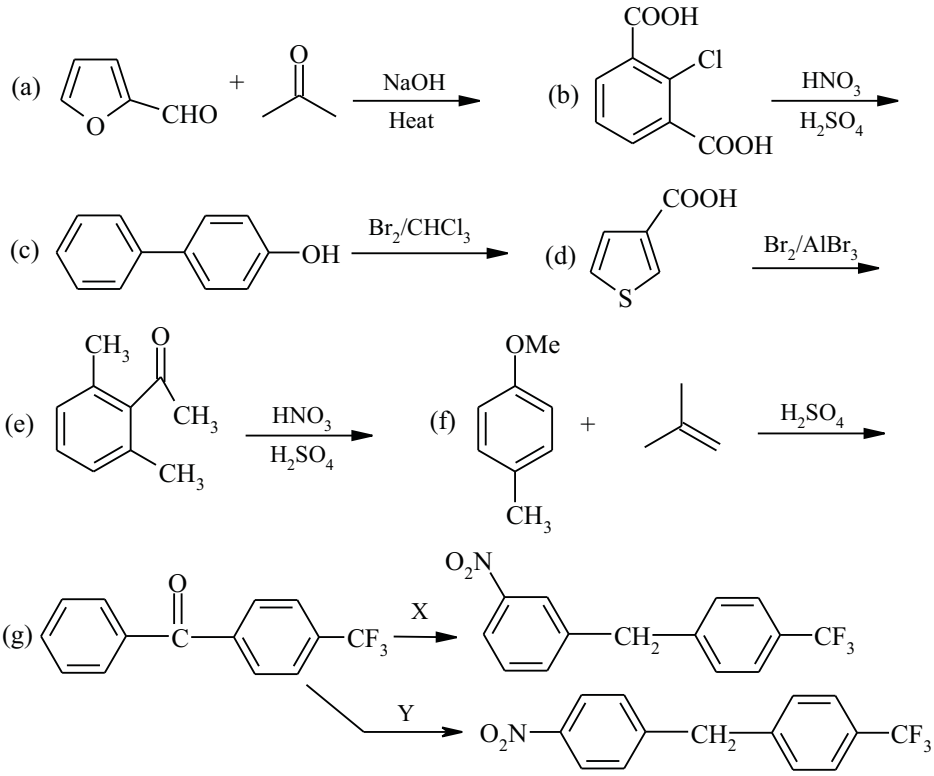
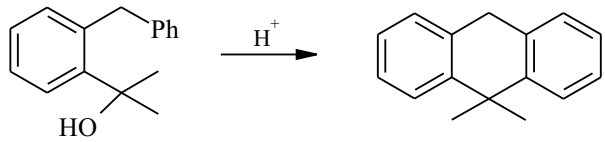
PROBLEM 1226 A resolvable organic compound *A* has molecular formula $C_{10}H_{14}O$. *A* does not forms any salt with NaOH but evolve a colourless gas on heating with sodium metal. *A* gives an yellow precipitate with $NaOH/I_2$ but does not decolourise Br_2-water solution. *A* on treatment with CrO_3/HCl/pyridine produces *B*($C_{10}H_{12}O$) which is non-resolvable but gives iodoform test. *B* on

treatment with $Cl_2/AlCl_3$ gives $C(C_{10}H_{11}OCl)$ as the only possible isomer. Also A on heating with alkaline $KMnO_4$ solution yields $C_8H_6O_4(D)$ as one of the product which evolves a gas with $NaHCO_3$. D on heating with ethan-1,2-diol in presence of an acid catalyst forms a polyester E. Deduce structures of A to D and write the formula of repeat unit of E.

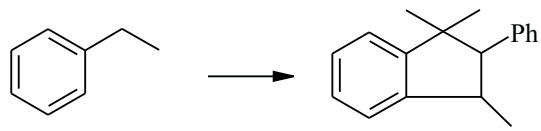
PROBLEM 1227 Predict products/reagents:



PROBLEM 1228 Propose mechanism:



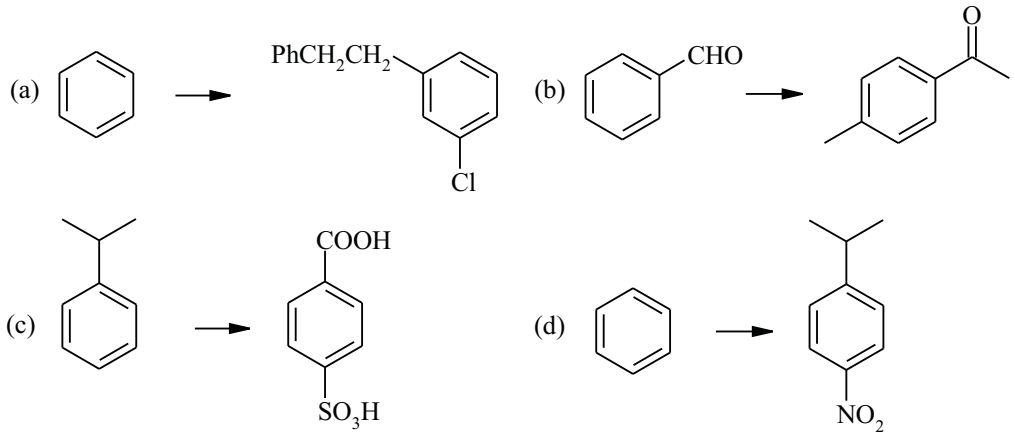
PROBLEM 1229 Bring about the following transformation:



PROBLEM 1230 An organic compound $A(C_{11}H_{14}O)$ exist in two stereo-isomeric forms, none of which is resolvable. A does not evolve any gas with sodium metal but decolourise bromine water solution. A on

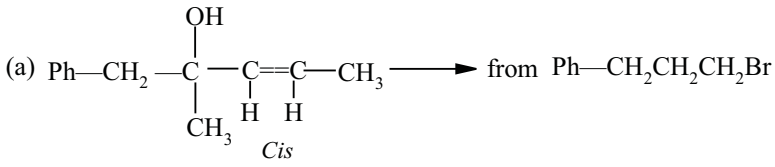
treatment with ozone followed by work-up with $(CH_3)_2S$ yields $B(C_9H_{10}O_2)$ as one of the product. *B* neither forms any salt with NaOH nor does it evolve any gas with sodium metal. Also *B* does not react with Tollen's reagent. *B* on treatment with concentrated solution of HI forms $C(C_8H_8O_2)$ as one of the product which forms salt with NaOH but does not evolve any gas with $NaHCO_3$. *B* on treatment with $AlCl_3/Cl_2$ gives $D(C_9H_9O_2Cl)$ as the only possible product. *C* can also be obtained by treatment of an ester $E(C_8H_8O_2)$ with $AlCl_3$. Deduce structures of *A* to *E* and explain the formation of *C* from *E*.

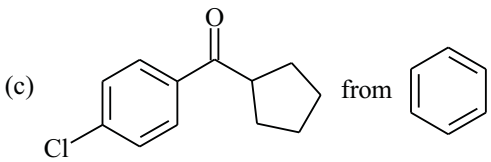
Problem 1231 Bring about the following transformation:



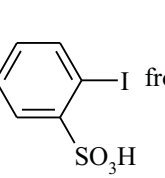
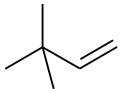
Problem 1232 An optically active organic compound *A* has molecular formula $C_{11}H_{16}O_2$ and it does not forms salt with NaOH as well as it does not decolourise Br_2—H_2O solution, but evolve a gas on treatment with MeMgBr. *A* on treatment with HI gives another optically active compound $B(C_9H_{10}O_2)$. *B* on treatment with aqueous KOH yields another optically active compound $C(C_9H_{12}O_2)$. *C* on treatment with PCC yields $D(C_9H_8O_2)$ which gives positive iodoform test as well as positive Tollen's test. *D* is optically inactive and on treatment with $Cl_2/AlCl_3$ gives one and only one possible monochloro derivative $E(C_9H_7O_2Cl)$. Deduce structures of *A* to *E*.

Problem 1233 Synthesize:

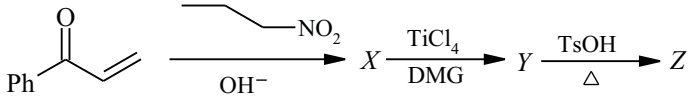


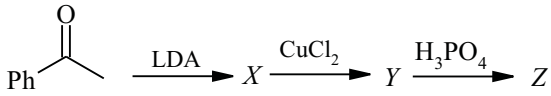


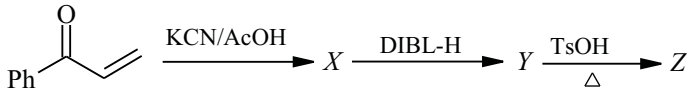
(d) $C_6H_5CH_2COC_6H_5$ from benzene, oxirane and inorganic reagent

(e) $(CH_3)_3CCH_2$  from iodo benzene and 

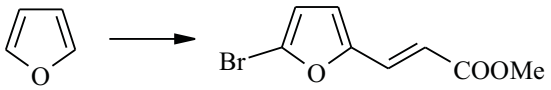
PROBLEM 1234 Complete the following reaction:

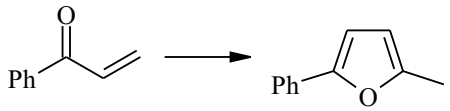
(a) 

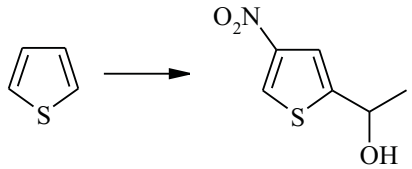
(b) 

(c) 

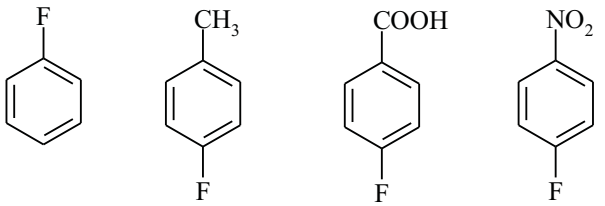
PROBLEM 1235 Bring about the following transformation:

(a) 

(b) 

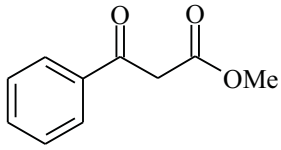
(c) 

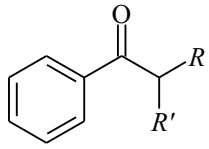
PROBLEM 1236 (a) Synthesize the following compounds starting from benzene:

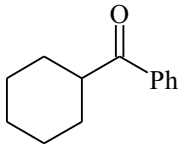


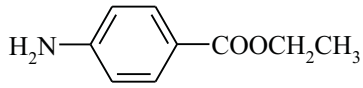
(b) Write mechanism of the reaction of *p*-nitrofluoro benzene with $(C_2H_5)_2NH$. Explain why *m*-nitro fluoro benzene does not react with diethyl amine under identical conditions.

(c) Synthesize the following compounds starting from benzene and any other reagents needed:

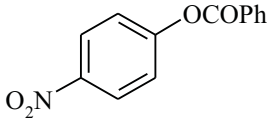
(i) 

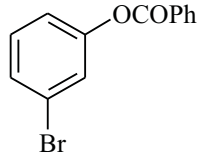
(ii) 

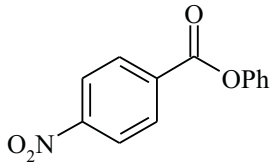
(iii) 

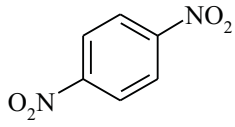
(iv) 

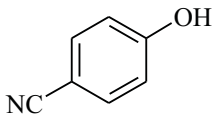
PROBLEM 1237 Synthesize the following compounds starting from benzene:

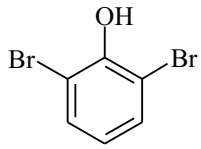
(a) 

(b) 

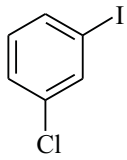
(c) 

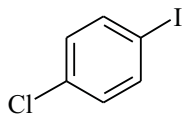
(d) 

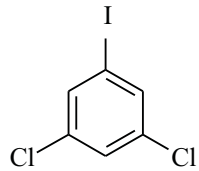
(e) 

(f) 

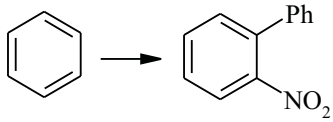
PROBLEM 1238 Synthesize the following compounds starting from benzene:

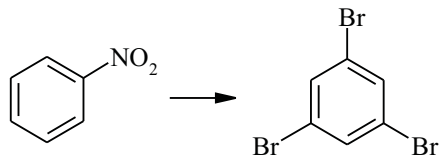
(a) 

(b) 

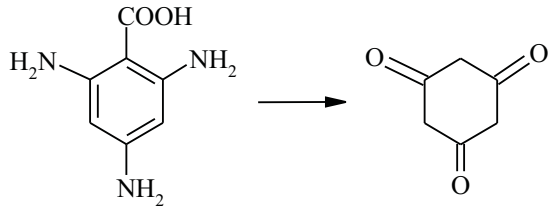
(c) 

PROBLEM 1239 Bring about the following transformation:

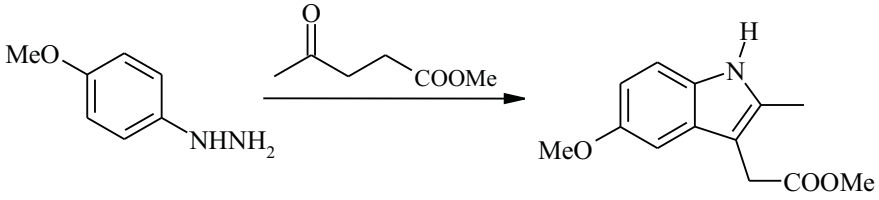
(a) 

(b) 

(c)

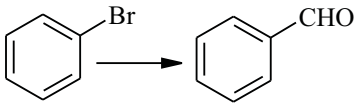


PROBLEM 1240 Propose mechanism:

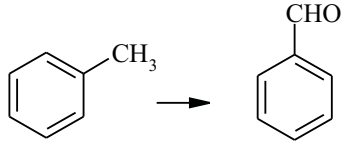


PROBLEM 1241 Bring about the following transformation:

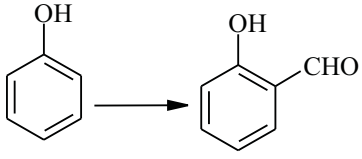
(a)



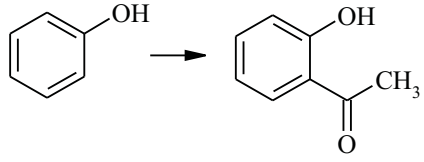
(b)



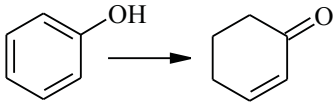
(c)



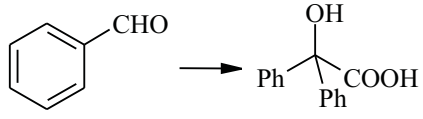
(d)



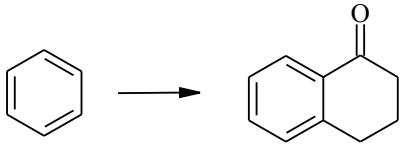
(e)



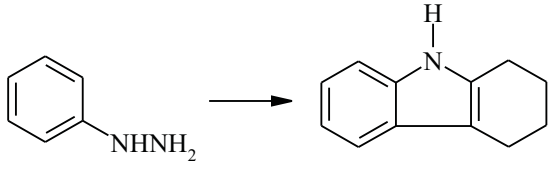
(f)



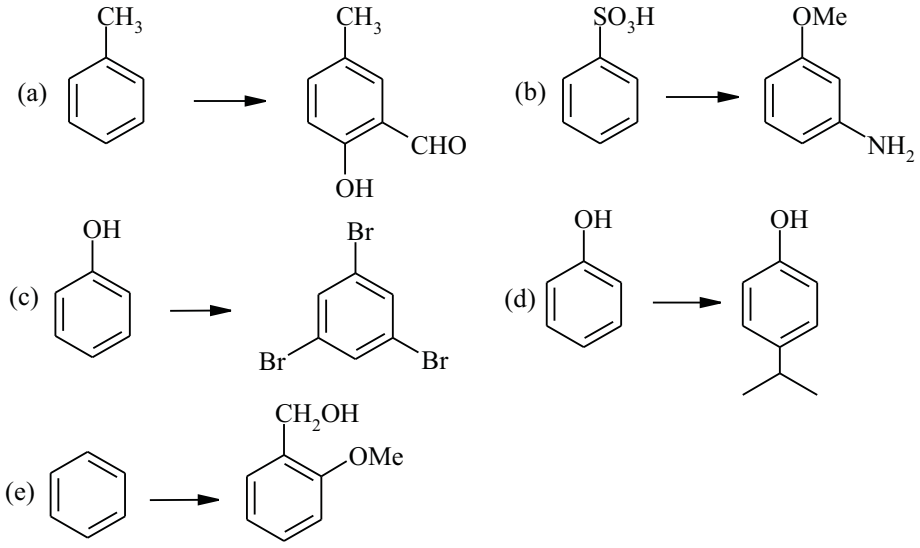
(g)



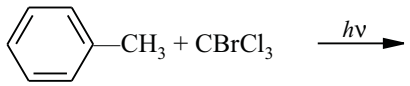
(h)



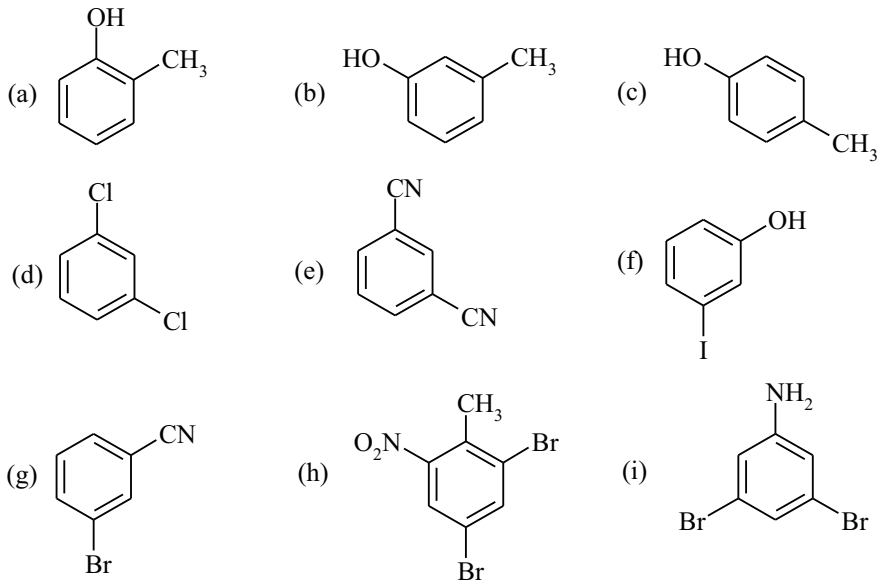
Problem 1242 Bring about the following conversions:

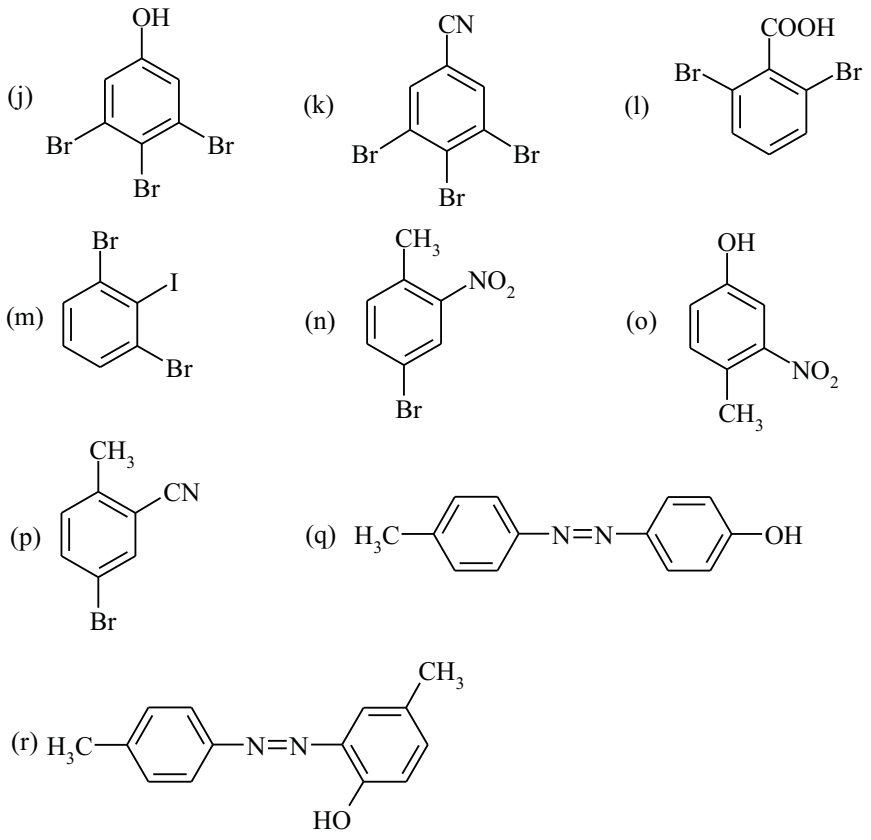


Problem 1243 Predict product of the following reaction explaining mechanism of their formation:

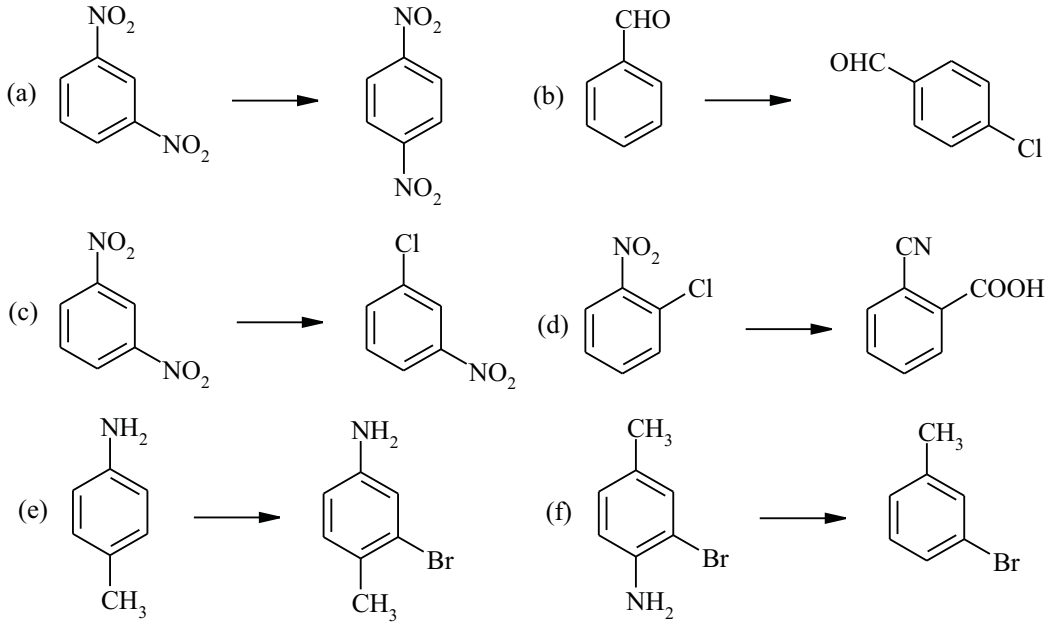


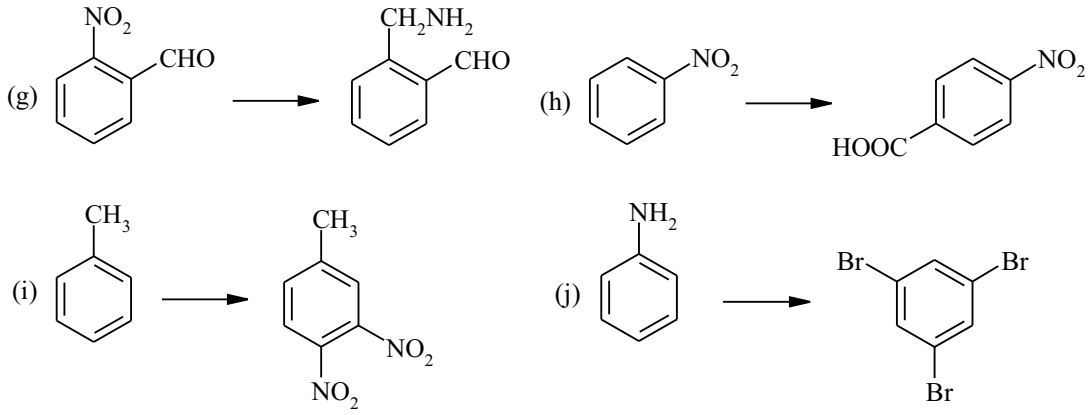
Problem 1244 Prepare the following compounds starting with either benzene or toluene:



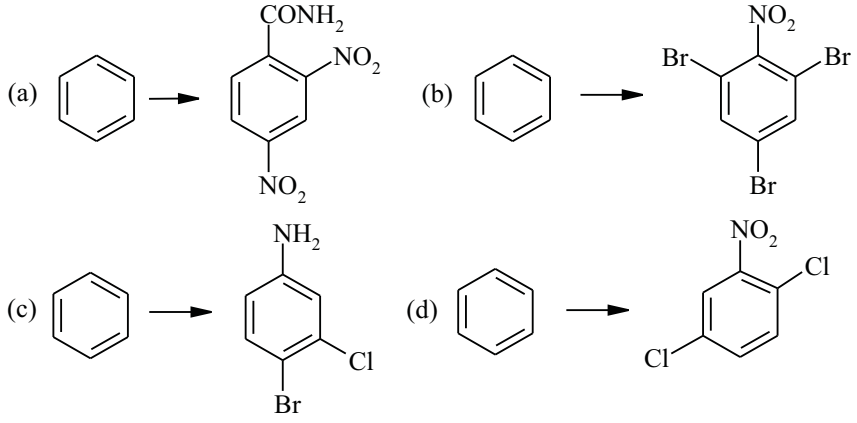


PROBLEM 1245 Bring about the following transformation:



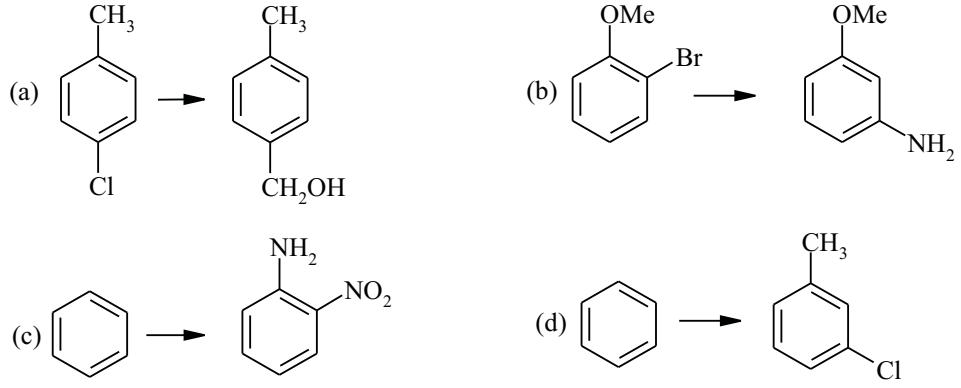


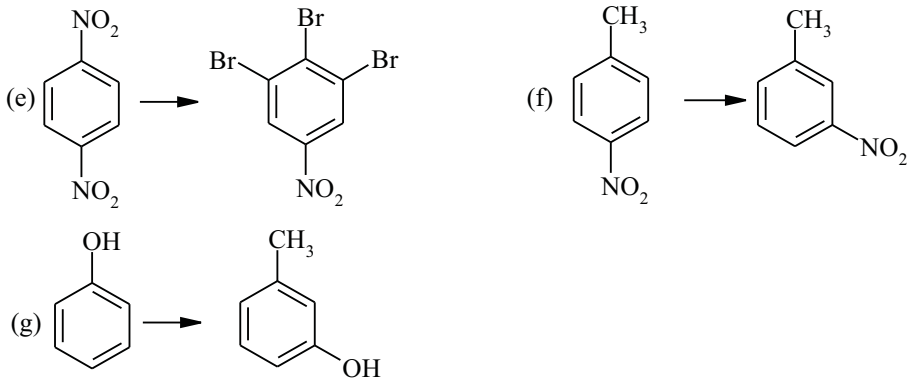
Problem 1246 Bring about the following transformation:



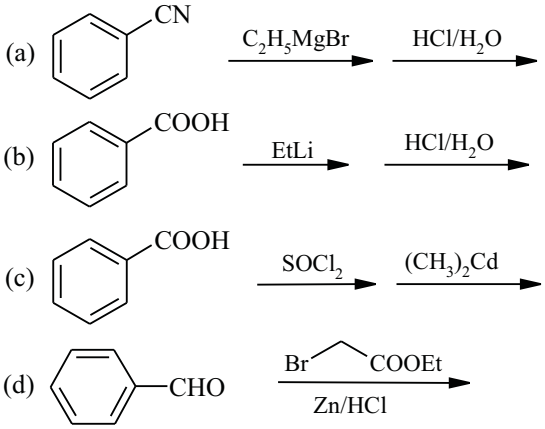
Problem 1247 An organic compound $A(C_8H_{10})$ on treatment with fuming sulphuric acid yields two isomeric products *B* and *C*. *B* on fusion with KCN gives $D(C_9H_9N)$ which on hydrolysis yields $E(C_9H_{10}O_2)$. *E* on treatment with hot alkaline $KMnO_4$ yields $F(C_8H_6O_4)$. *F* on heating with P_2O_5 undergo intramolecular dehydration to yield $G(C_8H_4O_3)$. Identify *A* to *G*.

