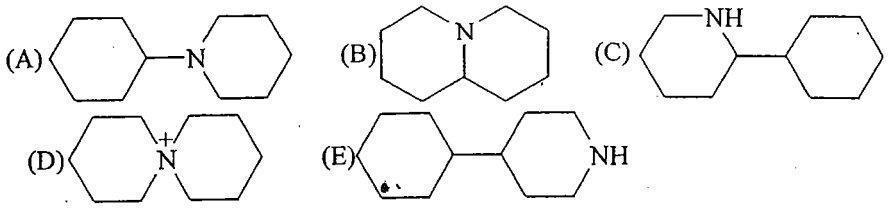
(B)79. What is the major product of the following reaction ?



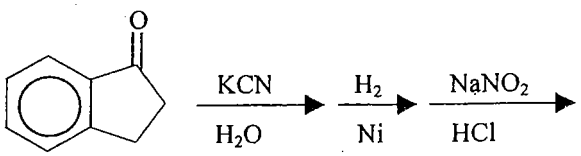


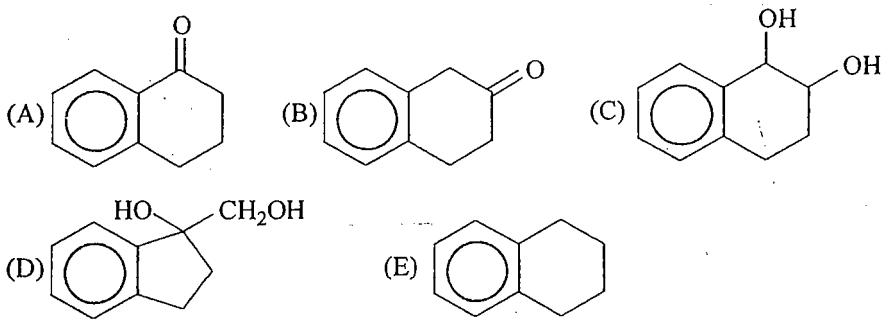
(A)80. Which is the major organic product of the following reaction ?





(A)81. What is the major product from this sequence of reactions ?





(A)82. The conversion of benzoic acid to phenylacetic acid is best accomplished with

(A)1. $LiAlH_4$ 2. TsCl 3. NaCN 4. H_3O^+, heat

(B)1. $LiAlH_4$ 2. TsCl 3. Mg, ether 4. CO_2 5. H_3O^+

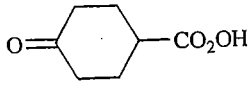
(C)1. $SOCl_2$ 2. $(CH_3)_2CuLi$

(D)1.$SOCl_2$ 2. NH_3 3. Br_2, NaOH

(E)None of these

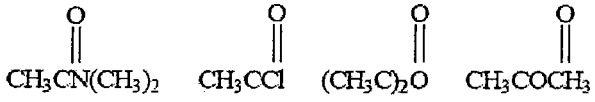
(D)83 The acid which could not be prepared from an organic halide by carboxylation of Grignard reagent is

(A)$C_6H_5CO_2H$ (B)$(CH_3)_3CCO_2H$ (C)$CH_3CH_2CO_2H$ (D)



(E)$CH_2=CHCH_2CO_2H$

(A)84. For the following compounds the correct order for decreasing reactivity toward nucleophilic acyl substitution is



I II III IV

(A) II > III > IV > I (B) I > IV > II > III (C) III > II > I > IV (D) I > IV > III > II (E) II > III > I > IV

(E)85. What is the best reagent for transformation of benzoic acid to benzaldehyde ?

(A)$SOCl_2$ then $LiAlH_4$ (B)$NaBH_4$ (C)DIBAH (D)$SOCl_2$ then $NaBH_4$

(E)$SOCl_2$ then $LiAlH(t\text{-}BuO)_3$

(B)86. Which of the following procedures would NOT yield 3-pentanone as a major product ?

(A)$CH_3CH_2CN + C_2H_5MgBr$ then H_3O^+

(B)$CH_3CH_2COOH + C_2H_5MgBr$(excess), then H_3O^+

(C)$CH_3CH_2COOH + C_2H_5Li$ (excess), then H_3O^+

(D)$CH_3CH_2CN + C_2H_5Li$, then H_3O^+

(E)$CH_3CH_2COCl + (CH_3CH_2)_2CuLi$

(C)87. Benzoic acid reacts with dimethylsulfate in aqueous sodium hydroxide to give (after acidification work up)

(A)acetophenone (B)benzyl alcohol (C)methyl benzoate (D)p-methyl benzoic acid

(E)m-methylbenzoic acid

(C)88. Which of the following statement is NOT correct ?

(A)Acidic hydrolysis of an ester is a reversible reaction

(B)Basic hydrolysis of an ester is a nonreversible reaction

(C)A ketone is more reactive toward nucleophile than an aldehyde

(D)An acid chloride reacts much faster in a bimolecular nucleophilic substitution reaction than a primary alkyl halide does

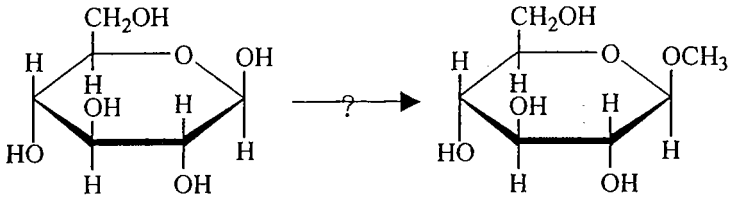
(E)Nucleophilic acyl substitution reactions usually occur by an addition-elimination mechanism

(E)89. Which one of the following is NOT found in a Wittig reaction ?