Problem 1248 Bring about the following transformation:

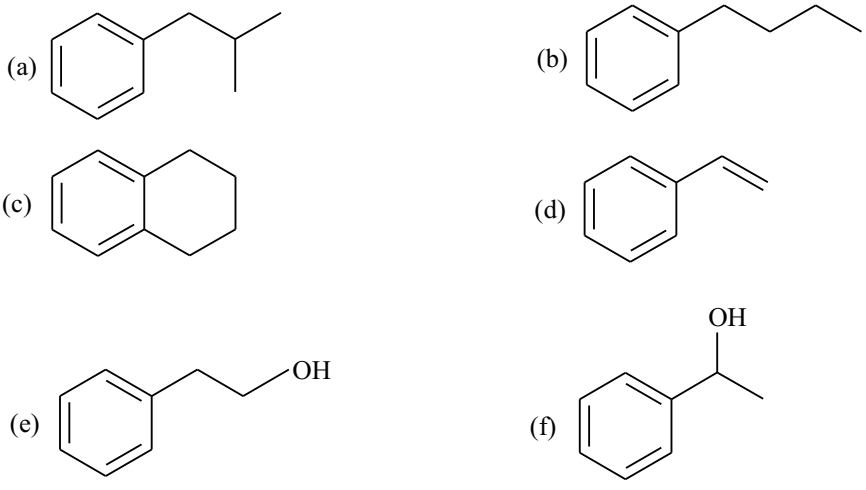




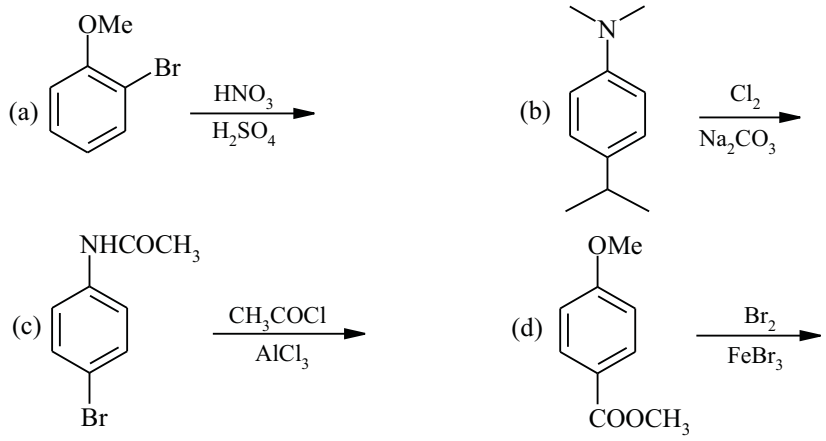
PROBLEM 1249 Identify the aromatic product formed in the following reaction:



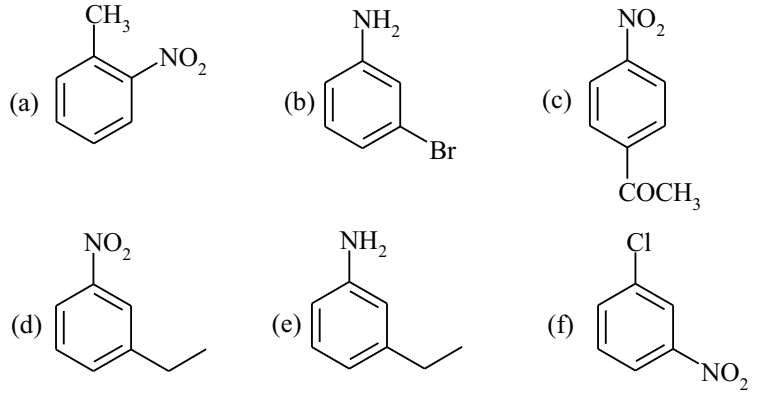
PROBLEM 1250 Synthesize the following compounds starting from benzene:



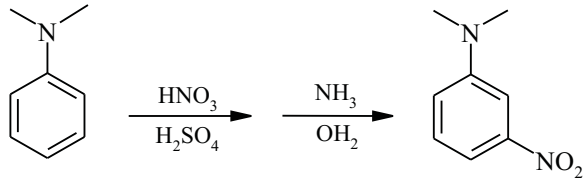
Problem 1251 Predict major substitution product in the following reactions:



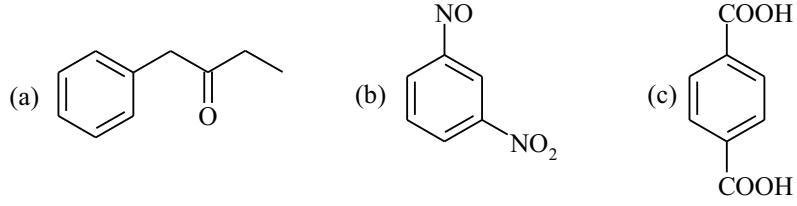
Problem 1252 Starting from benzene synthesize the following compounds as major product:

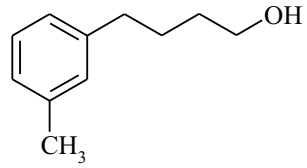


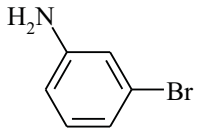
Problem 1253 How would you rationalize the following experimental result:

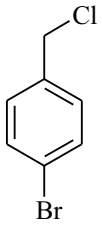


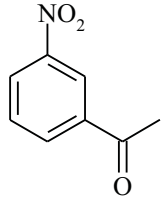
Problem 1254 Propose synthesis of the following compounds starting from benzene:

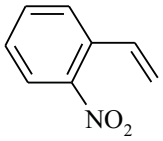


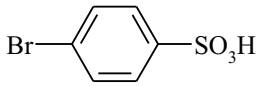
(d) 

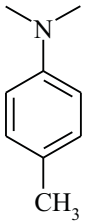
(e) 

(f) 

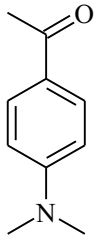
(g) 

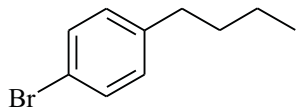
(h) 

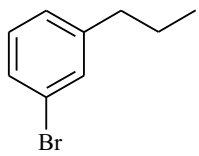
(i) 

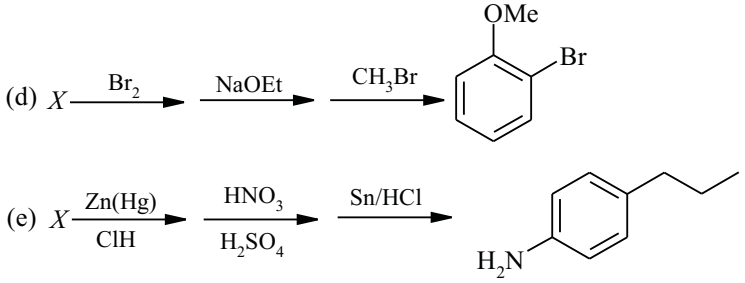
(j) 

PROBLEM 1255 Identify the starting material in the following sequence of reaction:

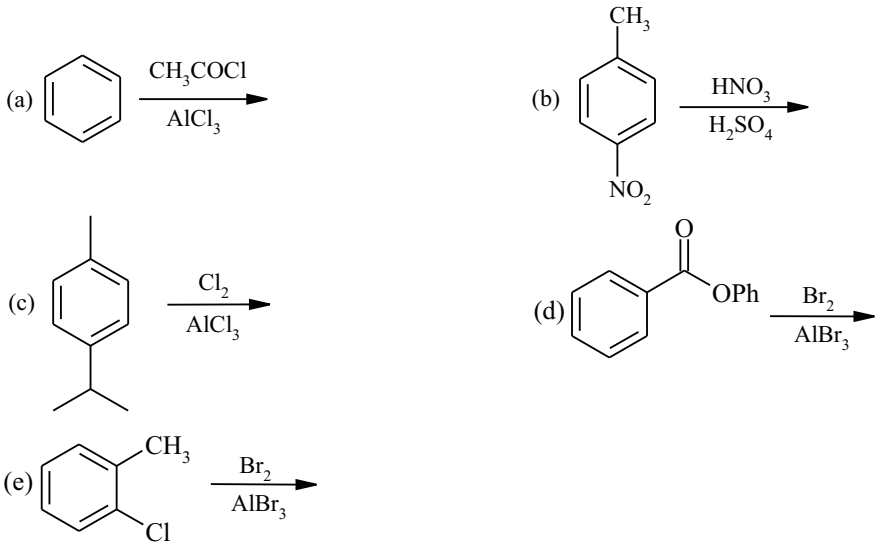
(a) $X \xrightarrow[AlCl_3]{CH_3COCl}$ 

(b) $X \xrightarrow[NaOH]{N_2H_4} \xrightarrow[AlBr_3]{Br_2}$ 

(c) $X \xrightarrow[AlBr_3]{Br_2} \xrightarrow{Sn/HCl}$ 

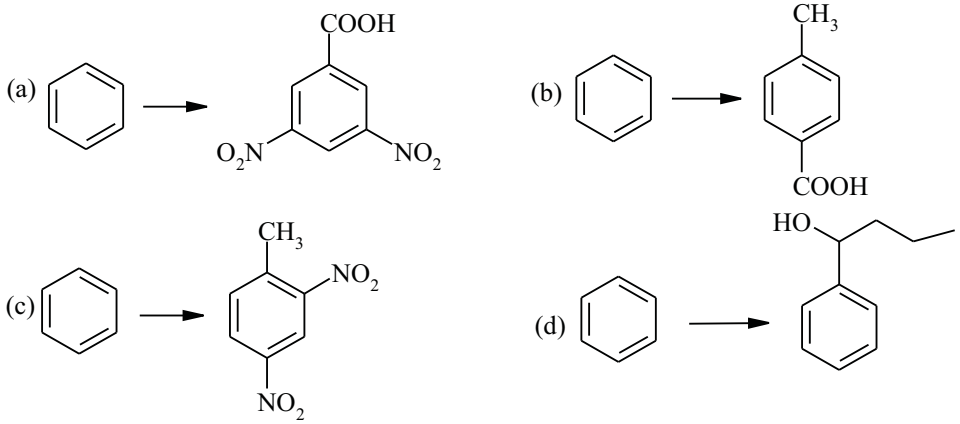


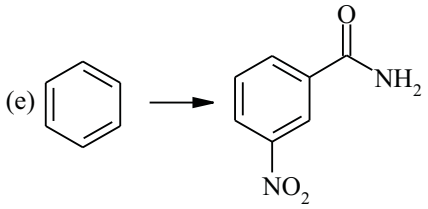
Problem 1256 Predict the major product in the following reaction:

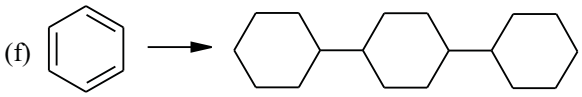


Problem 1257 *p*-nitro phenol is shaken with one equivalent of D_2O in the presence of a strong acid (perchloric acid) at 100°C for a long time. The product has two deuterium atom in it. One of these is lost instantly when the product is treated with ordinary water. Propose a structure for the original product and explain the difference in the ease with which the two deuterium atoms can be removed from the molecule.

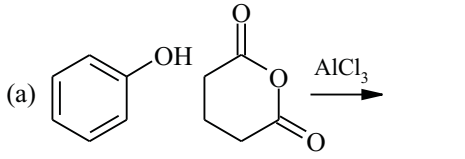
Problem 1258 Bring about the following transformation:

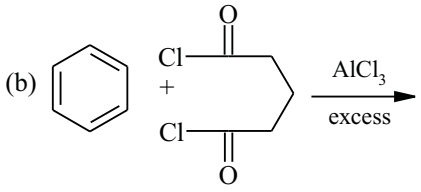


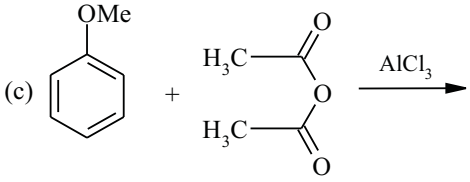




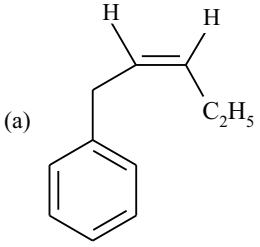
PROBLEM 1259 Complete the following reactions:

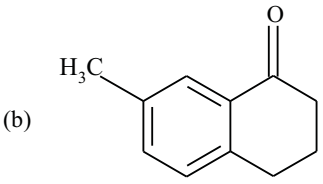


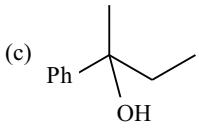




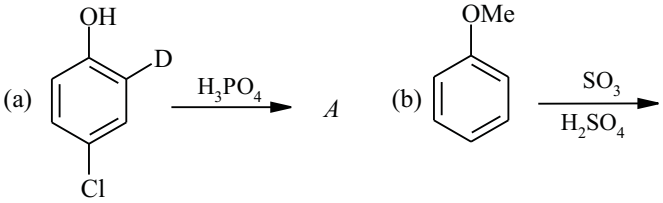
PROBLEM 1260 Synthesize the following compounds starting from benzene:

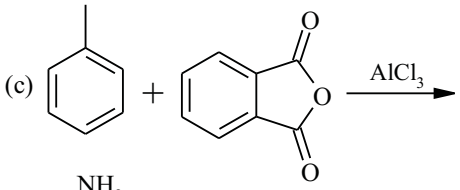


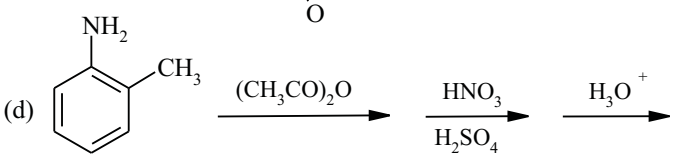




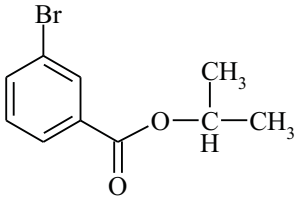
PROBLEM 1261 Predict the major substitution product in the following sequence of reaction:

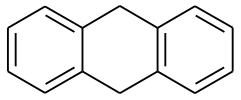


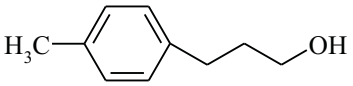


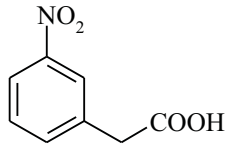


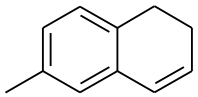
Problem 1262 Predict synthesis of the following products starting from benzene:

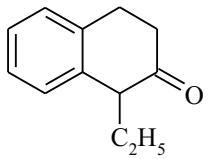
(a) 

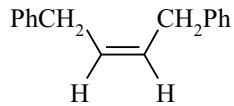
(b) 

(c) 

(d) 

(e) 

(f) 

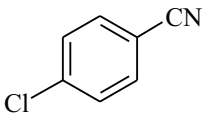
(g) 

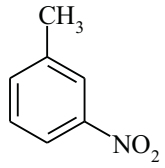
Problem 1263 1,3,5-trimethyl benzene undergoes electrophilic aromatic substitution with iodine monochloride (ICl). Write mechanism for this reaction showing major product.

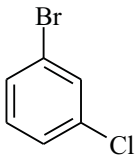
Problem 1264 When allyl alcohol is treated with HF in presence of benzene, two products are formed: 3-phenyl-1-propene and 1,2-diphenyl propane. Write equations showing the mechanism for the formation for these products.

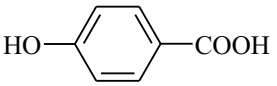
Problem 1265 When 2-hydroxy benzoic acid is heated with isobutyl alcohol in presence of sulphuric acid, compound *A* is formed. The same product is formed if tertiary butyl alcohol and sulphuric acid is used. What is the structure of compound *A*? Write mechanism of formation of this product.

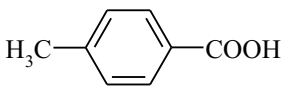
Problem 1266 Bring about the following synthesis starting from benzene:
(*direct F.C. alkylation of nitro benzene does not succeed)

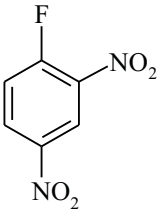
(a) 

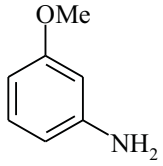
*(b) 

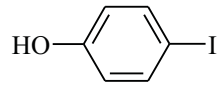
(c) 

(d) 

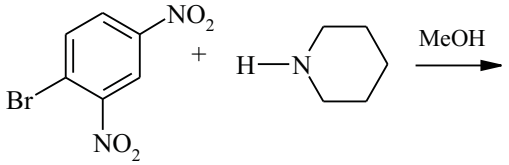
(e) 

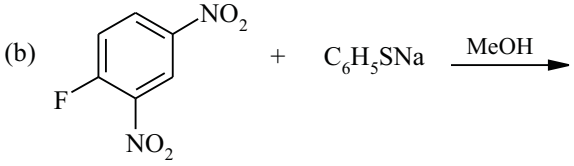
(f) 

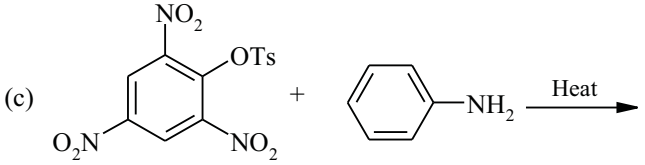
(g) 

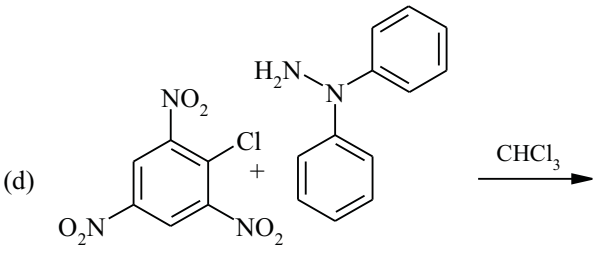
(h) 

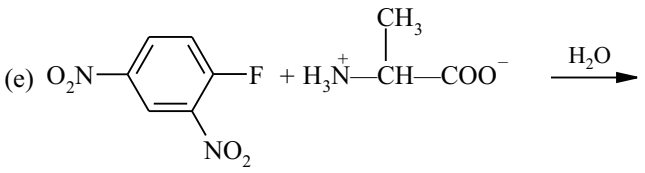
PROBLEM 1267 Complete the following reactions:

(a) 

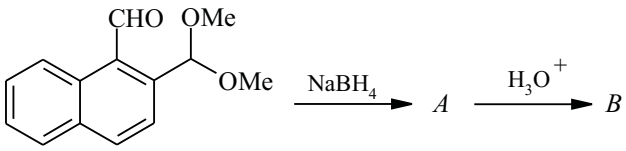
(b) 

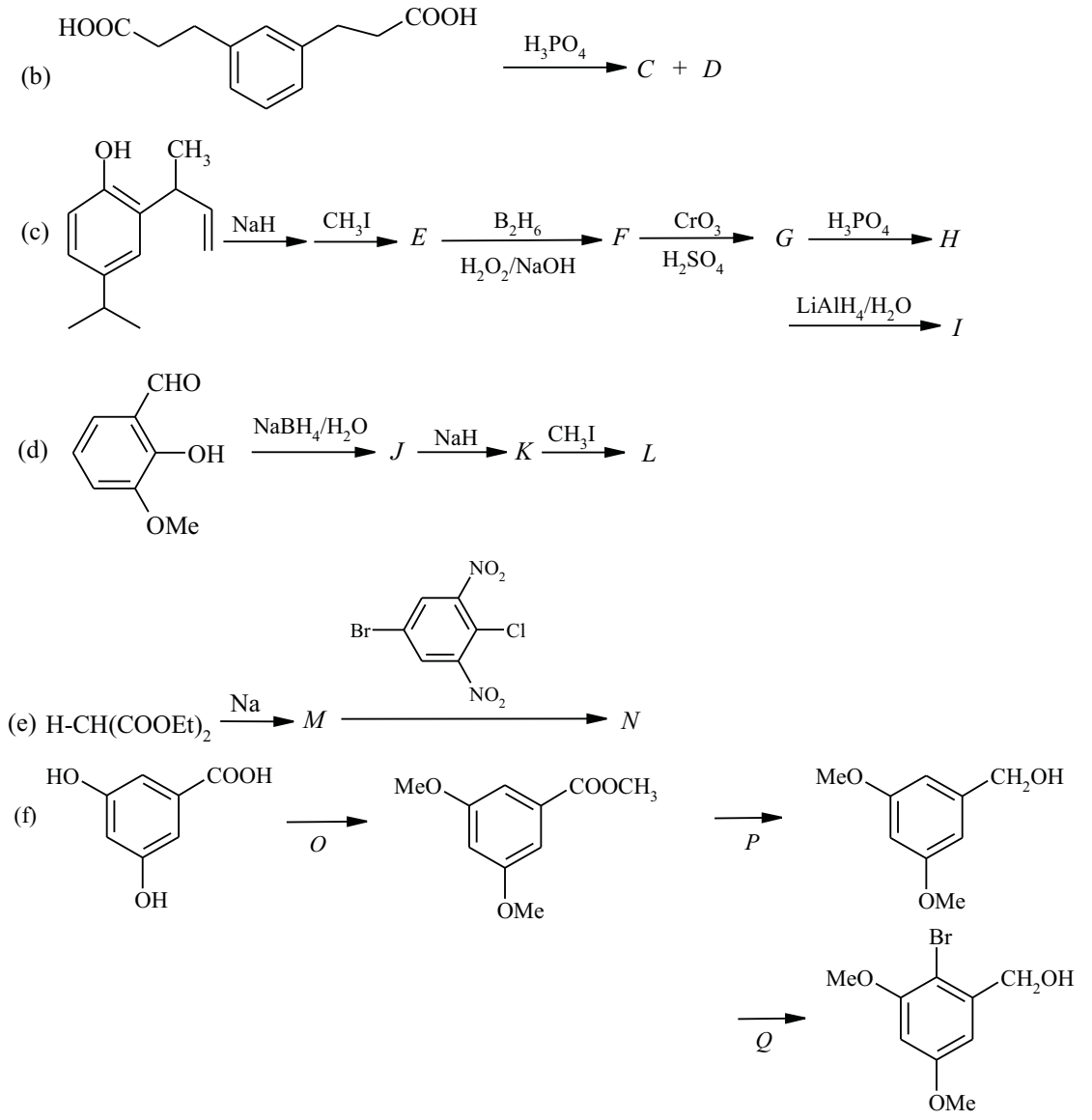
(c) 

(d) 

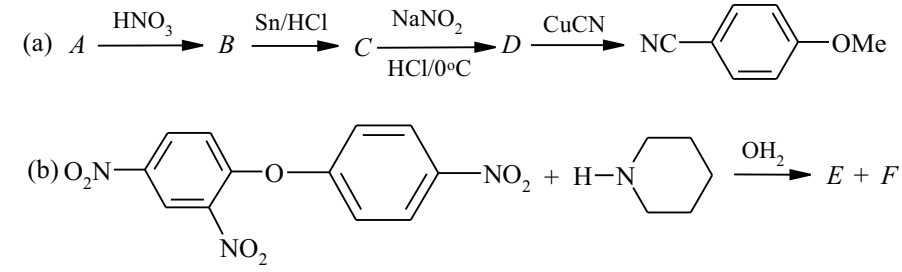
(e) 

PROBLEM 1268 Give structural formula for all reagents, intermediates and products designated by letters in the following equations:

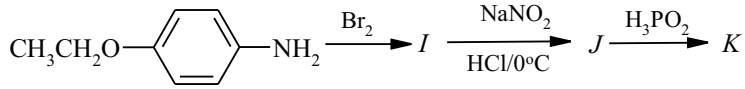
(a) 

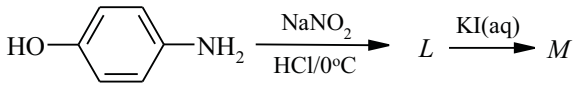


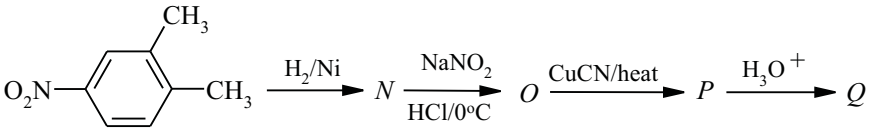
Problem 1269 Identify the missing reagents/reactants/products in the following sequence of reactions:



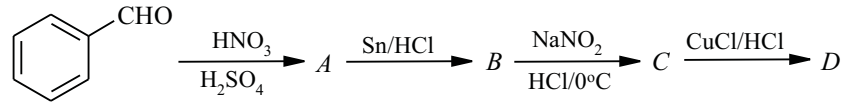
(c) 

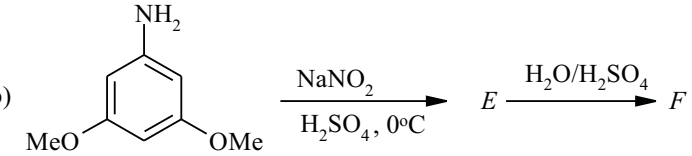
(d) 

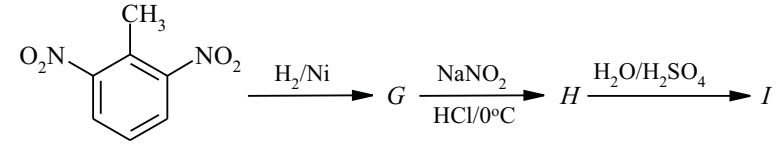
(e) 

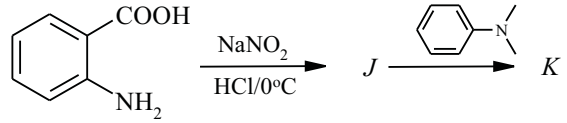
(f) 

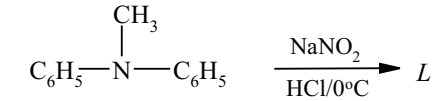
PROBLEM 1270 Write structural formula for all the products in the following sequence of reaction:

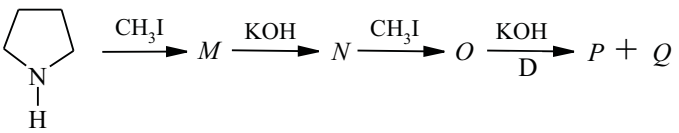
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

Problem 1271 An organic compound $A(C_8H_{10})$ does not decolourise aqueous solution of Br_2 and on treatment with $Br_2/FeBr_3$ in dark yields two product in principle, *B* and *C* but due to steric reason, *B* predominates. *A* on refluxing with alkaline solution of $KMnO_4$ yields $D(C_8H_6O_4)$ which gives off gas on treatment with $NaHCO_3$. *D* on treatment with $Br_2/FeBr_3$ reacts very slowly to produce $E(C_8H_5O_4Br)$ as the only isomer. Also *D* on treatment with excess of $SOCl_2$ followed by work-up with benzene solution of $AlCl_3$ produces $F(C_{14}H_8O_2)$ which does not yields any gas with $NaHCO_3$. *F* on heating with N_2H_4 produces $G(C_{14}H_8N_2)$. Deduce structures of *A* to *G*.

Problem 1272 An organic compound *A* $(C_9H_{10}O_2)$ does not change colour of Br_2-H_2O and produces no gas with NaH. *A* on treatment with Br_2 in presence of $FeBr_3$ yields $B(C_9H_9O_2Br)$ as only isomer. Also *A* gives orange precipitate with 2,4-dinitro phenyl hydrazine and produces a resolvable compound $C(C_9H_{12}O_2)$ on reduction with $NaBH_4$. Deduce structures of *A, B* and *C*.

Problem 1273 An organic compound $A(C_9H_8O_2)$ does not decolourise bromine water solution and evolves no gas with CH_3MgBr but gives orange precipitate with 2,4-dinitro phenyl hydrazine. *A* on refluxing with dilute H_2SO_4 produces $B(C_9H_{10}O_3)$ which forms salt with NaOH and on treatment with excess of CH_3COCl yields $C_{13}H_{14}O_5$. *B* is a non-resolvable compound which on heating with N_2H_4/NaOH yields $C(C_9H_{12}O_2)$. *C* on dehydrating with concentrated H_3PO_4 yields $D(C_9H_{10}O)$ as major product. *D* on ozonolysis followed by work-up with $(CH_3)_2S$ yields $E(C_7H_6O_2)$ which can also be obtained by the action of phenol with alkaline solution of chloroform followed by acidification of product. Identify *A* to *E*.

Problem 1274 An oily liquid *A* is insoluble in water, but on heating with aqueous solution of sodium hydroxide for one hour, it dissolves. From the reaction mixture, a liquid *B* can be distilled, which gives a yellow precipitate with $NaOH/I_2$ as well as it is resolvable. *B* on treatment with acidic dichromate solution yields *C* which also gives positive iodoform test. If sulphuric acid is added to solution obtained on heating with NaOH, a white precipitate *D* is obtained. *D* gives effervescence with $NaHCO_3$ and heating *D* with soda lime converts it into toluene. Also *A* on treatment with $Br_2/FeCl_3$ in dark yield single mono bromo derivative as a substitution product. Compound *B* on heating with concentrated H_2SO_4 yields stereomeric alkene, one of which on treatment with cold, dilute and alkaline $KMnO_4$ yields a meso diol. Deduce structures of *A* to *D*.

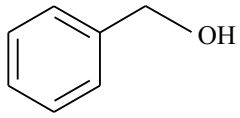
Problem 1275 An organic compound *A* has molecular formula $C_{10}H_{14}$ and it does not decolourize bromine water solution. *A* on treatment with Br_2/Fe yields three products in principle but in actual practice, only two of these are produced as mono-bromo derivative. *A* on heating with Br_2 yields *B* $(C_{10}H_{13}Br)$ as the mono-bromo derivative which is optically inactive. *A* on heating with alkaline $KMnO_4$ yields $C(C_8H_6O_4)$ which does not forms anhydride on heating. Deduce structures of *A* to *C*.

Problem 1276 An organic compound $A(C_8H_8O_3)$ evolves a gas with $NaHCO_3$ as well as forms salt with NaOH. *A* on treatment with HI yields $B(C_7H_6O_3)$ which when treated with excess of acetyl chloride (CH_3COCl) yields $C(C_{11}H_{10}O_5)$. *B* on treatment with $Br_2/FeBr_3$ in CCl_4 should yield three products *D*, *E* and *F* in principle but only two products *E* and *F* are produced in reality and *E* is the major product. Deduce structures of *A* to *F*.

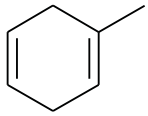
Problem 1277 An oily liquid is insoluble in water, but on heating with aqueous solution of sodium hydroxide for one hour, it dissolves. From the reaction mixture, a liquid *B* can be distilled, which gives a yellow precipitate with iodine and NaOH solution. On careful oxidation, *B* gives an aldehyde *C*, which also gives positive iodoform test. If sulphuric acid solution is added to the solution obtained from heating

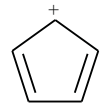
A with NaOH, a white crystal *D* is obtained. *D* liberates a gas with $NaHCO_3$. Heating *D* with NaOH/CaO, converts it into C_6H_6. Identify *A* to *D*.

Problem 1278 Identify the followings as aromatic, antiaromatic or non-aromatic, supporting your answer with brief explanations.

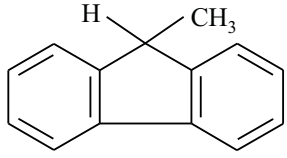
(a) 

(b) 

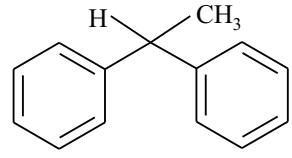
(c) 

(d) 

Problem 1279 The pK_a of benzylic hydrogen in A is ~ 16, whereas the pK_a of benzylic H in B is ~ 25. Explain the difference.

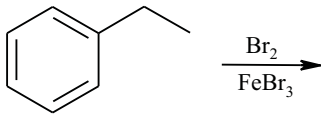


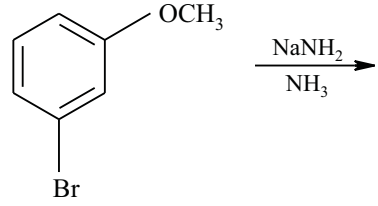
A

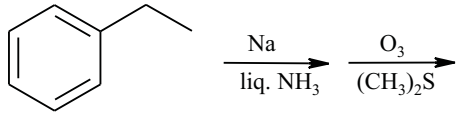


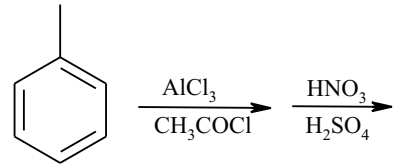
B

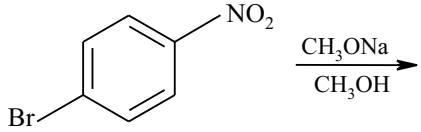
Problem 1280 Predict products in the following reactions and show stereochemistry where appropriate:

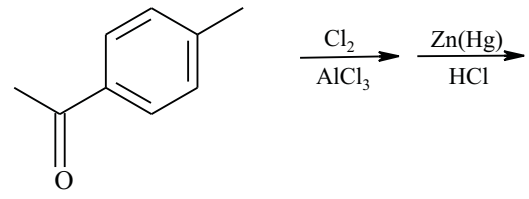
(a) 

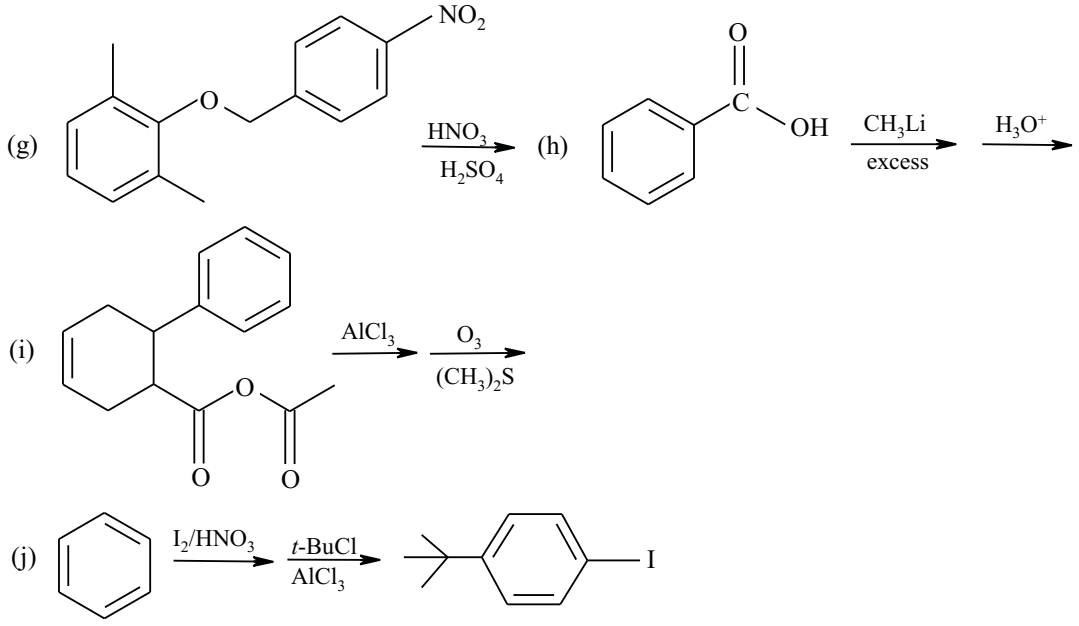
(b) 

(c) 

(d) 

(e) 

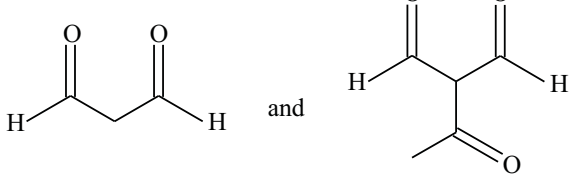
(f) 



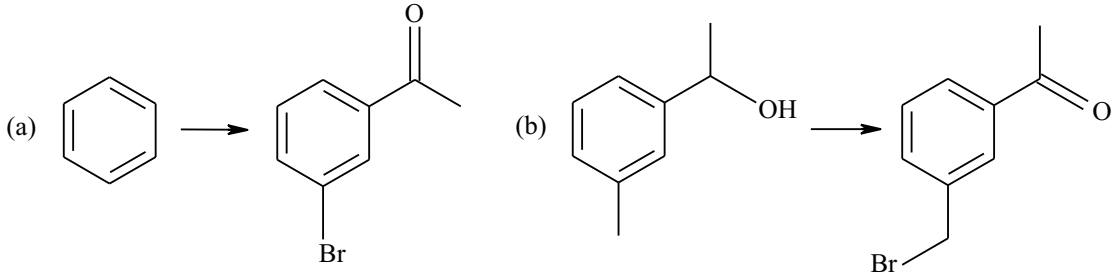
Problem 1281 Provide a mechanism for the nitration of benzene using concentrated nitric acid-sulphuric acid mixture. Draw an energy diagram for the reaction. Will the rate of reaction change if benzene is replaced by hexadeutrobenzene? Why?

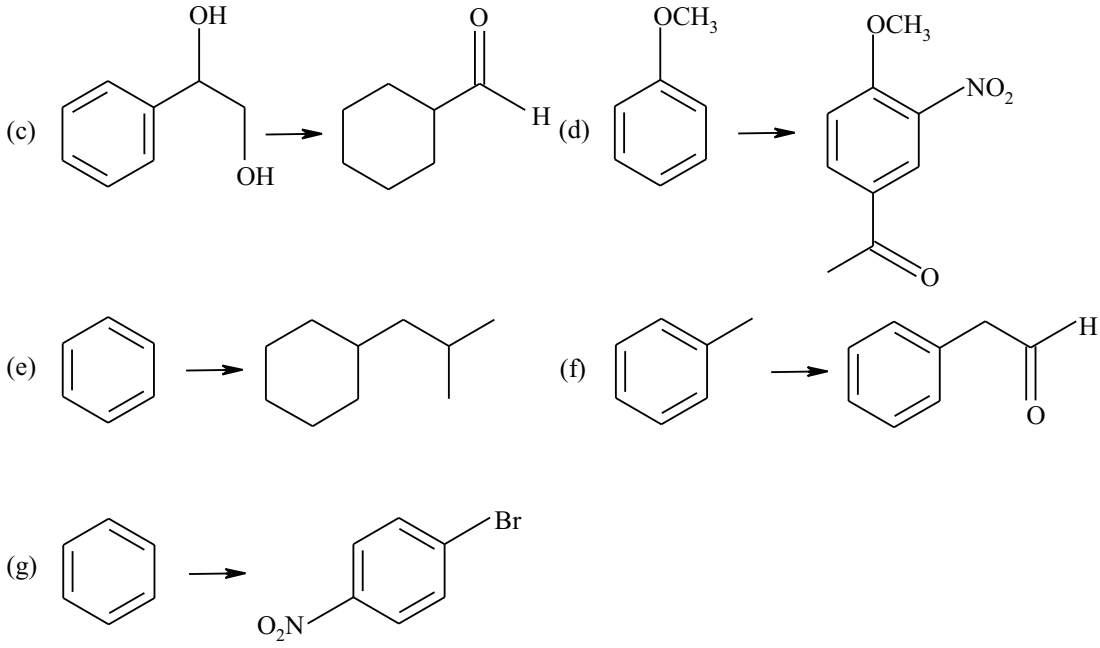
Problem 1282 A by product of sulphonation of benzene is diphenyl sulphone. Propose a mechanism by which diphenyl sulphone is produced during sulphonation reaction.

Problem 1283 Synthesize the following compounds starting from benzene:



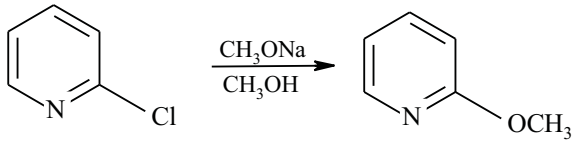
Problem 1284 Provide reagents that will accomplish the following transformations:



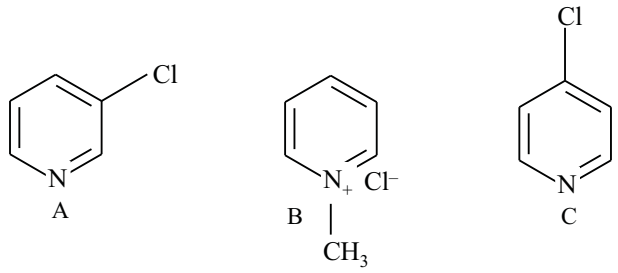


PROBLEM 1285 Reaction of acetophenone with $Br_2/FeBr_3$ yield meta-bromo acetophenone. Does this reaction occur at faster rate or slower rate than the treatment of benzene with bromine under similar conditions? Why?

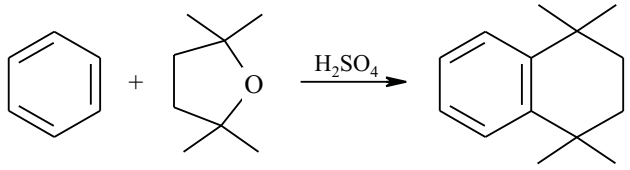
PROBLEM 1286 Chloropyridines undergo nucleophilic substitution with sodium methoxide to give methoxy pyridine as:



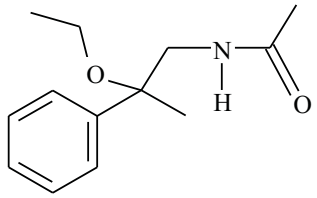
Order the following derivatives from high to low in term of their reactivity towards nucleophilic aromatic substitution.



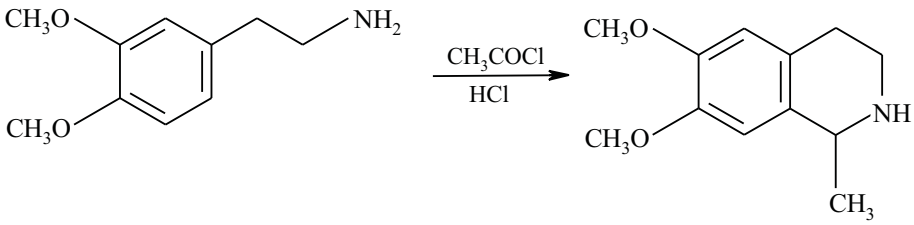
Problem 1287 Propose a mechanism for the following reaction:



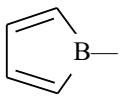
Problem 1288 Devise synthesis of indicated compound starting from benzene:

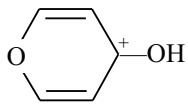


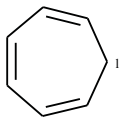
Problem 1289 Provide a mechanism for the following reaction:

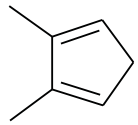


Problem 1290 Identify the followings as aromatic, antiaromatic or nonaromatic:

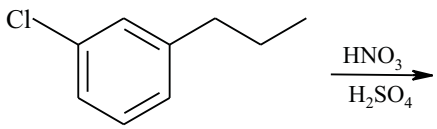
(a) 

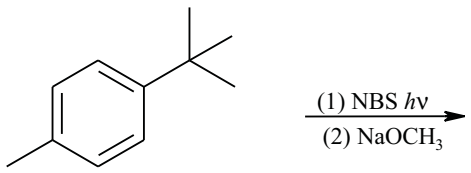
(b) 

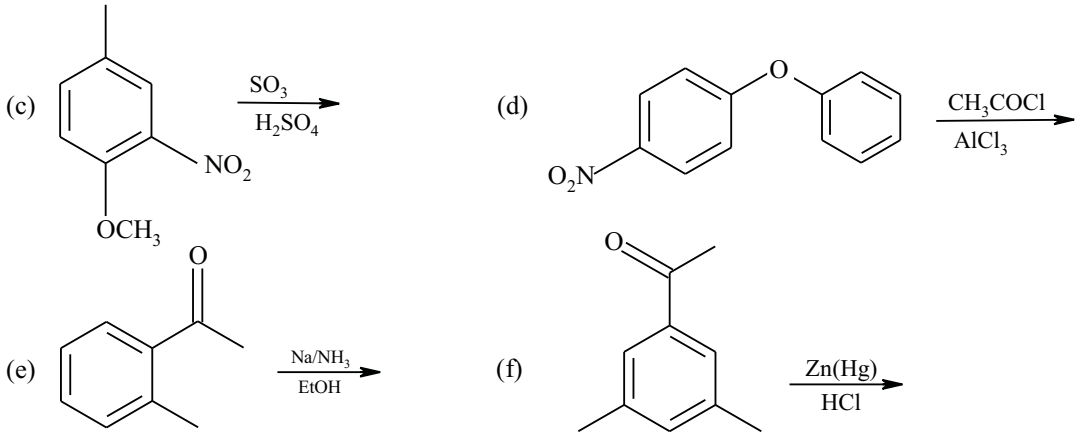
(c) 

(d) 

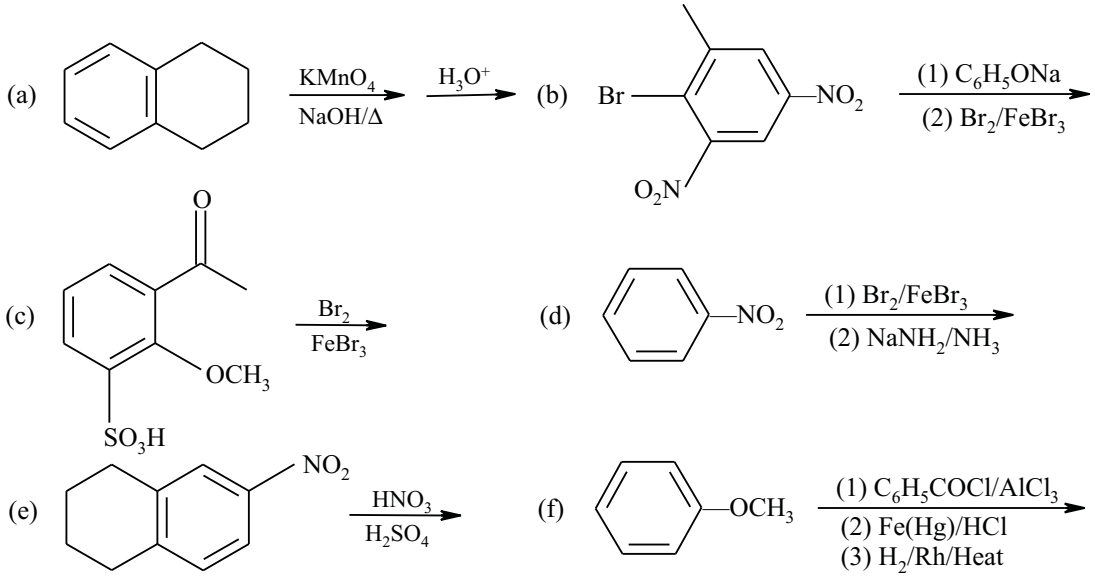
Problem 1291 Predict major products in the following reactions:

(a) 

(b) 

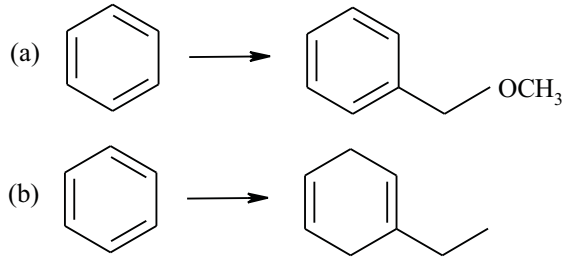


PROBLEM 1292 Predict major products in the following reactions:



PROBLEM 1293 Nitration of toluene gives exclusively the ortho and para substitution products. Using mechanism, explain the reason for regioselectivity.