(A)phosphonium salt (B)ylide (C)betaine (D)oxophosphetane

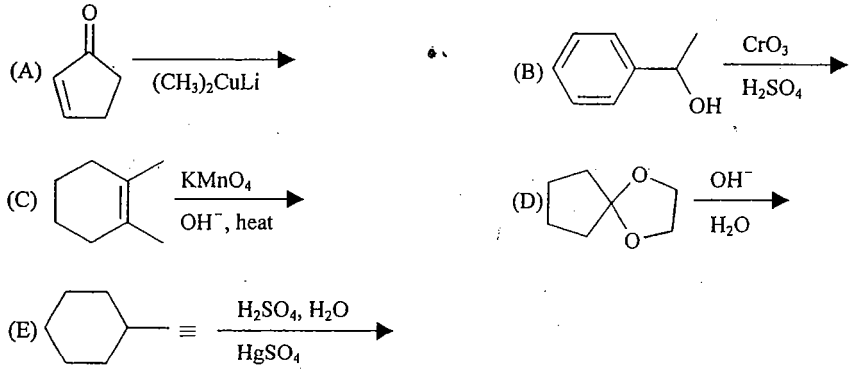
(E)phosphorous tribromide

(A)90. Select the reagent(s) needed to perform the following transformation.

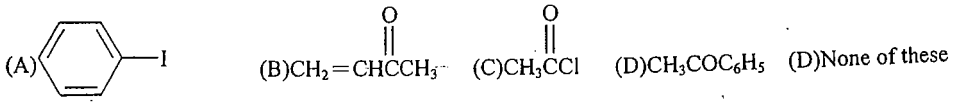


(A)CH_3OH, H^+ (B)CH_3Br, KOH (C)CH_3OCH_3, HI (D)$(CH_3)_2SO_4$, NaOH (E)(B) and (D)

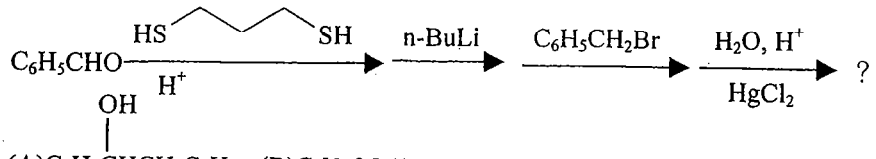
(D)91. Which of the following reactions can NOT give a ketone as the final product ?



(D)92. Which of the following compounds can NOT be react with $(CH_3)_2CuLi$?



(B)93. What product would you expect from the following reaction：



(A)$C_6H_5CHCH_2C_6H_5$ (B)$C_6H_5COCH_2C_6H_5$ (C)$C_6H_5CH{=}CHCOC_6H_5$ (D)$C_6H_5COC_6H_5CH_3$

(E)None of these

(B)94. Which is a non-reducing disaccharide ?

(A)cellobiose (B)sucrose (C)maltose (D)lactose (E)all of these

(C)95. Which of the following statements about ketal formation is CORRECT ?

(A)Ketal formation is catalyzed either by acid or by base.

(B)Ketal formation is an irreversible process.

(C)Ketal are usually unstable and can be cleaved in acidic solution.

(D)Ketal can be easily oxidized by $KMnO_4$ under basic conditions.

(E)A ketal has an alcohol and an ether group bonded to the same carbon atom.

(C)96. Which of the following is not used in the Strecker synthesis of α-amino acids ?

(A)HCN (B)RCHO (C)HNO_2 (D)NH_3 (E)all of these

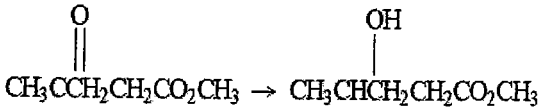
(B)97. The following transformation can be accomplished with：

cyclohexanone → cyclohexane

(A)1. $LiAlH_4$ 2. KOH, H_2O (B)1. NH_2NH_2 2. KOH, H_2O (C)$NaBH_4$, KOH

(D)H_2 / Pd-$CaCO_3$ (E)Na / $NH_{3(l)}$

(B)98. Select the correct reagent(s) for the following reaction：



(A)$LiAlH_4$; then H_3O^+ (B)$NaBH_4$; then H_3O^+ (C)H_2 / Pt-C (D)(A)and (B) (E)(A), (B), and (C)

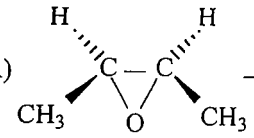
(E)99. The following transformation can be accomplished with：

3-Methyl-2-butanone → isobutyric acid

(A)H_2O_2, OH^-, H_2O (B)1. $LiAlH_4$ 2. KOH (C)Br_2, PBr_2 (D)1. H_2O_2 2. H_2SO_4, H_2O

(E)Br_2, KOH

(D)100. Which of the following reactions is True ?

(A)  $\xrightarrow[H^+]{H_2O}$ meso-2,3-butanediol

(B)cis-2-Butene $\xrightarrow[CCl_4]{Br_2}$ meso-2,3-dibromobutane

(C)(R)-3-Bromo-1-butene $\xrightarrow{HBr}$ Racemic-2,3-dibromobutane

(D)(2S, 3R)-3-Bromo-2-butanol $\xrightarrow{\text{conc. HBr}}$ meso-2,3-dibromobutane

(E)trans-2-Butene $\xrightarrow[H_2O]{Br_2}$ (2S, 3S)-and (2R, 3R)-3-bromo-2-butanol