PROBLEM 1294 Provide reagents that will effect the following transformations. More than one steps may be required:



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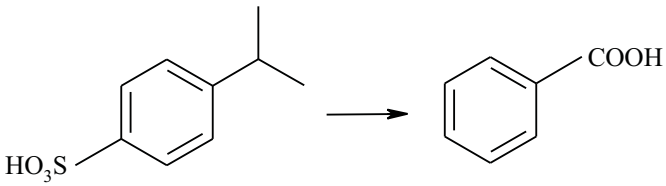
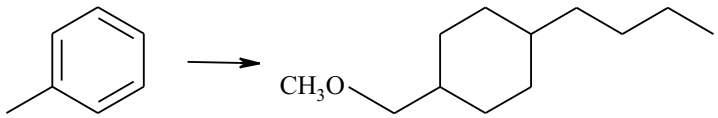
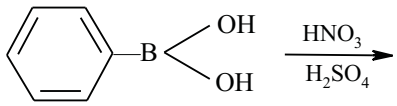


(d)

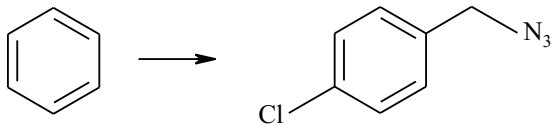


Problem 1295 Will the following reaction give mostly ortho/para products or mostly meta product. Explain.

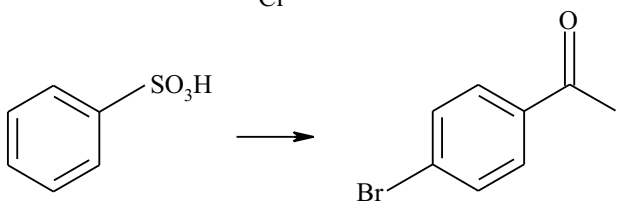


Problem 1296 Devise synthesis of the following compounds from the indicated starting materials:

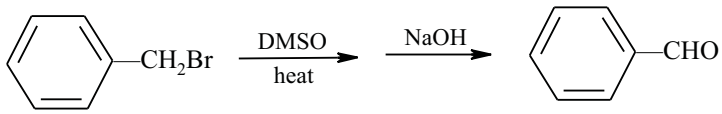
(a)



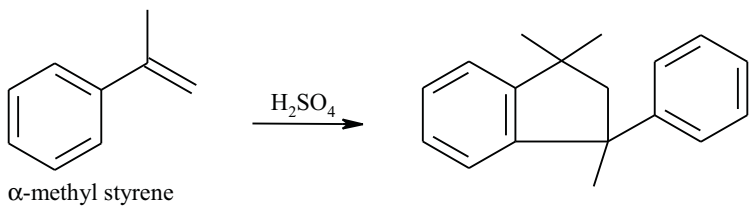
(b)



Problem 1297 Propose mechanism for the following reaction:

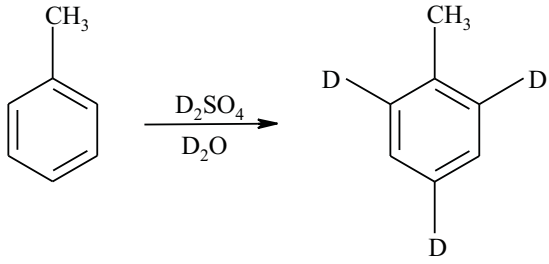


Problem 1298 When treated with H_2SO_4, α-methyl styrene gives the indicated dimeric product. Propose mechanism of its formation:



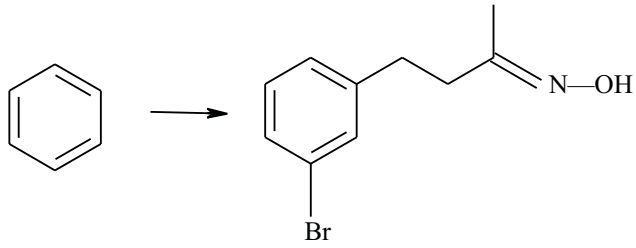
α-methyl styrene

PROBLEM 1299 Propose a mechanism of the following reaction:



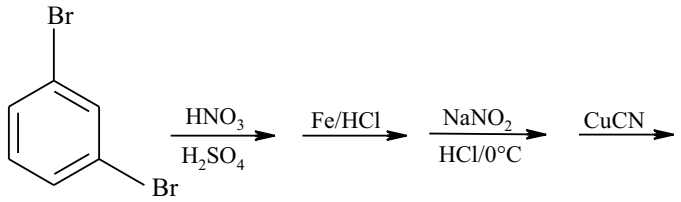
PROBLEM 1300 Would you expect Birch reduction (Na/liq. NH_3/EtOH) of benzoic acid or anisole to proceed more quickly, explain.

PROBLEM 1301 Devise a synthesis of the indicated compound starting from benzene:



PROBLEM 1302 Write products in the following reactions:

(a)



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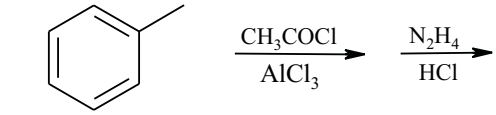

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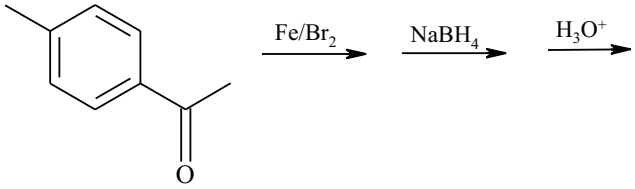
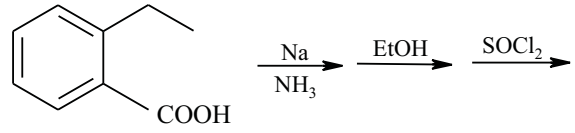
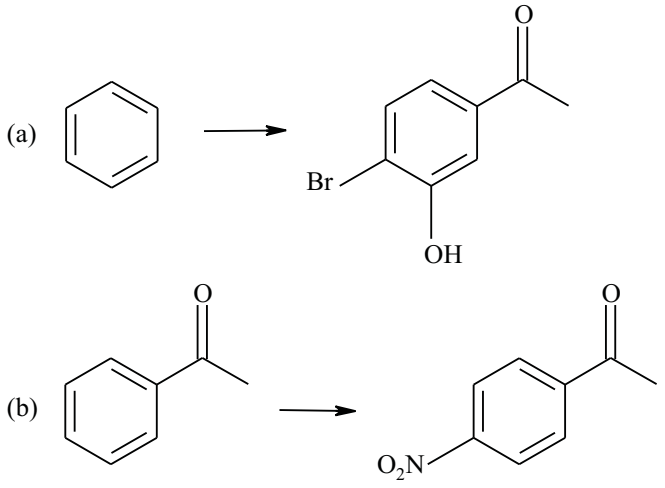


(d)



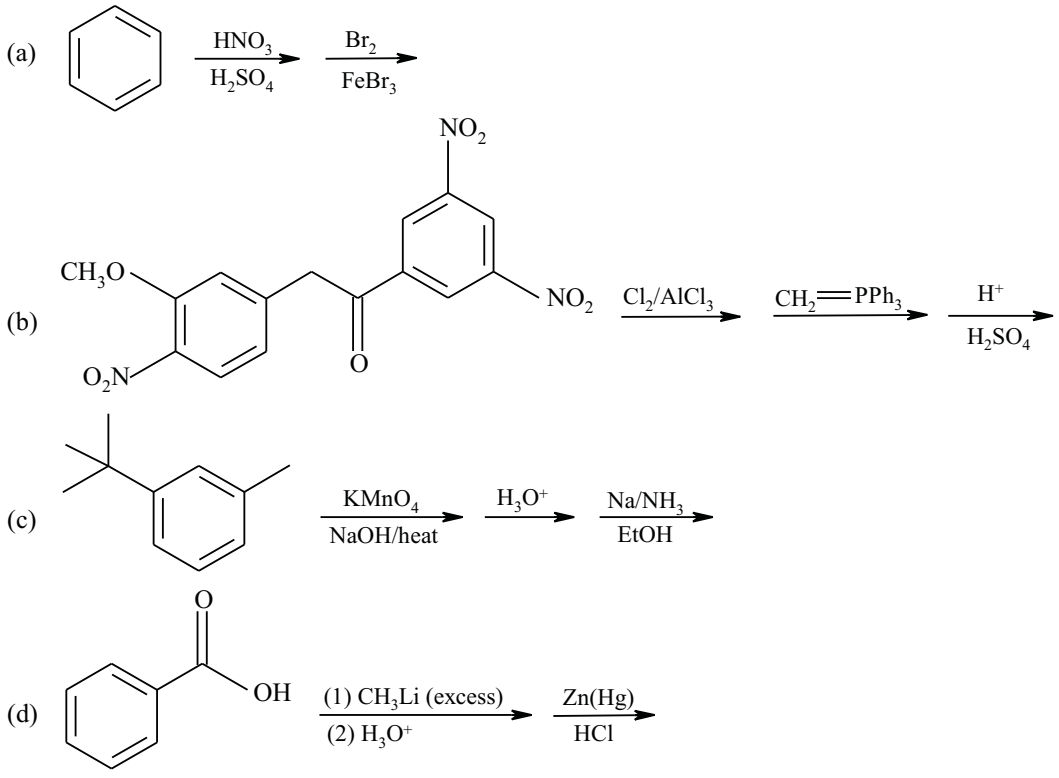
Problem 1303 Bring about the following transformation:

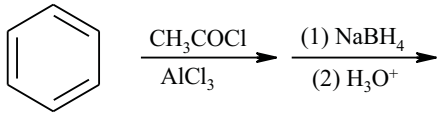


Problem 1304 Provide structure of one example of the following species:

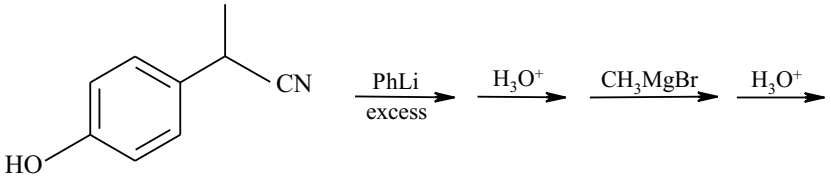
(a) An antiaromatic, (b) An aromatic cation, (c) A cyclic non-aromatic compound containing 6 π electrons, (d) A neutral, aromatic heterocyclic compound.

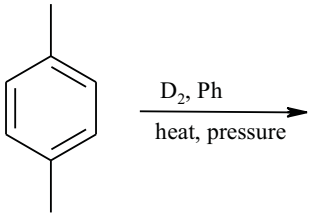
Problem 1305 Predict products in the following reactions:

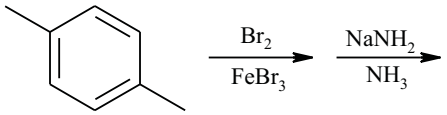


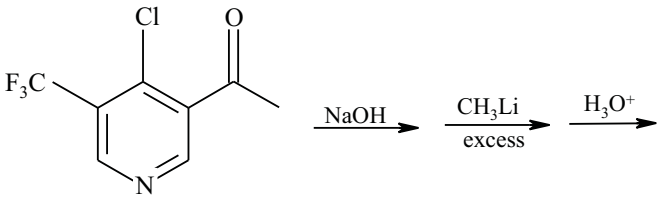
(e) 

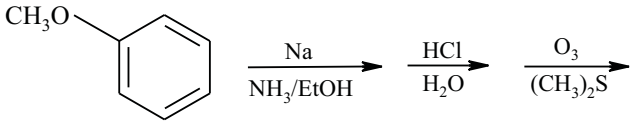
PROBLEM 1306 Predict products of the following reactions:

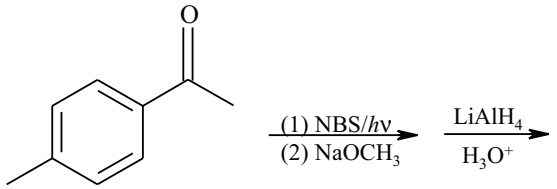
(a) 

(b) 

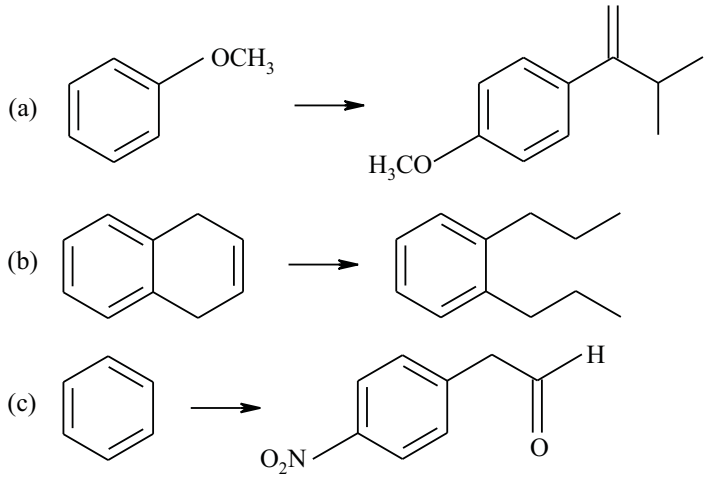
(c) 

(d) 

(e) 

(f) 

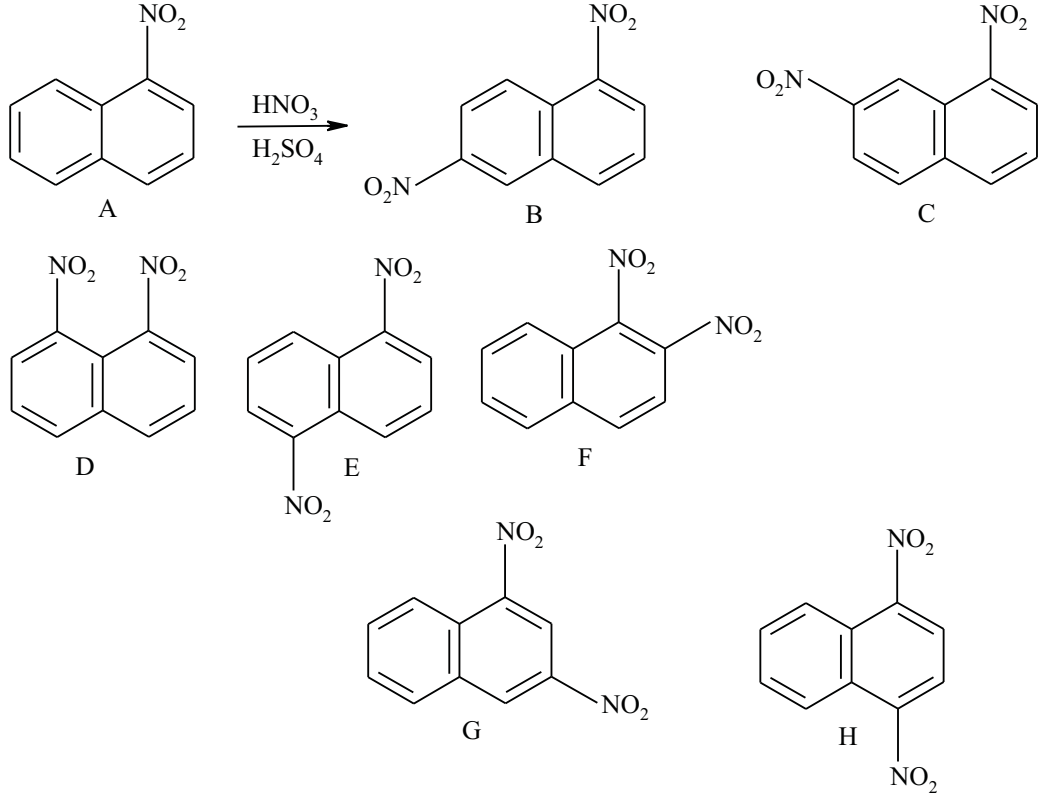
Problem 1307 Provide reagents that can be used to carryout the following transformations:



Problem 1308 Identify *A*, *B* and *C* in the following sequence of reaction:

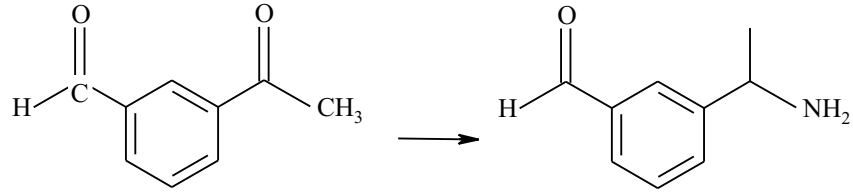
$$CH_3OCH_2I \xrightarrow[BuLi]{Ph_3P} A \xrightarrow{C_6H_5CHO} B \xrightarrow[H_2O]{HCl} C$$

Problem 1309 Nitration of *A* can give rise to seven possible products in principle (B—H). However, only three are produced. Indicate, which are formed and explain with the of aid of mechanism.

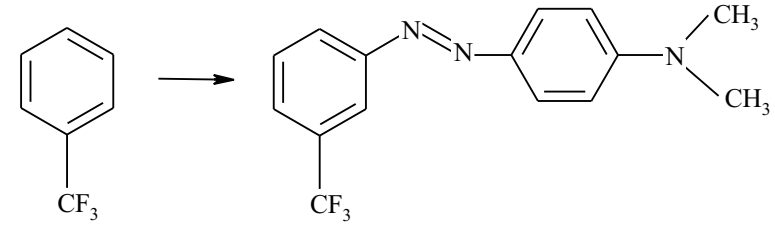


PROBLEM 1310 Provide reagents that will bring about the following transformations:

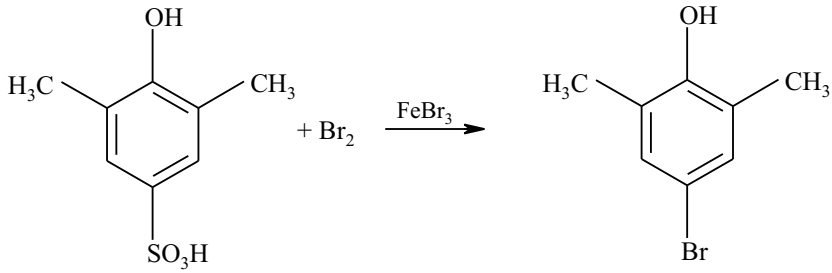
(a)



(b)

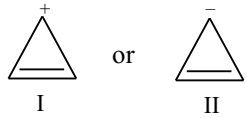


PROBLEM 1311 Propose mechanism of the following reaction:

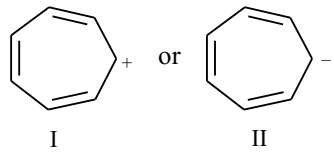


PROBLEM 1312 In each of the following pair, select the more stable one:

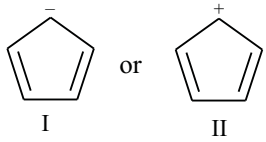
(a)



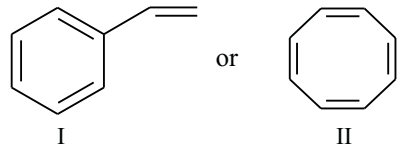
(b)



(c)



(d)

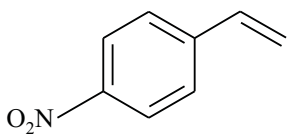


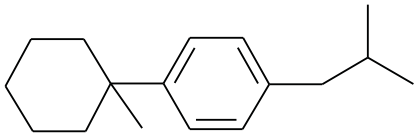
PROBLEM 1313 Rank the compounds in each group in increasing order of their reactivity towards electrophilic aromatic substitution reaction:

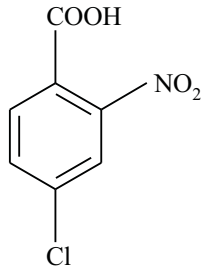
(a) Chlorobenzene (I), fluorobenzene (II), cyanobenzene (III),
(b) *o*-dichlorobenzene (I), benzaldehyde (II), methoxybenzene (III),
(c) methoxybenzene (I), *o*-xylene (II), benzene (III).

PROBLEM 1314 Discuss the orienting effect of nitroso group (—NO) in aromatic electrophilic substitution reaction.

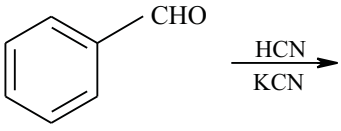
Problem 1315 Provide synthesis of the following compounds starting from benzene:

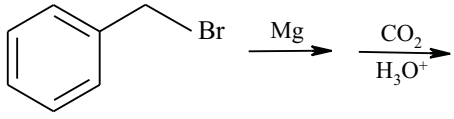
(a) 

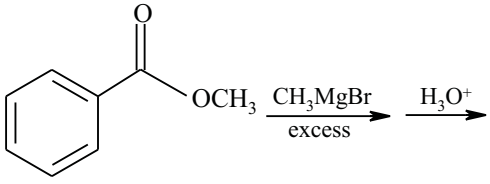
(b) 

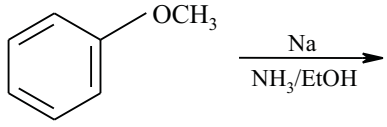
(c) 

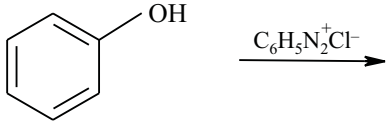
Problem 1316 Write products in the following reaction:

(a) 

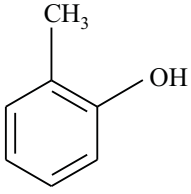
(b) 

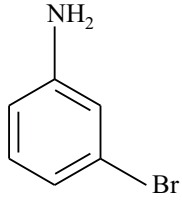
(c) 

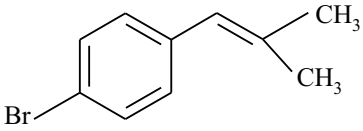
(d) 

(e) 

Problem 1317 Starting from benzene synthesize the following compounds:

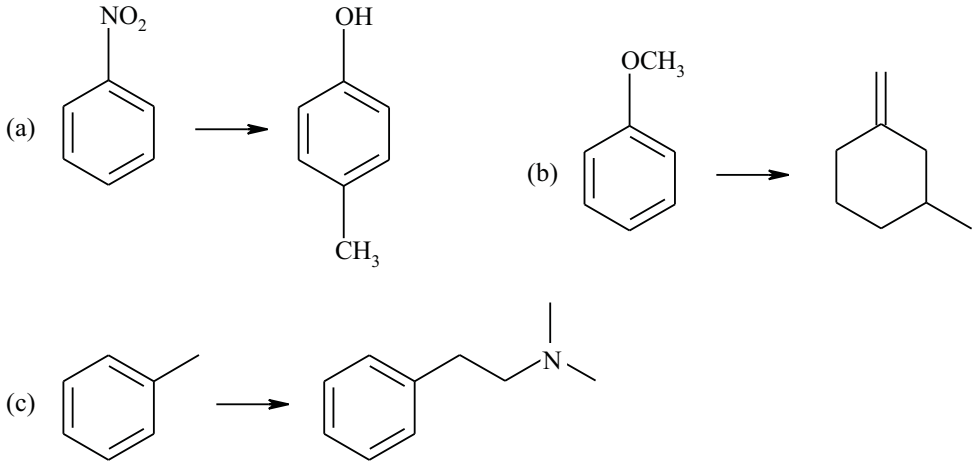
(a) 

(b) 

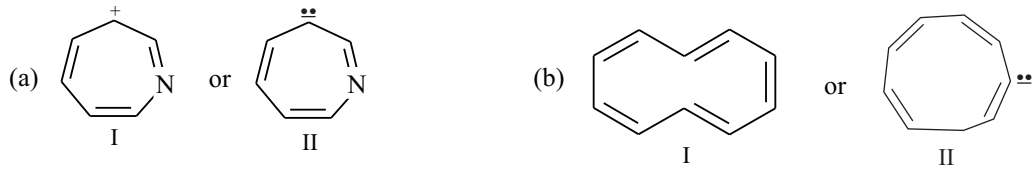
(c) 

Problem 1318 Furan undergo electrophilic aromatic substitution. With the help of mechanism, explain the most probable site for the attack of electrophile on furan ring.

PROBLEM 1319 Bring about the following transformations:



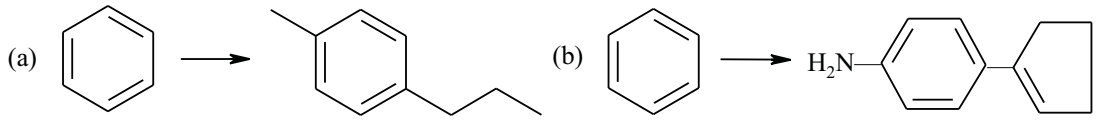
PROBLEM 1320 Which of the following pairs is more stable:



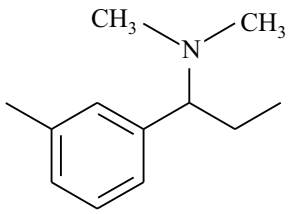
PROBLEM 1321 Arrange the following compounds in increasing order of reactivity towards electrophilic aromatic substitution reaction:

(a) Chlorobenzene (I), benzene (II), nitrobenzene (III),
(b) *m*-chloroanisole (I), *p*-chloroanisole (II), anisole (III),
(c) Cyanobenzene (I), *p*-cyanotoluene (II), *p*-cyanoanisole (III).

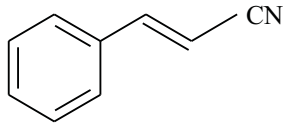
PROBLEM 1322 Bring about the following transformations:



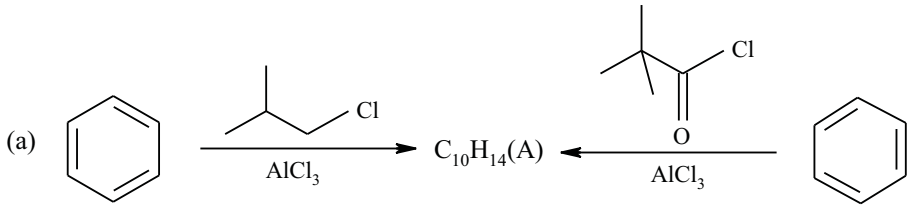
PROBLEM 1323 Starting from toluene, synthesize:



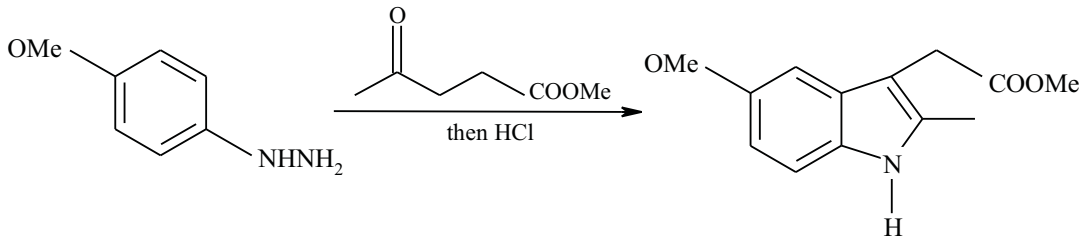
Problem 1324 Predict the direction of electrophilic attack on the following compound:



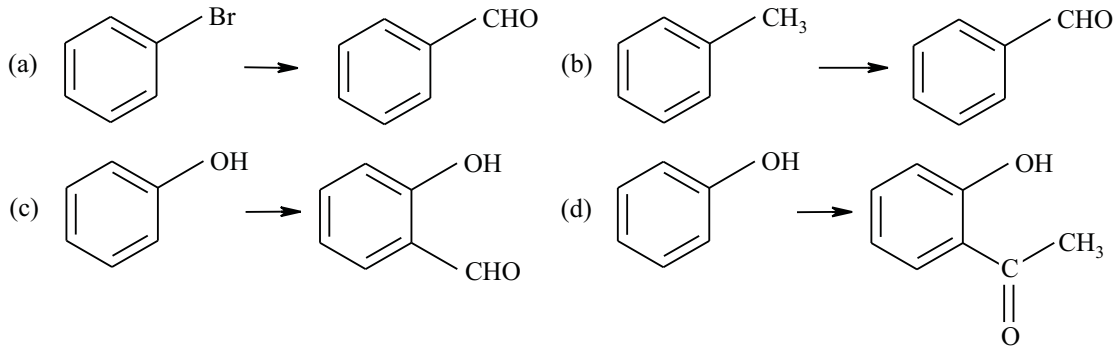
Problem 1325 Provide structures of *A* and *B* and suggest mechanism of their formation:

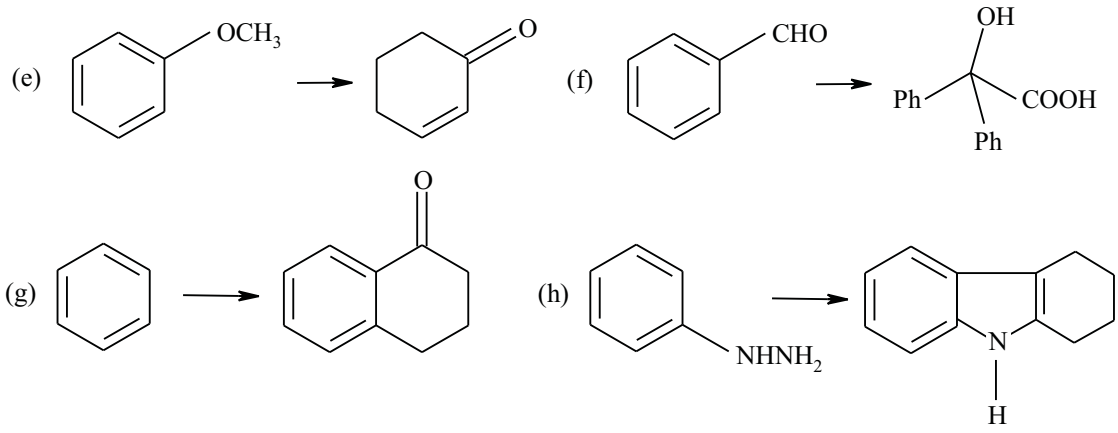


Problem 1326 Propose mechanism:

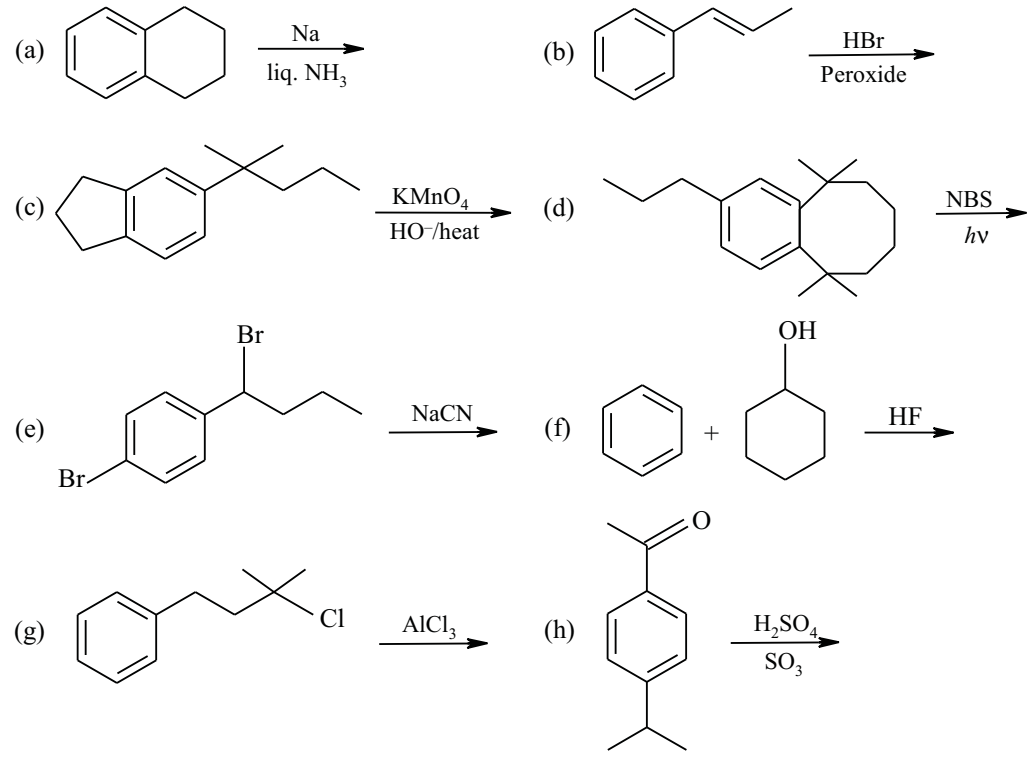


Problem 1327 Bring about the following transformations:

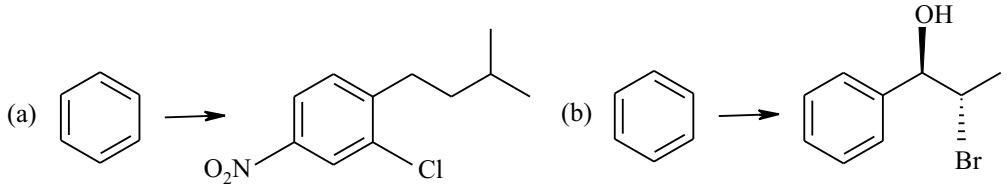




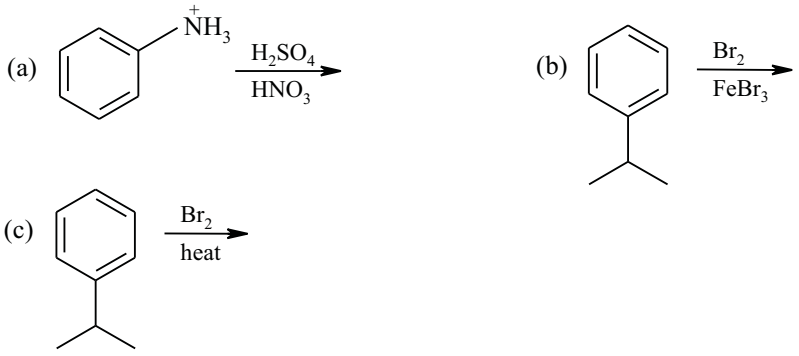
PROBLEM 1328 Provide missing species in the following reactions:



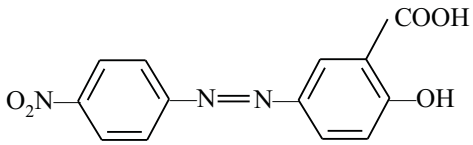
PROBLEM 1329 Propose synthesis of the target compound starting with the substrate provided:



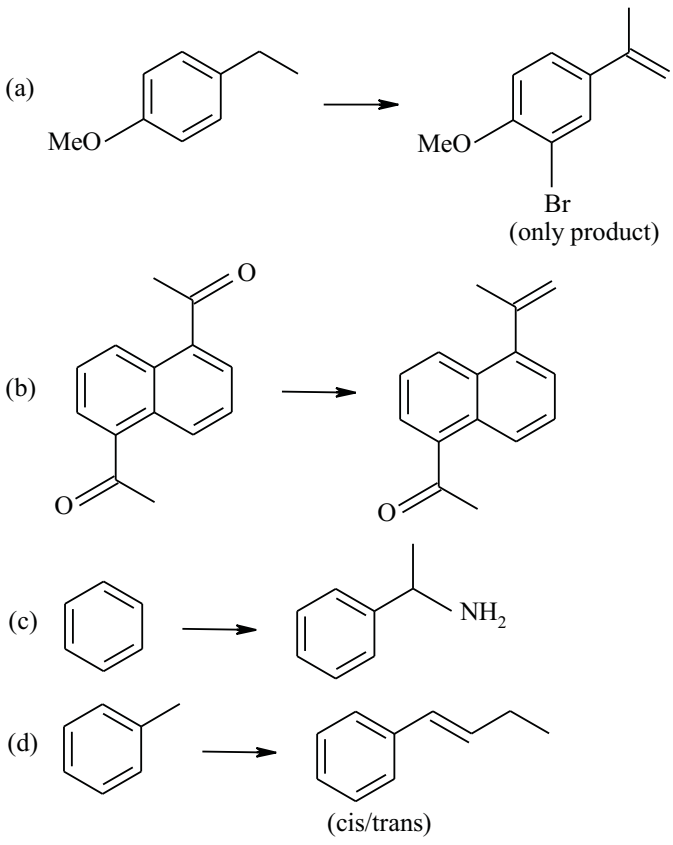
PROBLEM 1330 Complete the following reaction:



PROBLEM 1331 Starting from benzene, synthesize:

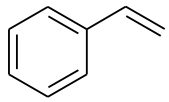


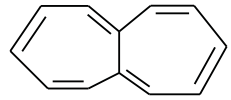
PROBLEM 1332 Bring about the following transformations:

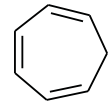


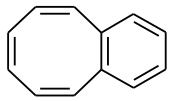
PROBLEM 1333 Classify each of the followings as aromatic, antiaromatic or nonaromatic:

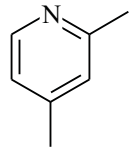
(a) 

(b) 

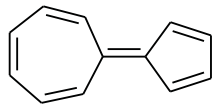
(c) 

(d) 

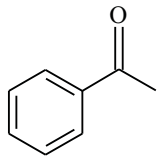
(e) 

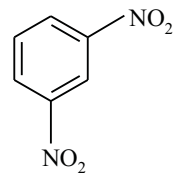
(f) 

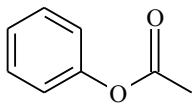
PROBLEM 1334 Ordinarily barrier to rotation about carbon-carbon double bond is quite high (≈ 40 kcal/mol) but the compound shown below was observed to have a rotational barrier of about only 20 kcal/mol, explain.

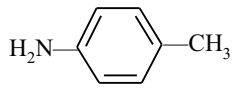


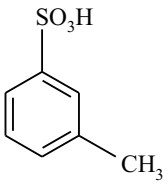
PROBLEM 1335 Specify whether you expect the benzene ring in the following compounds to be activated/deactivated for electrophilic aromatic substitution reaction:

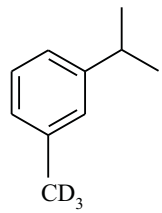
(a) 

(b) 

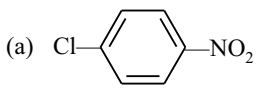
(c) 

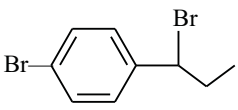
(d) 

(e) 

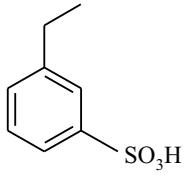
(f) 

PROBLEM 1336 Propose a reasonable synthesis of each of the following multiply substituted arenes from benzene:

(a) 

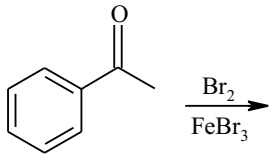
(b) 

(c)

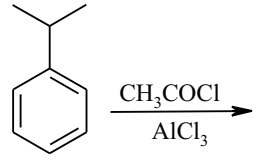


PROBLEM 1337 Predict products of the following reactions:

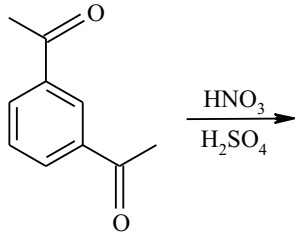
(a)



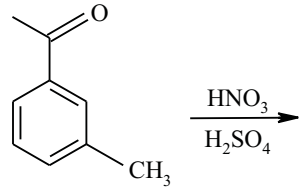
(b)



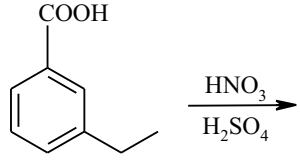
(c)



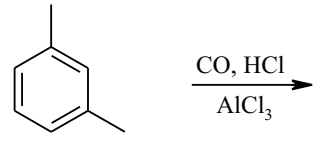
(d)



(e)

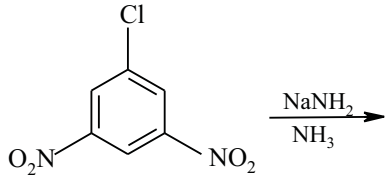


(f)

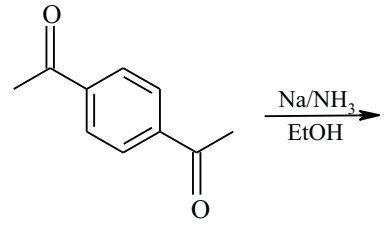


PROBLEM 1338 Predict product of the following reactions:

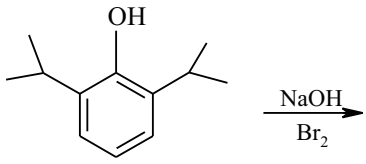
(a)



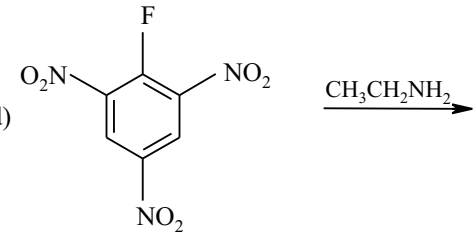
(b)

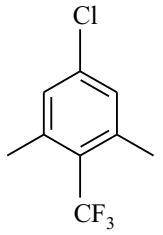


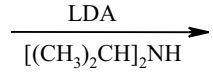
(c)

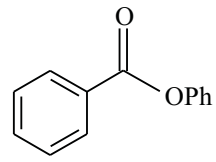


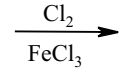
(d)

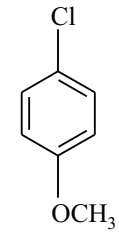


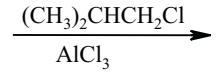
(e) 

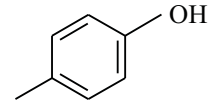


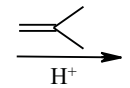
(f) 



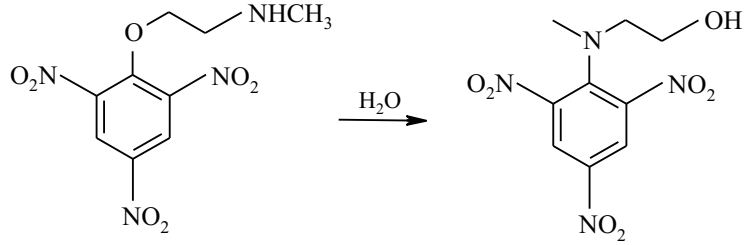
(g) 



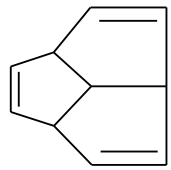
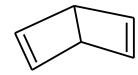
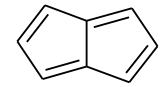
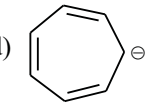
(h) 

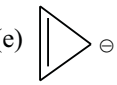


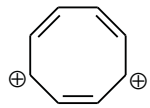
PROBLEM 1339 Propose mechanism:

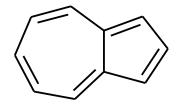
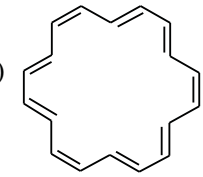


PROBLEM 1340 Classify each of the following species as either antiaromatic, aromatic or non aromatic.

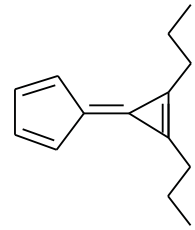
(a) 
(b) 
(c) 
(d) 

(e) 

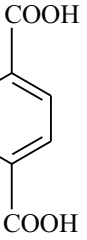
(f) 

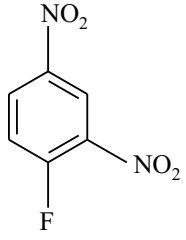
(g) 
(h) 

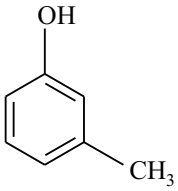
PROBLEM 1341 Discuss the reasons for low energy barrier to rotation about the double bond connecting the two rings, as compared to normal double bond.

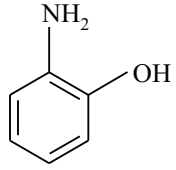


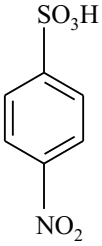
Problem 1342 Suggest a method of synthesis of the following compounds starting from benzene:

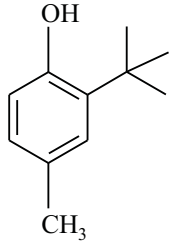
(a) 

(b) 

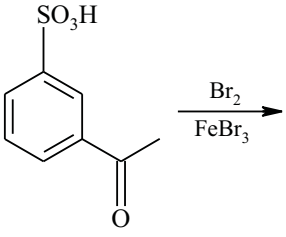
(c) 

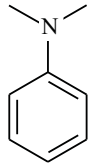
(d) 

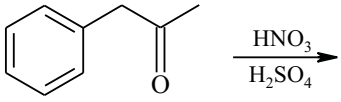
(e) 

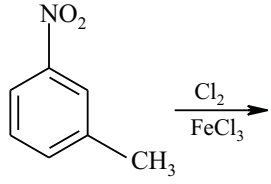
(f) 

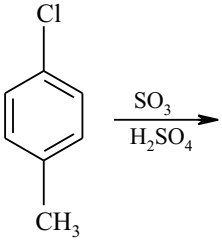
Problem 1343 Predict product of the following reactions:

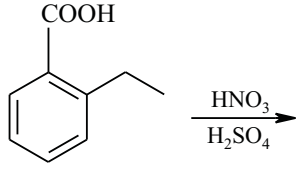
(a) 

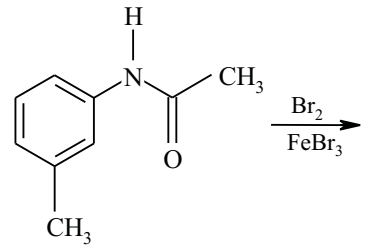
(b) 

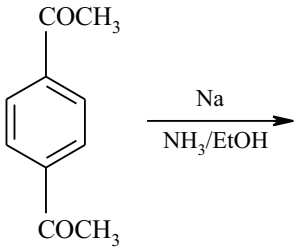
(c) 

(d) 

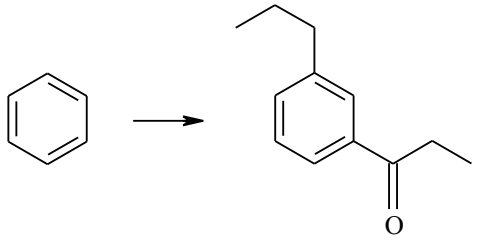
(e) 

(f) 

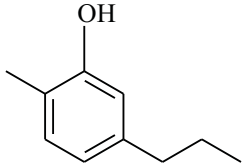
(g) 

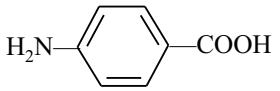
(h) 

PROBLEM 1344 Bring about the following transformations:

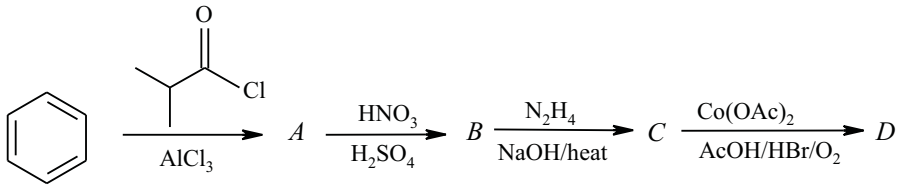


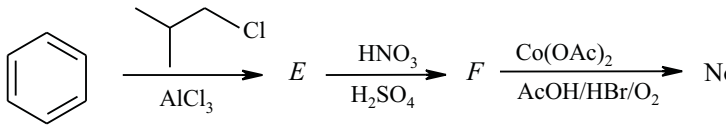
PROBLEM 1345 Synthesize following compounds starting from benzene:

(a) 

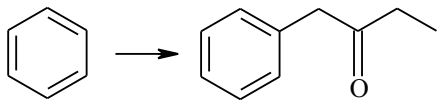
(b) 

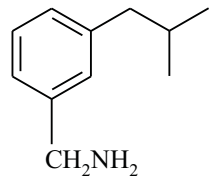
PROBLEM 1346 Identify *A* to *F* in the following reaction:

(a) 

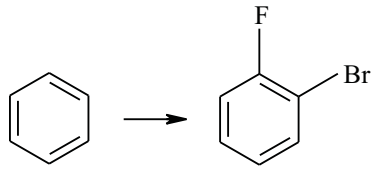
(b) 

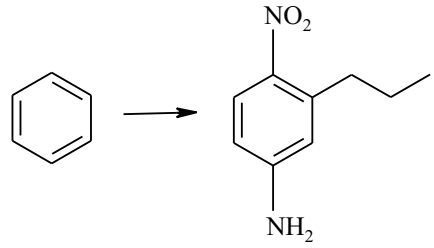
PROBLEM 1347 Bring about the following transformations:

(a) 

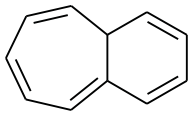
(b) 

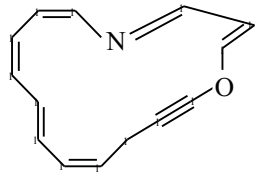
from benzene

(c) 

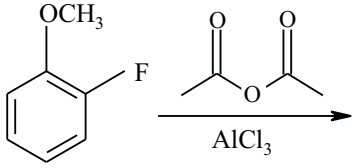
(d) 

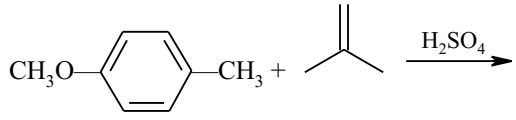
PROBLEM 1348 On the basis of Huckel rule, discuss the aromaticity of the followings:

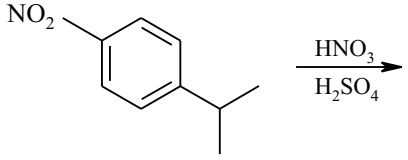
(a) 

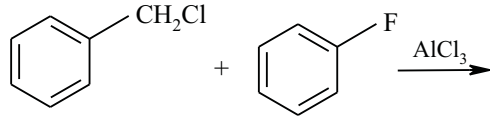
(b) 

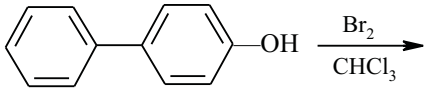
PROBLEM 1349 Give formula of the major organic product in each of the followings:

(a) 

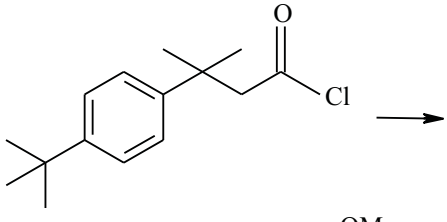
(b) 

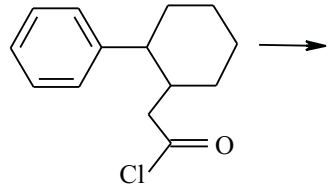
(c) 

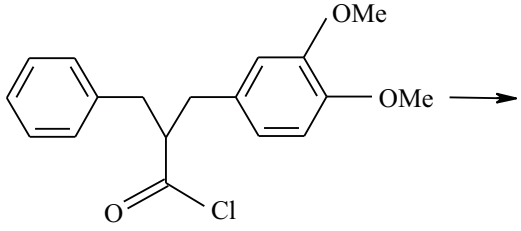
(d) 

(e) 

PROBLEM 1350 The following compounds undergo intramolecular Friedel-Craft reaction in presence of a Lewis acid catalyst. Give structures of most likely product in each case.

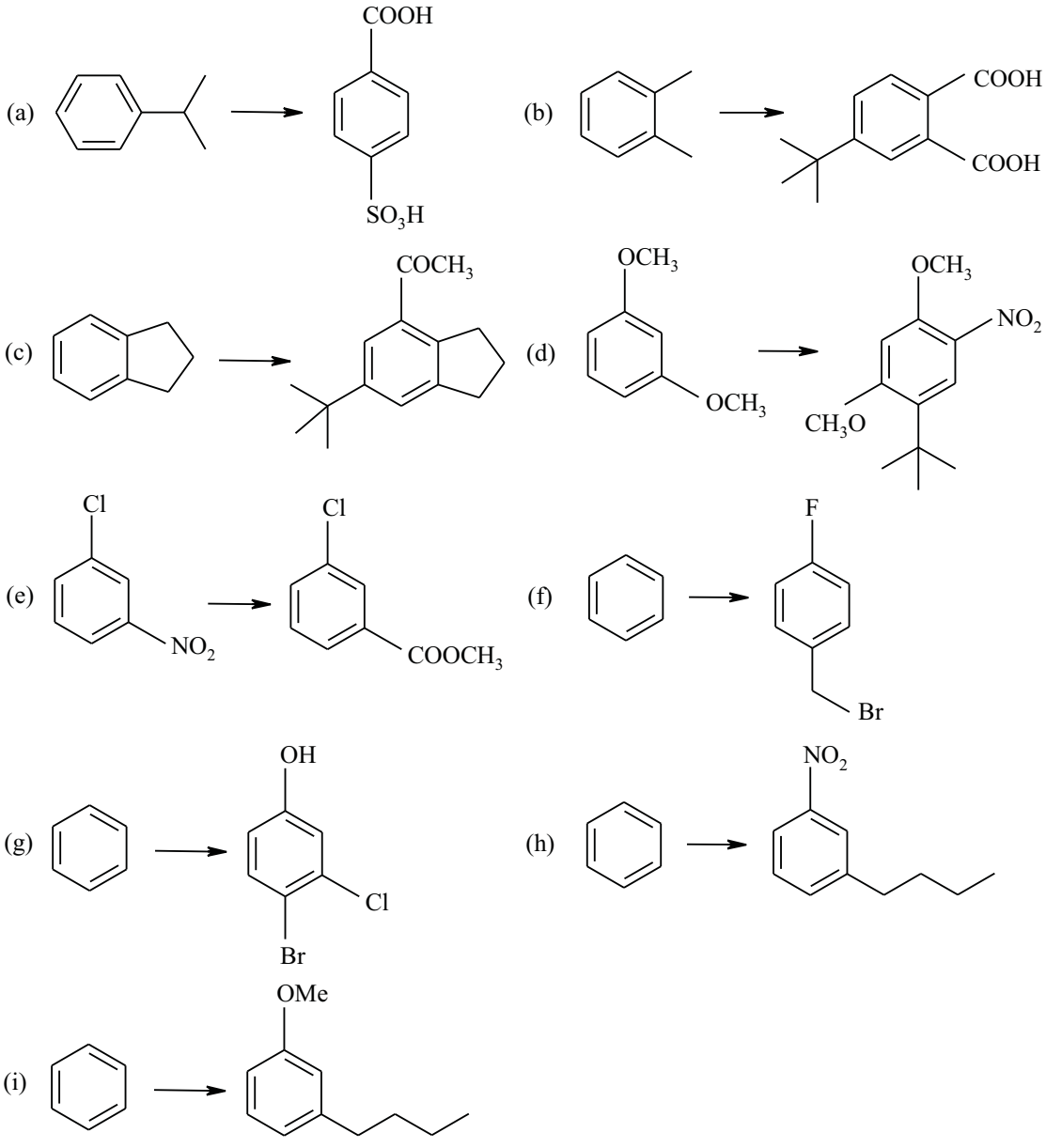
(a) 

(b) 

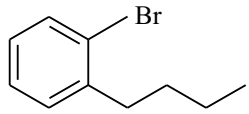
(c) 

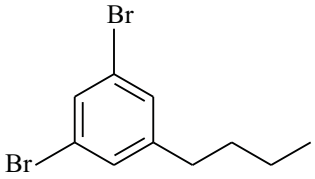
PROBLEM 1351 Synthesize the following compounds starting from benzene:
(a) 2-bromo-4-nitro toluene, (b) *p*-bromoanisole, (c) *p*-nitrobenzene sulphonic acid.

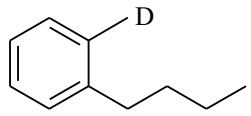
PROBLEM 1352 Bring about the following transformations:

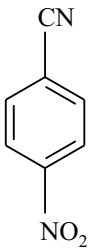


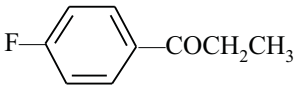
PROBLEM 1353 Starting from benzene, synthesize the following:

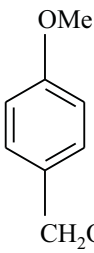
(a) 

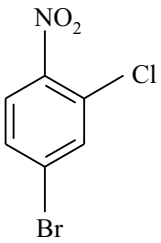
(b) 

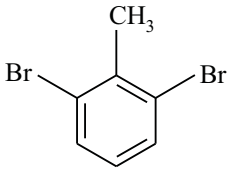
(c) 

(d) 

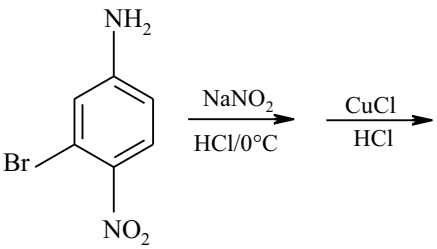
(e) 

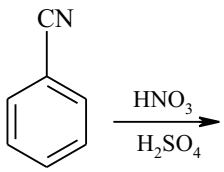
(f) 

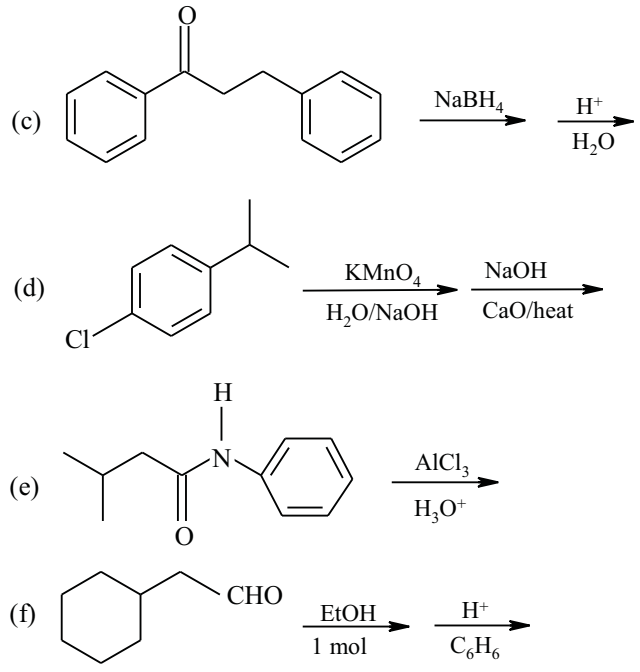
(g) 

(h) 

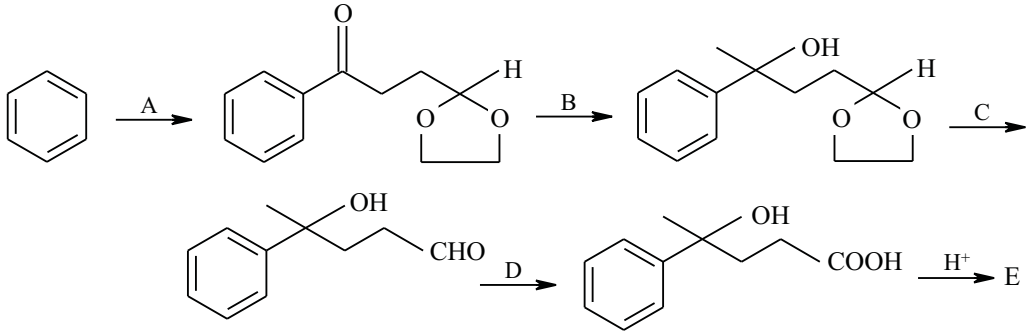
PROBLEM 1354 Complete the following reactions:

(a) 

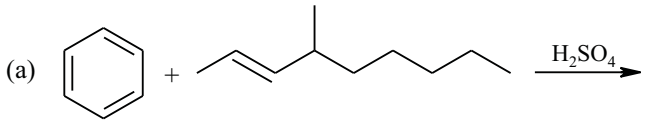
(b) 

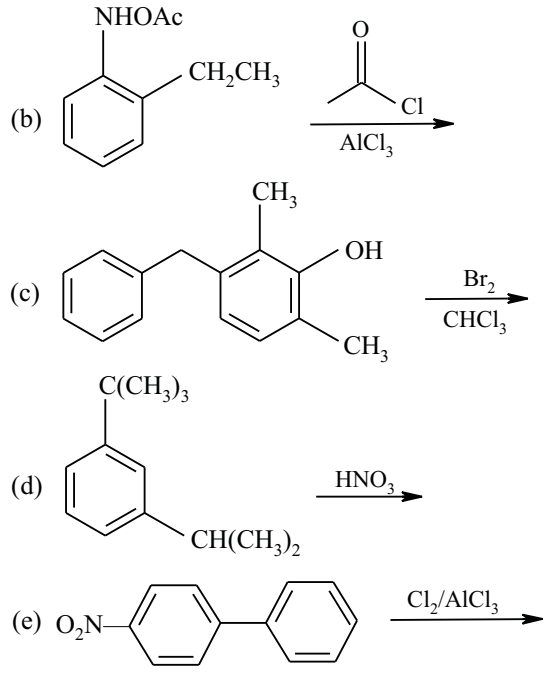


PROBLEM 1355 A sequence of reaction has been carried out on benzene as described below. Provide reagents which are needed for each observed transformations and give a structure of product *E* which results.

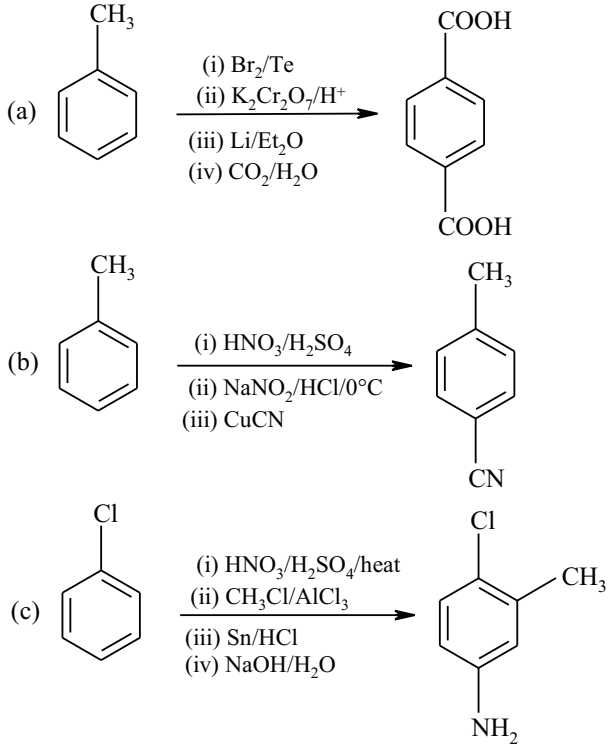


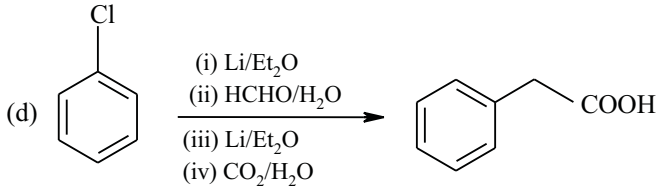
PROBLEM 1356 Each of the following reaction is reported to yield single predominant product. Write structural formula for one of them.



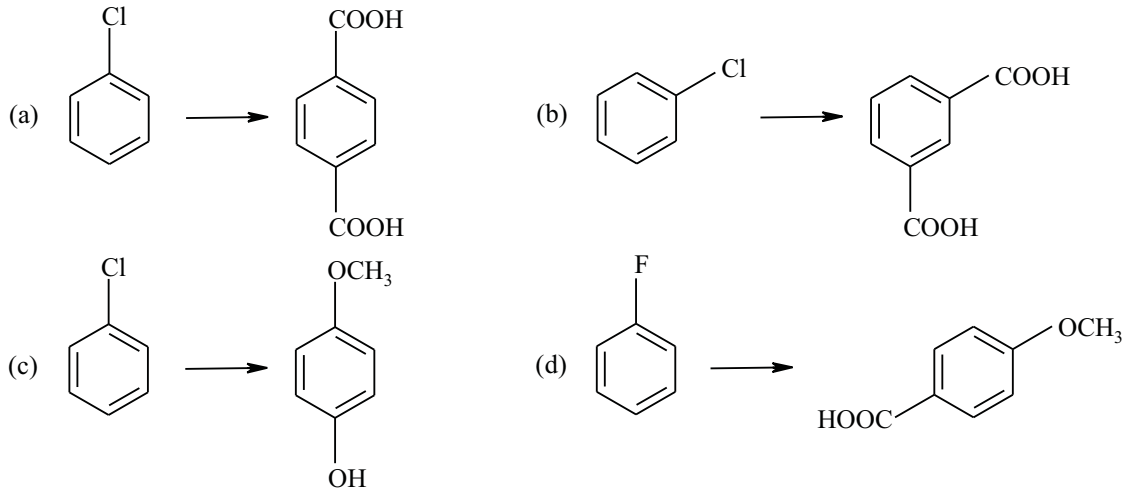


PROBLEM 1357 As written, the following synthesis has certain flaws. What is wrong with each of them?

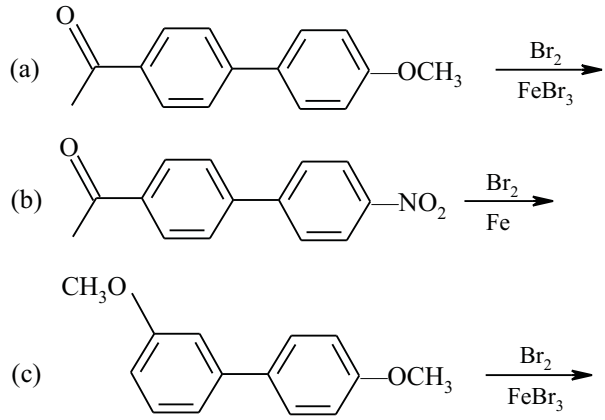




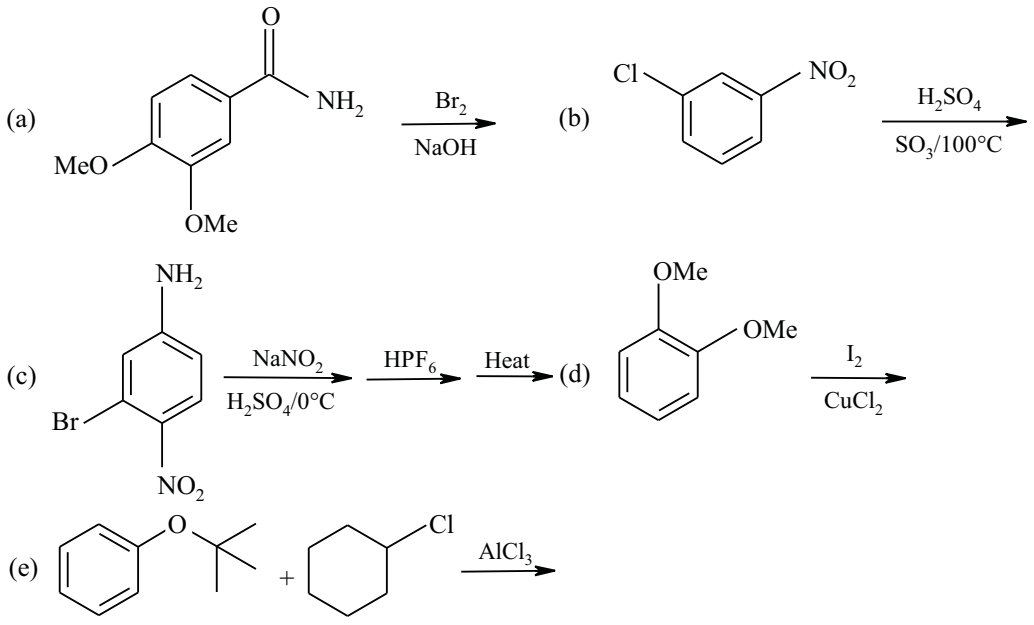
PROBLEM 1358 Bring about the following transformations:



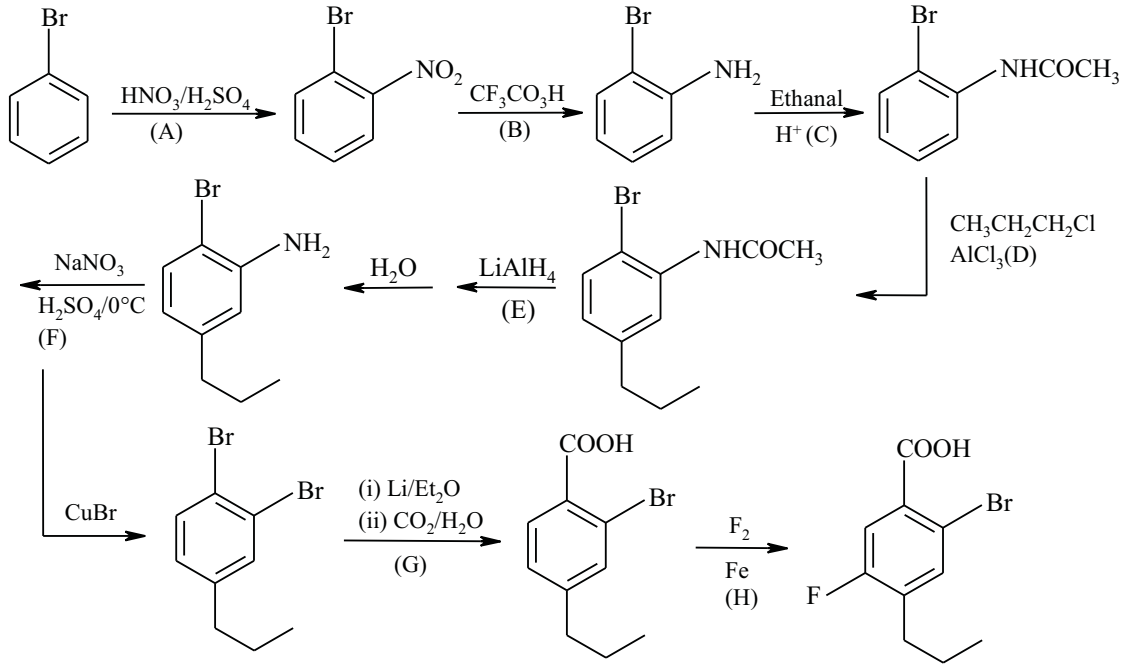
PROBLEM 1359 If we do the electrophilic bromination on the compound below, only one product (major) will be formed. Predict structure of the predominant product in each case:



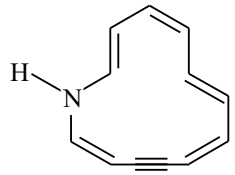
Problem 1360 Write product (major) in the following reactions:

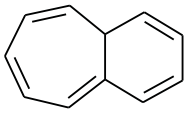


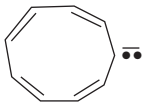
Problem 1361 In the following sequence of reaction, every steps has certain flaws. Correct them by providing appropriate reagents:

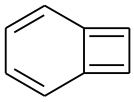


PROBLEM 1362 On the basis of Huckel rule, decide whether the following species are aromatic or not:

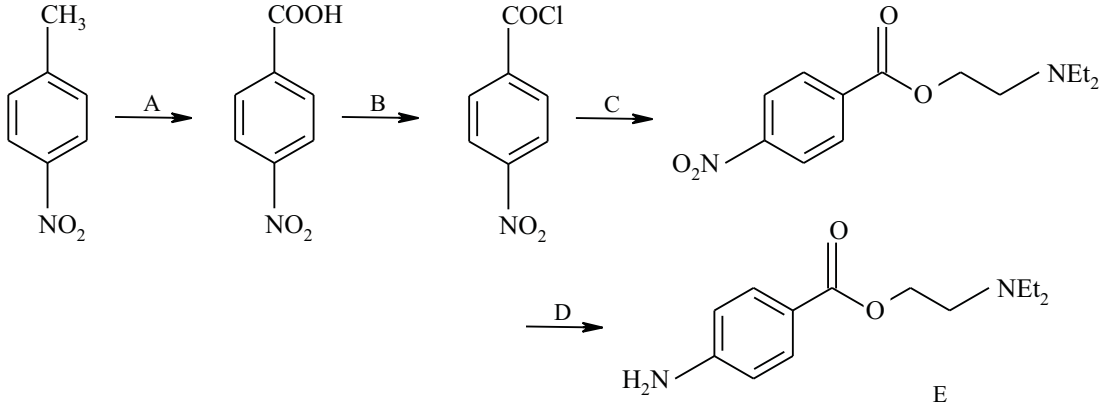
(a) 

(b) 

(c) 

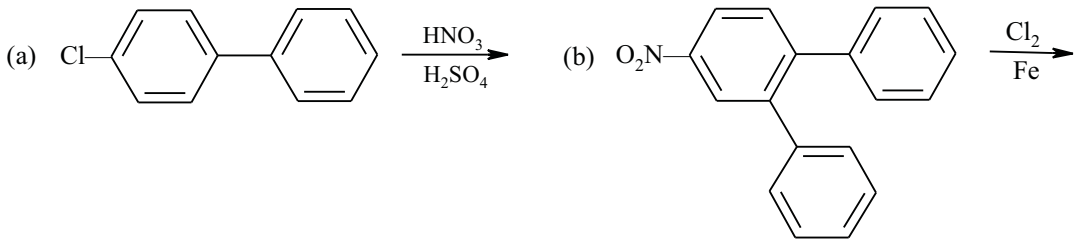
(d) 

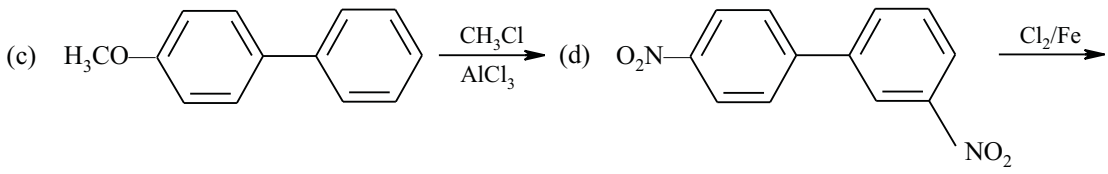
PROBLEM 1363 The following series of reaction was performed during synthesis of E. Provide appropriate reagents needed to perform the indicated transformations:



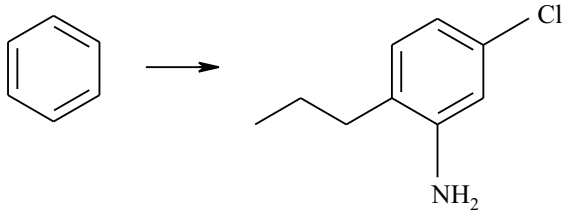
PROBLEM 1364 Two, isomeric, aromatic lactones *A* and *B* have molecular formula $C_9H_8O_4$. Both *A* and *B* dissolves in dilute NaOH solution but none gives gas with $NaHCO_3$. Both *A* and *B* gave violet colouration with $FeCl_3$. Reaction of *A* with NaOH followed by work-up with CH_3I yields *C* ($C_{10}H_{10}O_4$). Selective demethylation of C with BCl_3 followed by aqueous work-up yields *D* which is also an isomer of *A*. *D* showed presence of an intramolecularly hydrogen bonded hydroxyl group. Complete hydrolysis of either *A* or *C* with dilute H_2SO_4 produced the same compound *E* ($C_8H_8O_5$). Oxidising E with alkaline permanganate followed by acidification of product yields *F* ($C_8H_6O_6$). Heating *F* with sodalime followed by acidification of product yields 1,3-dihydroxy benzene. Identify *A* to *F*.

PROBLEM 1365 Write the major product in the following reactions:



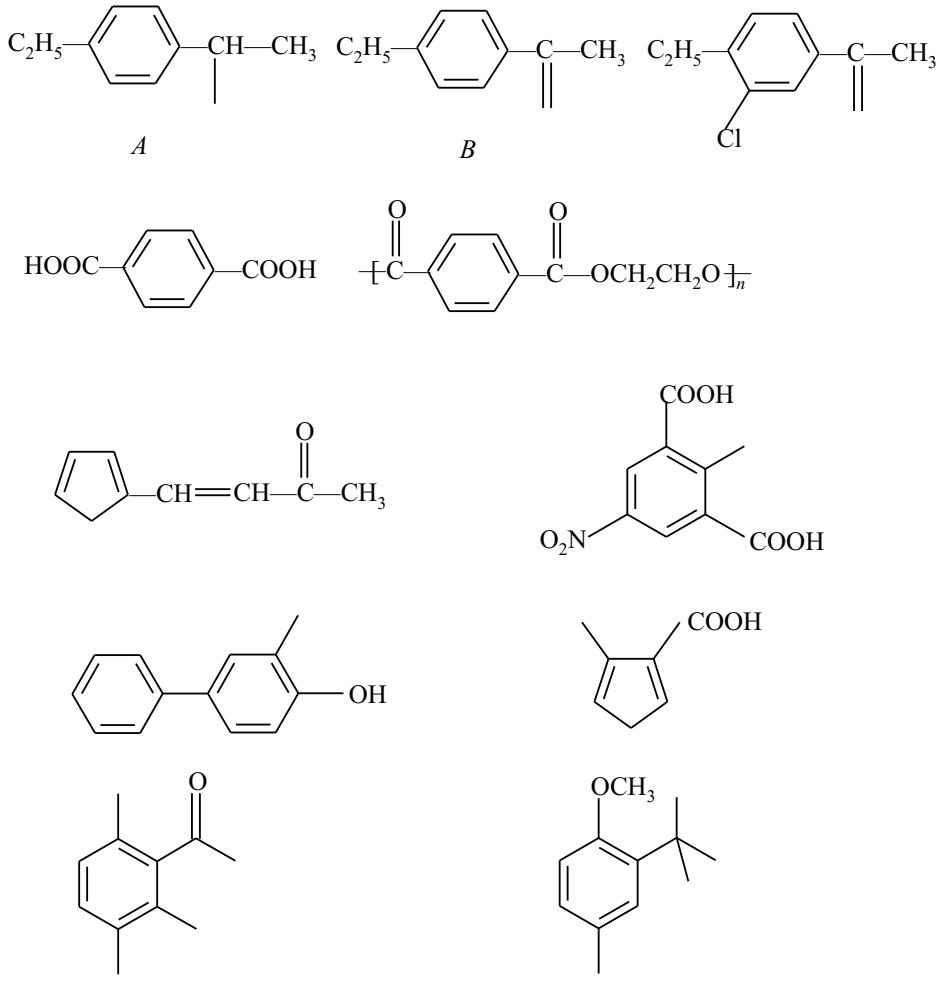


PROBLEM 1366 Bring about the following transformation in good yield.



Solutions

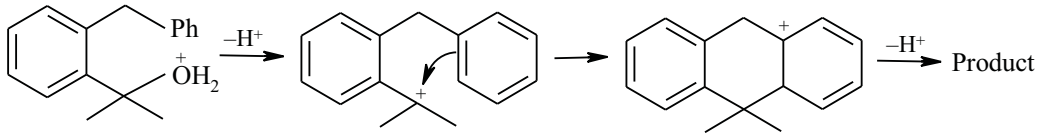
Aromatic Compounds



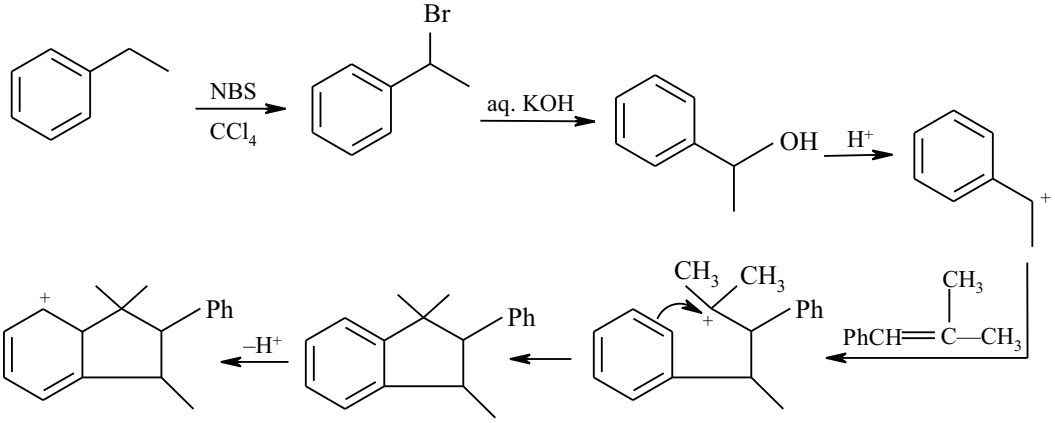
(g) X : HNO_3/H_2SO_4 followed by reduction with N_2H_4/OH^-/Heat.

Y : Reduction with N_2H_4/OH^- /Heat followed by nitration.

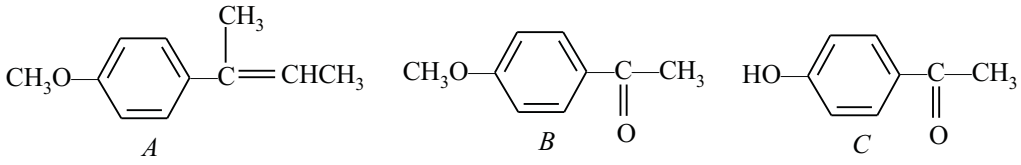
1228.



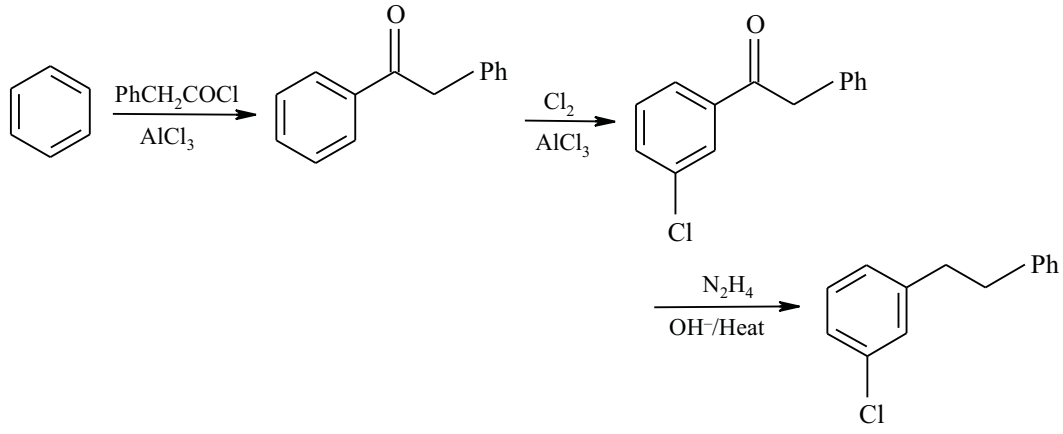
1229.



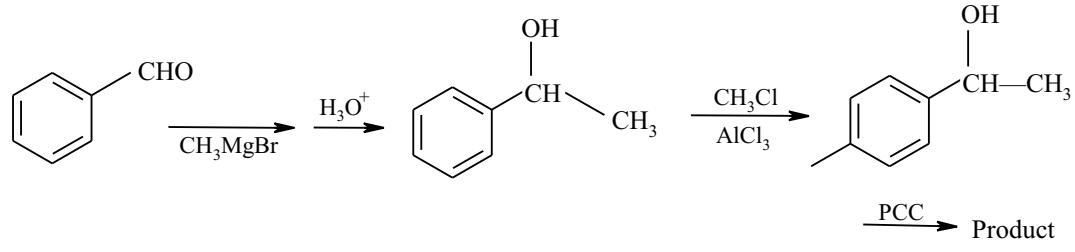
1230.



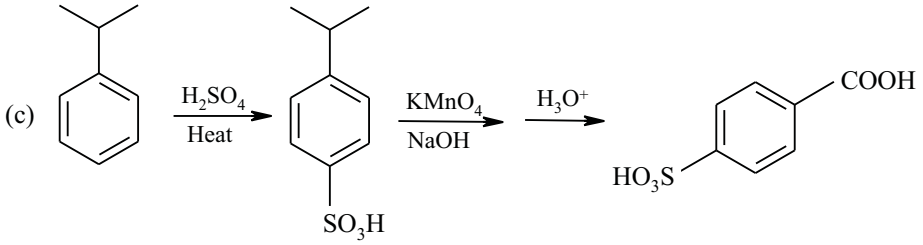
1231. (a)



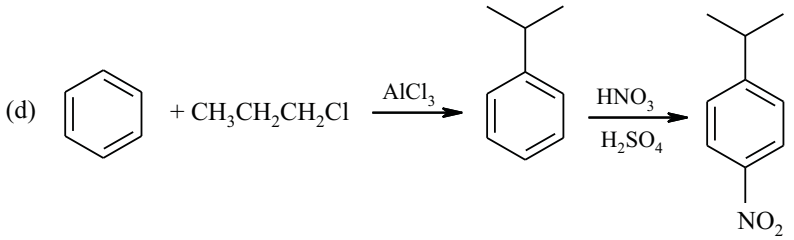
(b)



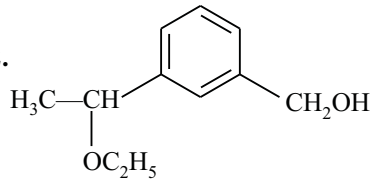
(c)



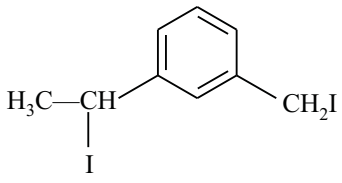
(d)



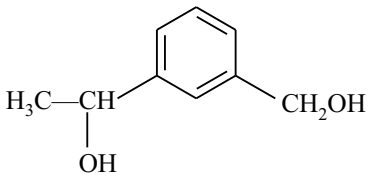
1232.



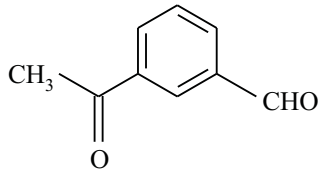
A



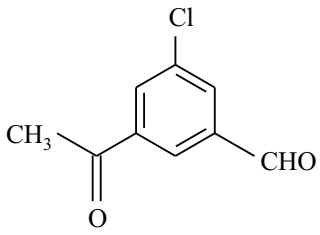
B



C



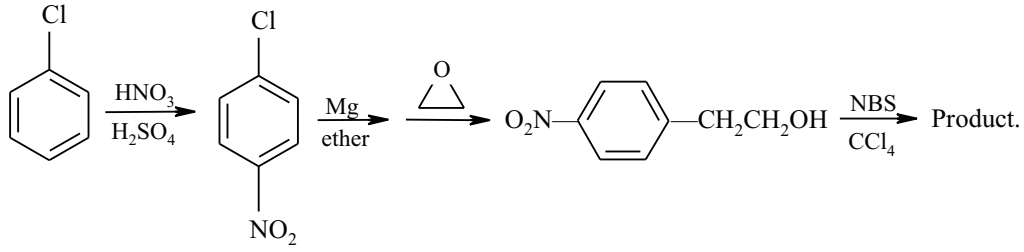
D

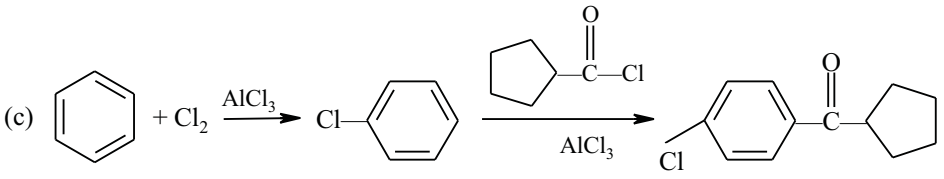


E

1233. (a) $PhCH_2CH_2CH_2Br \xrightarrow[C_2H_5OH]{C_2H_5ONa} PhCH_2CH{=}CH_2 \xrightarrow[H_2O]{(CH_3COO)_2Hg} \xrightarrow{NaBH_4} PhCH_2{-}\underset{OH}{CH}{-}CH_3$

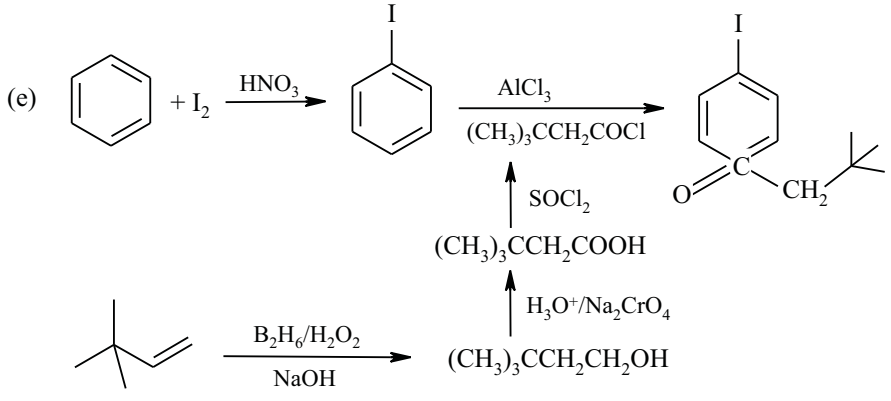
$PhCH_2{-}\underset{O}{\overset{\|}{C}}{-}CH_3 \xrightarrow{PCC} PhCH_2{-}\underset{C\equiv C-CH_3}{\overset{OH}{\underset{|}{\overset{|}{C}}}}{-}CH_3 \xrightarrow{CH_3C\equiv CNa} \xrightarrow{H_3O^+} \xrightarrow[H_2]{Pd/BaSO_4}$ Product

(b) 

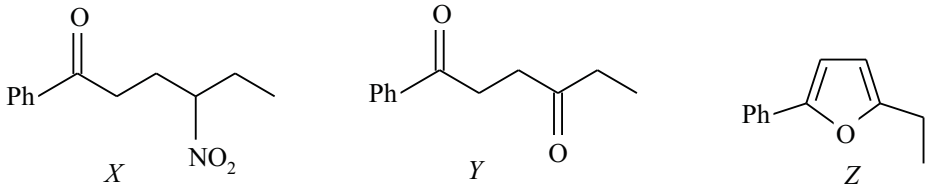
(c) 

(d) $C_6H_6 + Cl_2 \xrightarrow{AlCl_3} C_6H_5Cl \xrightarrow[ether]{Mg} C_6H_5MgCl \xrightarrow[H_3O^+]{Oxirane} C_6H_5CH_2CH_2OH \xrightarrow{PCC}$

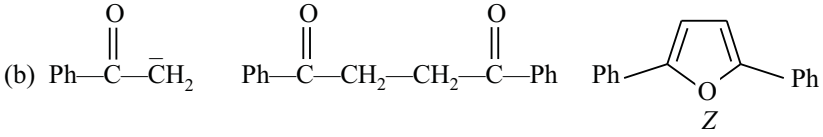
$C_6H_6CH_2{-}\underset{O}{\overset{\|}{C}}{-}C_6H_5 \xleftarrow{PCC} C_6H_5CH_2\underset{OH}{CH}{-}C_6H_5 \xleftarrow{H_3O^+} \xleftarrow{C_6H_5MgCl}$

(e) 

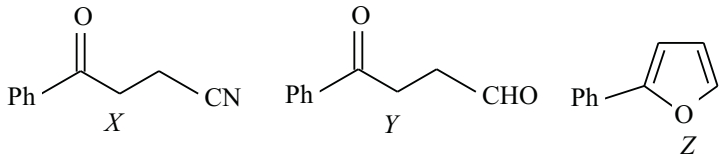
1234. (a)



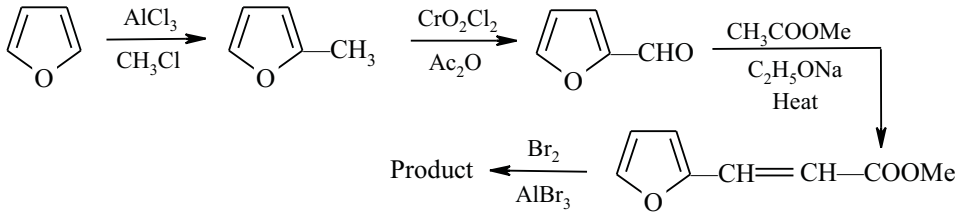
(b)



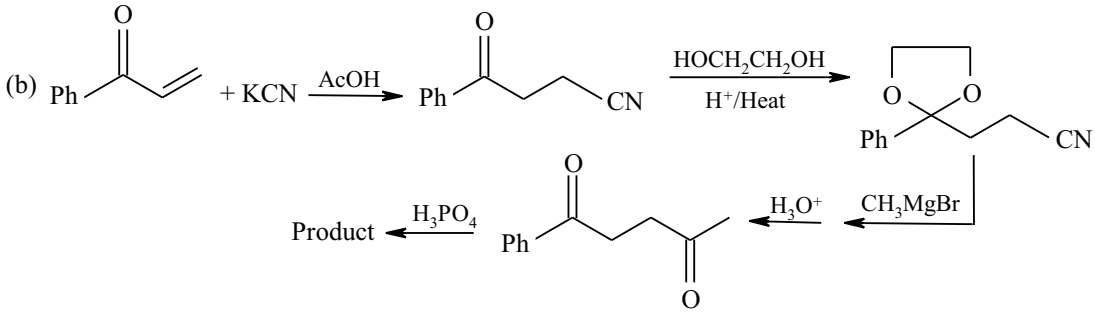
(c)



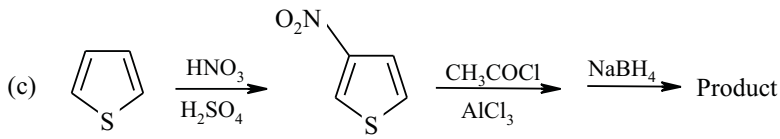
1235. (a)



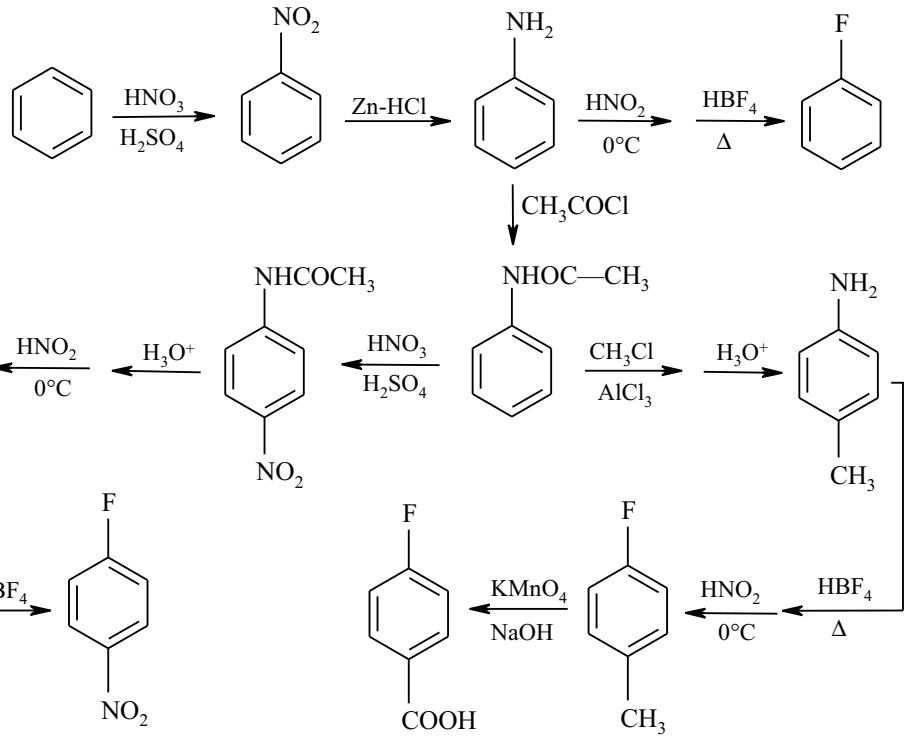
(b)



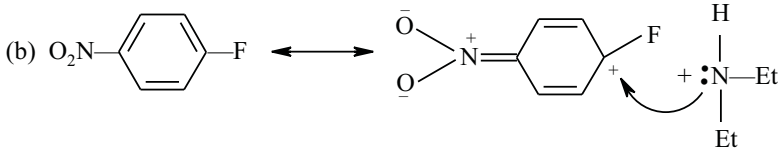
(c)



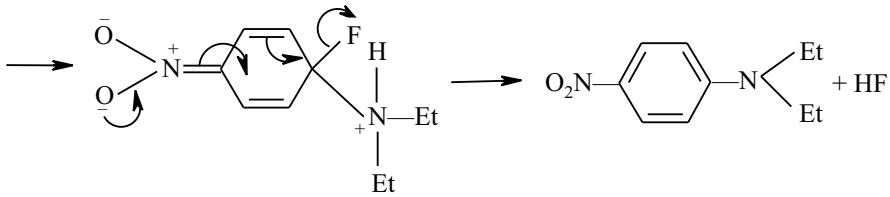
1236. (a)



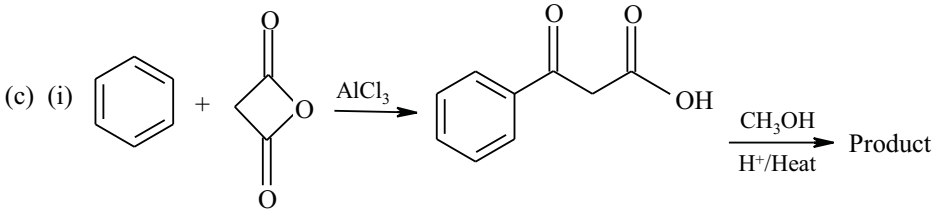
(b)



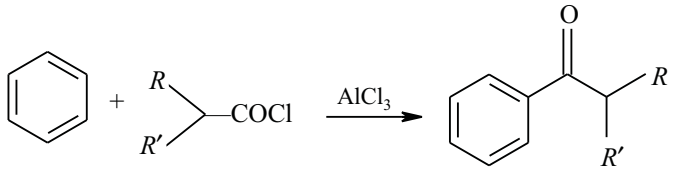
(Positive charge at *p*-carbon activate the nucleophilic attack)



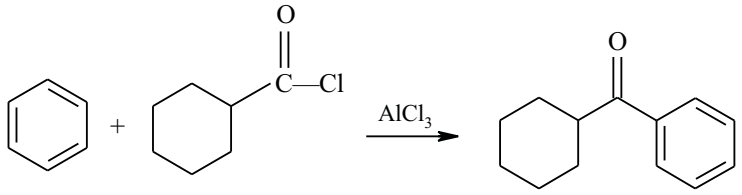
(c) (i)



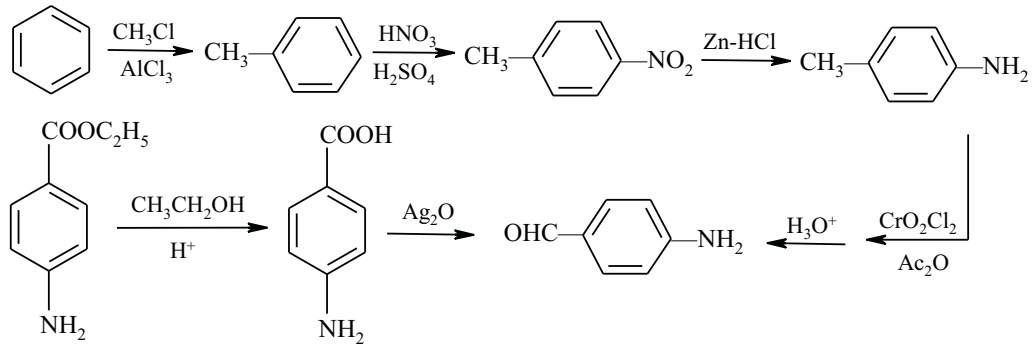
(ii)



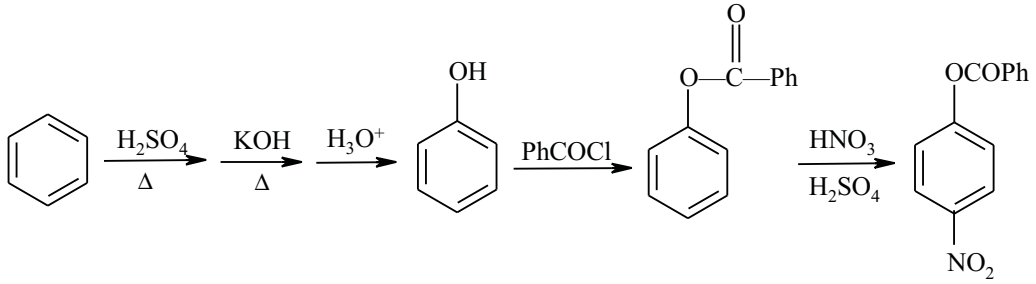
(iii)



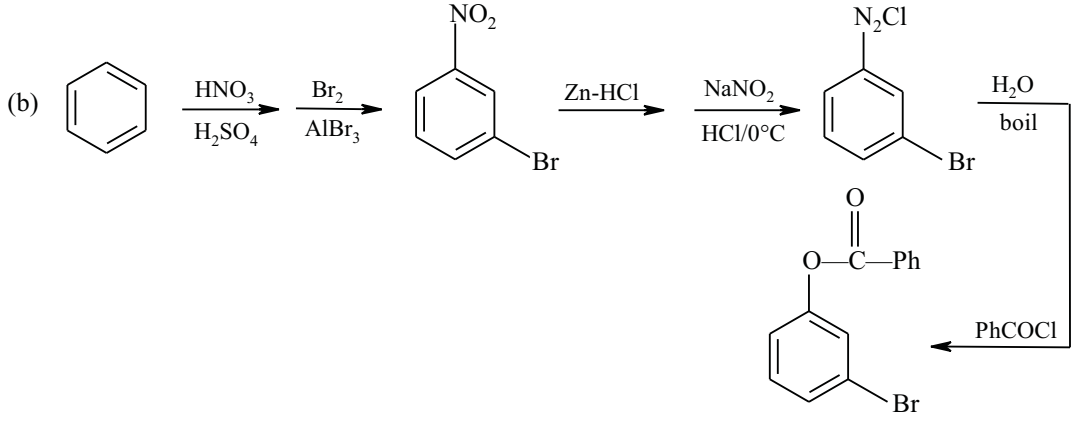
(iv)

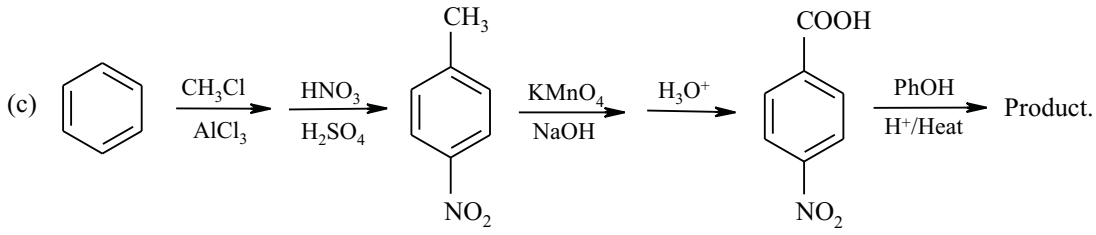


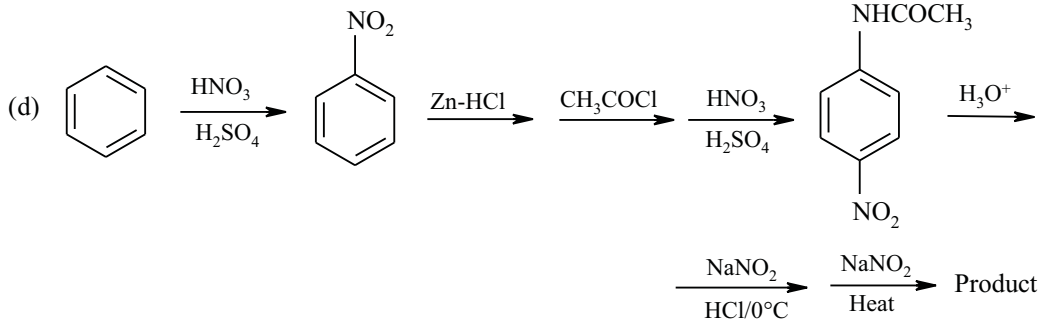
1237. (a)

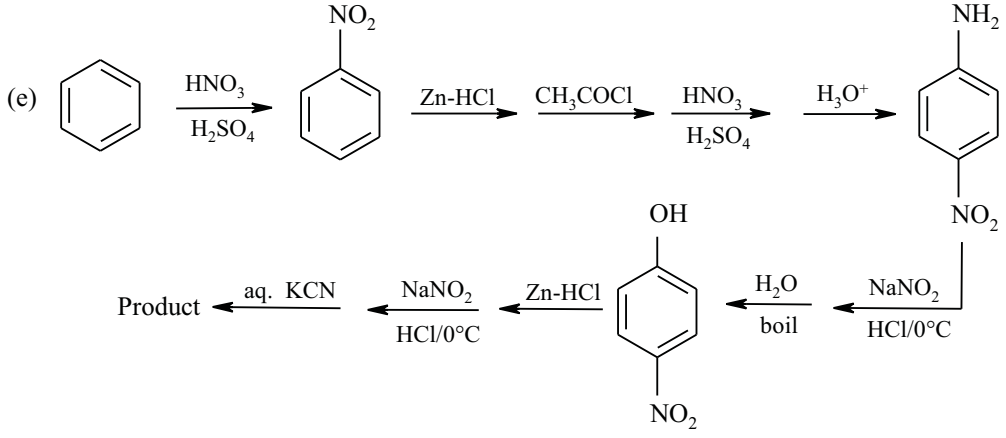


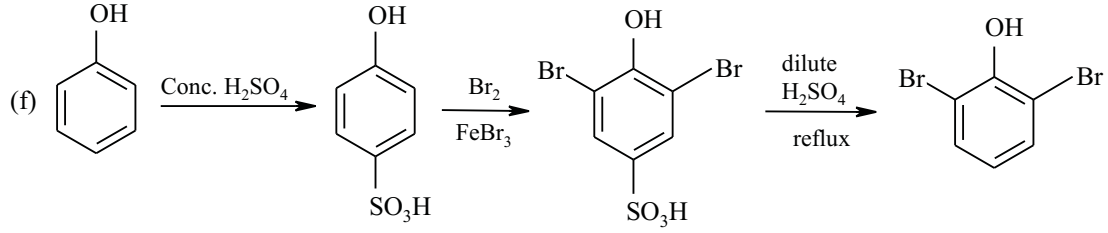
(b)

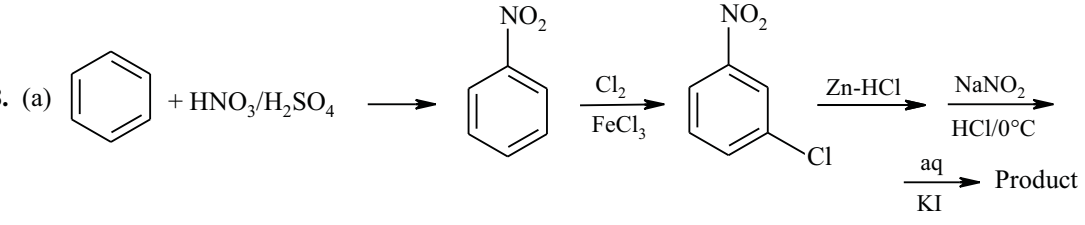


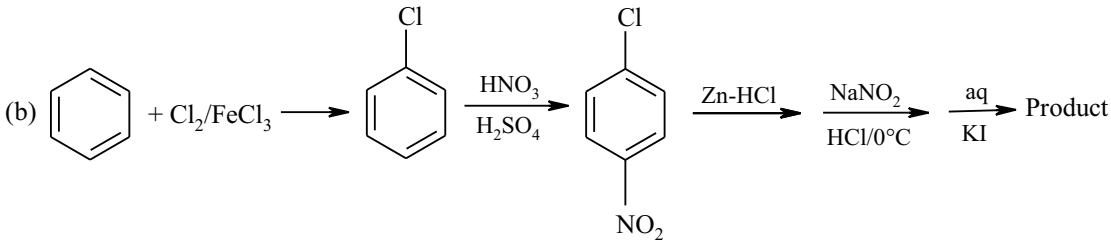
(c) 
CH3Cl
AlCl3
HNO3
H2SO4
CH3
NO2
KMnO4
NaOH
H3O+
COOH
NO2
PhOH
H+/Heat
Product.

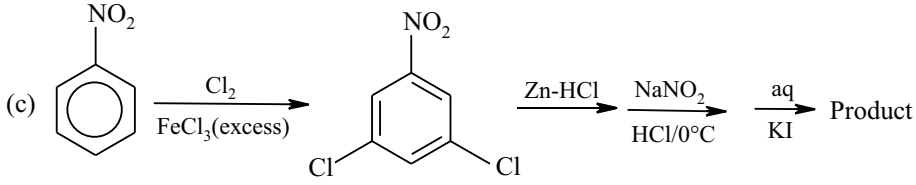
(d) 
HNO3
H2SO4
NO2
Zn-HCl
CH3COCl
HNO3
H2SO4
NHCOCH3
NO2
H3O+
NaNO2
HCl/0°C
NaNO2
Heat
Product

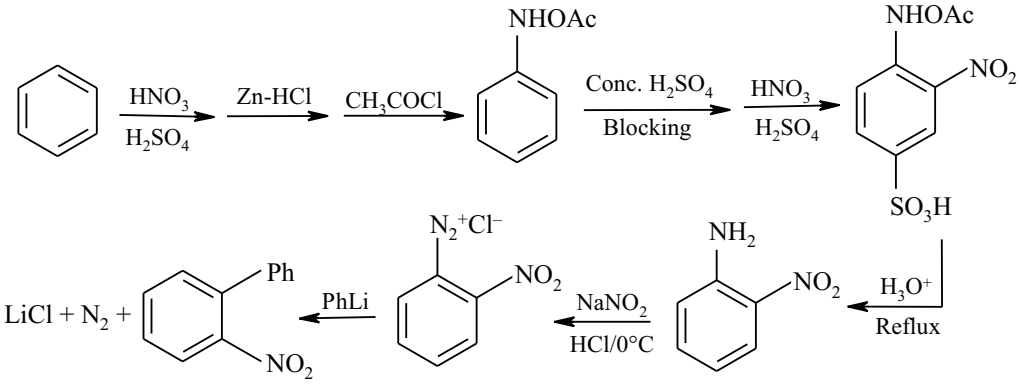
(e) 
HNO3
H2SO4
NO2
Zn-HCl
CH3COCl
HNO3
H2SO4
H3O+
NH2
NO2
NaNO2
HCl/0°C
H2O
boil
OH
NO2
Zn-HCl
NaNO2
HCl/0°C
aq. KCN
Product

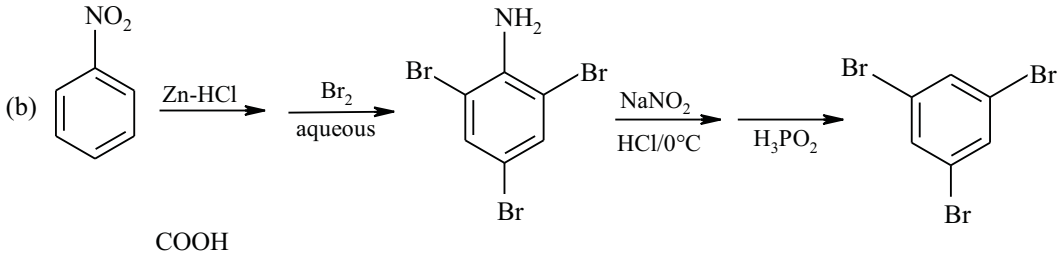
(f) 
OH
Conc. H2SO4
OH
SO3H
Br2
FeBr3
OH
Br
Br
SO3H
dilute
H2SO4
reflux
OH
Br
Br

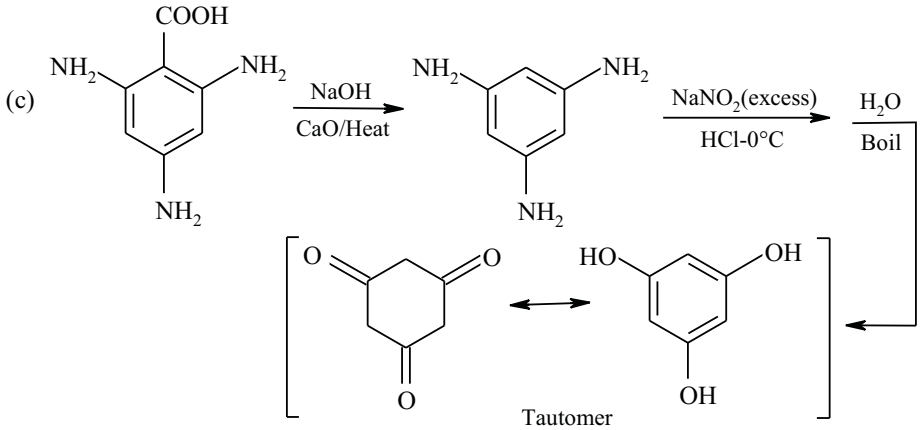
1238. (a) 
+ HNO3/H2SO4
NO2
Cl2
FeCl3
NO2
Cl
Zn-HCl
NaNO2
HCl/0°C
aq
KI
Product

(b) 
+ $Cl_2/FeCl_3$
Cl
HNO_3
H_2SO_4
Cl
NO_2
Zn-HCl
$NaNO_2$
HCl/0°C
aq
KI
Product

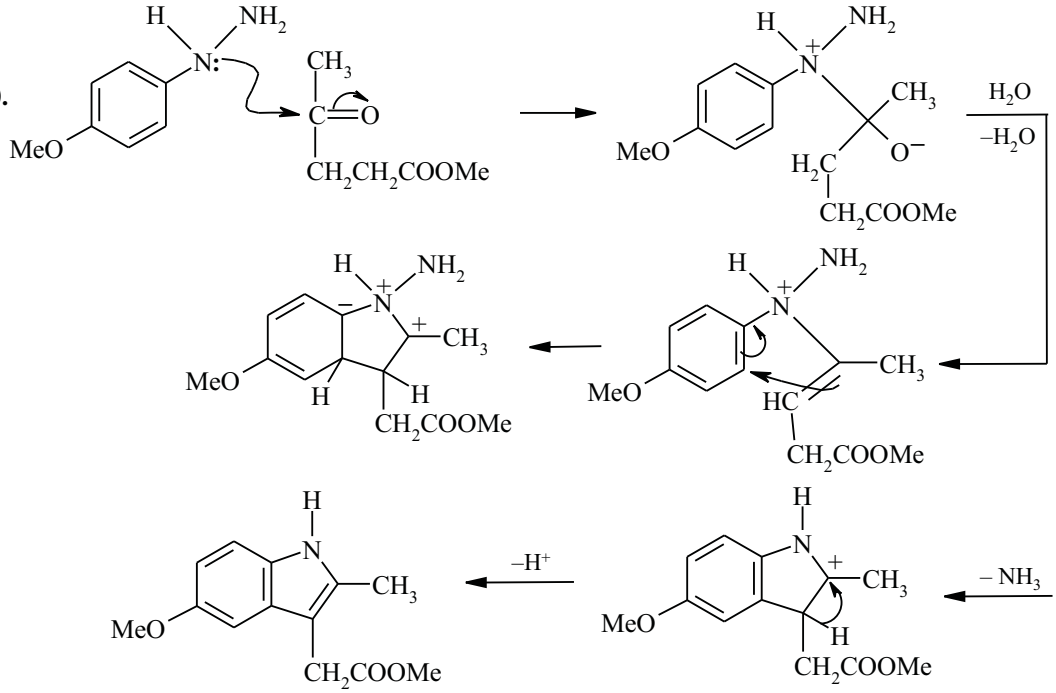
(c) 
NO_2
Cl_2
$FeCl_3$(excess)
NO_2
Cl
Cl
Zn-HCl
$NaNO_2$
HCl/0°C
aq
KI
Product

1239. (a) 
HNO_3
H_2SO_4
Zn-HCl
CH_3COCl
NHOAc
Conc. H_2SO_4
Blocking
HNO_3
H_2SO_4
NHOAc
NO_2
SO_3H
H_3O^+
Reflux
NH_2
NO_2
$NaNO_2$
HCl/0°C
$N_2^+Cl^-$
NO_2
PhLi
Ph
NO_2
LiCl + N_2 +

(b) 
NO_2
Zn-HCl
Br_2
aqueous
NH_2
Br
Br
Br
$NaNO_2$
HCl/0°C
H_3PO_2
Br
Br
Br

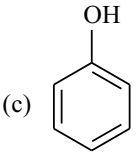
(c) 
COOH
NH_2
NH_2
NH_2
NaOH
CaO/Heat
NH_2
NH_2
NH_2
$NaNO_2$(excess)
HCl-0°C
H_2O
Boil
O
O
O
HO
OH
OH
Tautomer

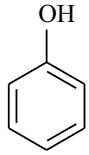
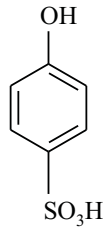
1240.

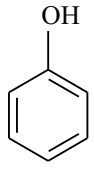
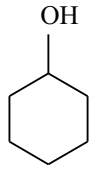
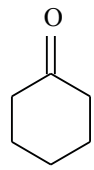


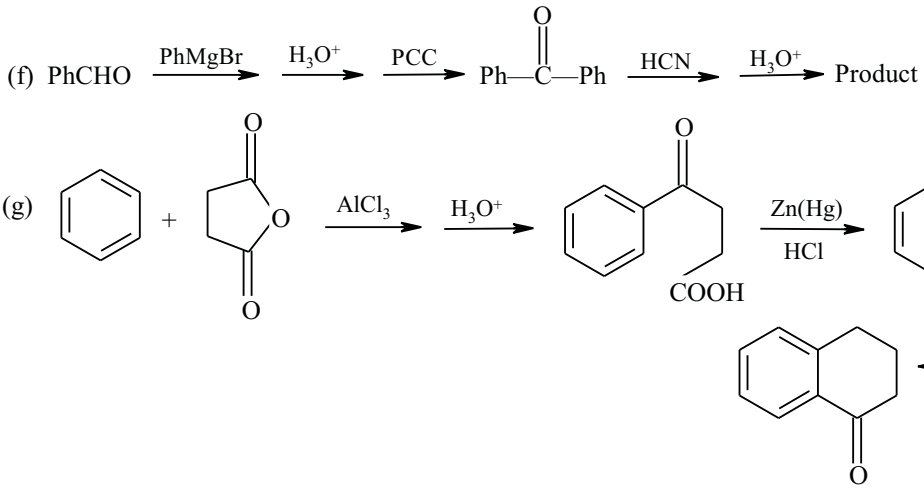
1241. (a) $PhBr \xrightarrow[ether]{Mg} \xrightarrow{CH_2O} \xrightarrow{H_3O^+} PhCH_2OH \xrightarrow{PCC} Product$

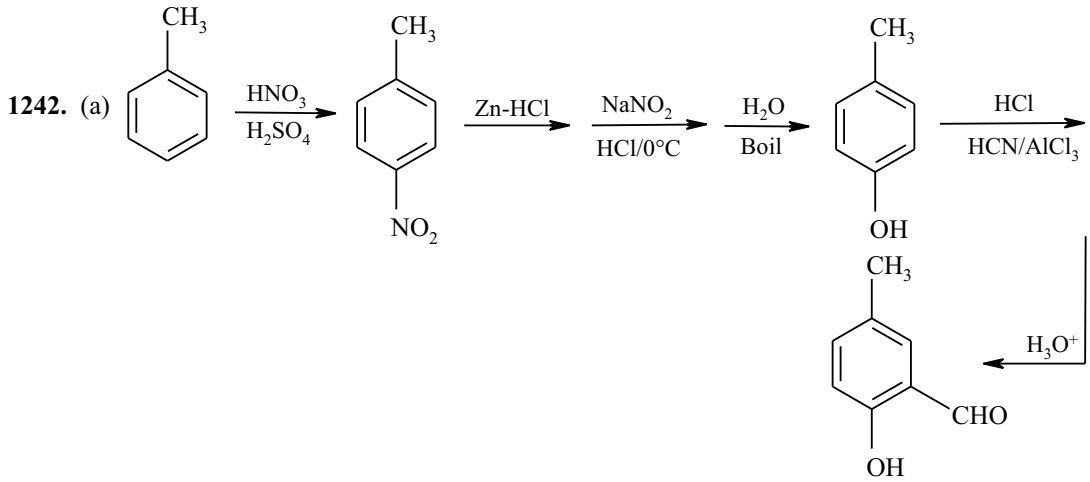
(b) $PhCH_3 \xrightarrow[Ac_2O]{CrO_2Cl_2}$ Product.
Etard's reaction

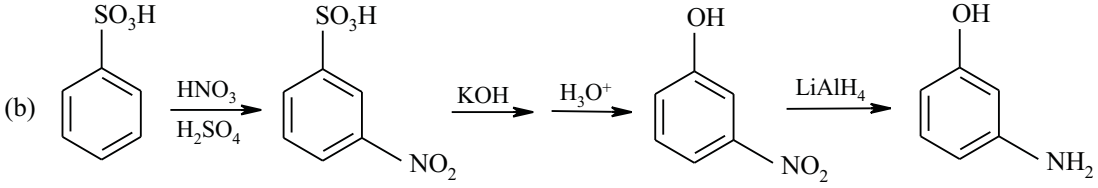
(c)  $+ CHCl_3 \xrightarrow[\text{Reimer-Tieman reaction}]{NaOH} \xrightarrow{H_3O^+}$ Product

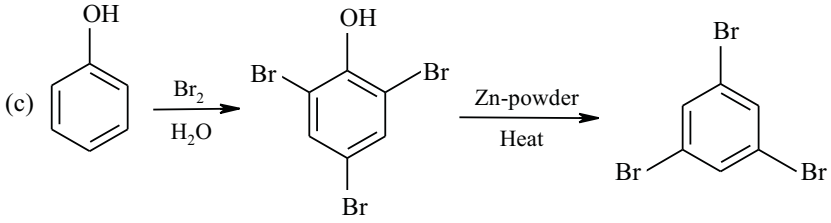
(d)  $\xrightarrow{\text{Conc } H_2SO_4}$  $\xrightarrow[CH_3COCl]{AlCl_3(excess)} \xrightarrow[\text{Reflux}]{H_3O^+}$ Product.

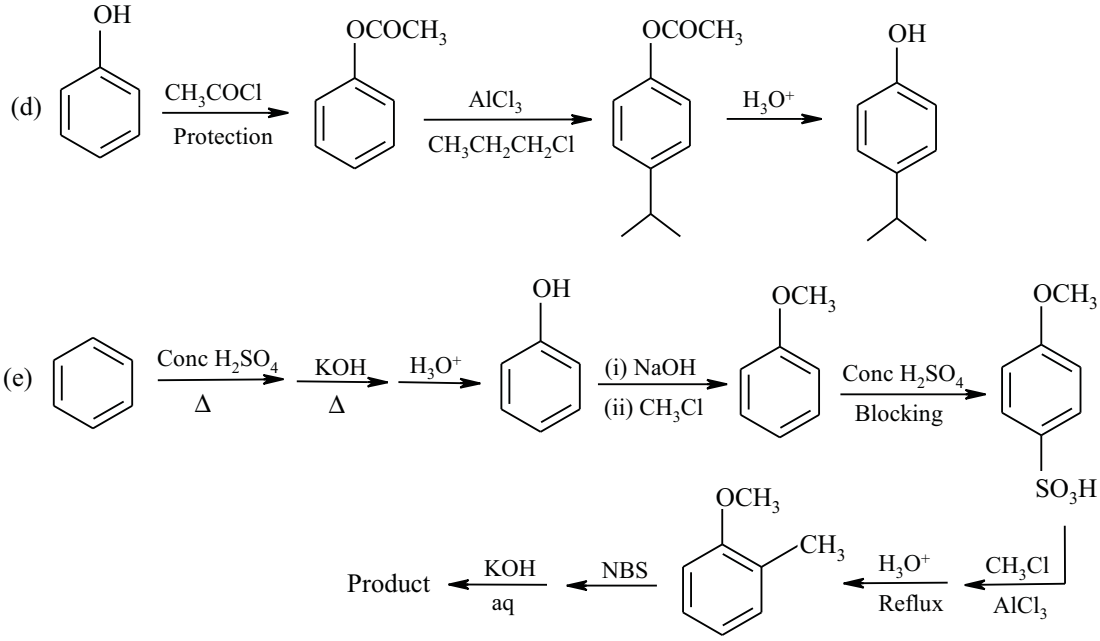
(e)  $\xrightarrow[Ni]{H_2}$  $\xrightarrow{H_2CrO_4}$  $\xrightarrow[\Delta]{Cl_2} \xrightarrow[C_2H_5OH]{C_2H_5ONa}$ Product


(f) PhCHO
PhMgBr
H_3O^+
PCC
Ph—C—Ph
O
HCN
H_3O^+
Product
(g)
+
O
O
O
$AlCl_3$
H_3O^+
COOH
Zn(Hg)
HCl
HOOC
HF
O


1242. (a)
CH_3
HNO_3
H_2SO_4
NO_2
Zn-HCl
$NaNO_2$
HCl/0°C
H_2O
Boil
OH
HCl
$HCN/AlCl_3$
H_3O^+
CHO

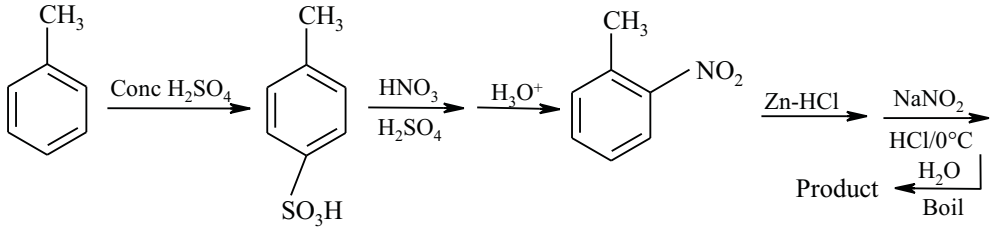

(b)
SO_3H
HNO_3
H_2SO_4
NO_2
KOH
H_3O^+
OH
$LiAlH_4$
NH_2


(c)
OH
Br_2
H_2O
Br
Zn-powder
Heat

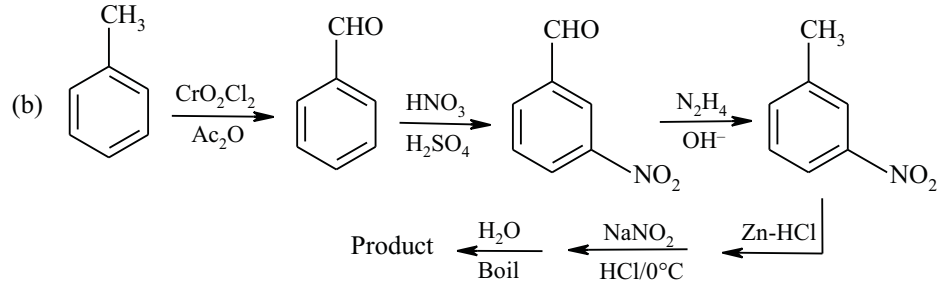


1243. $PhCH_2Br + CHCl_3$.

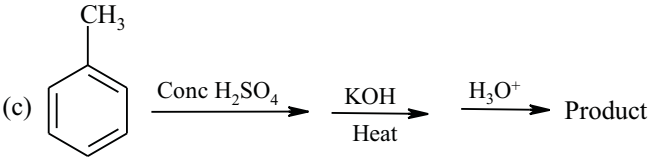
1244. (a)

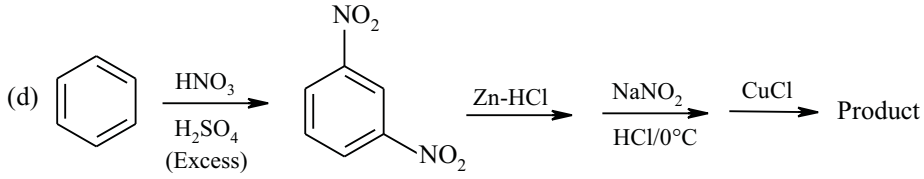


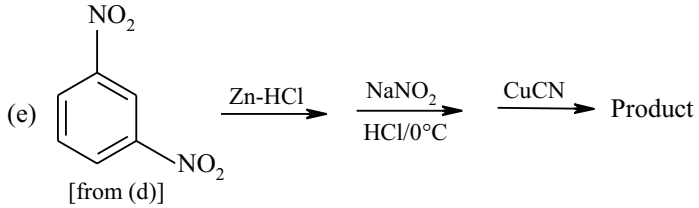
(b)

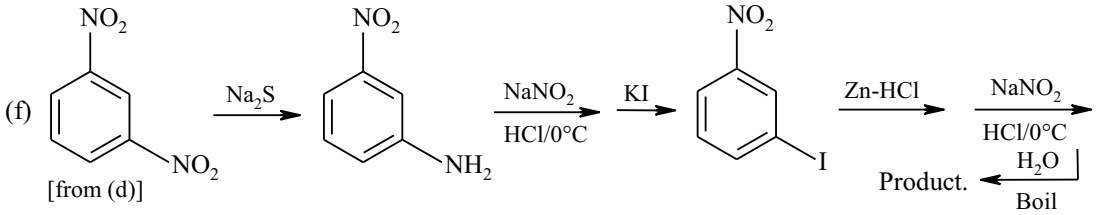


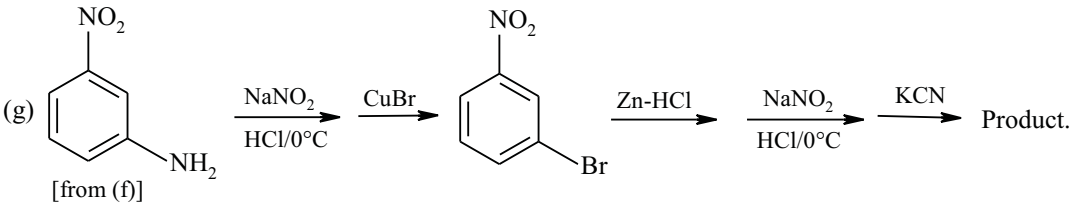
(c)

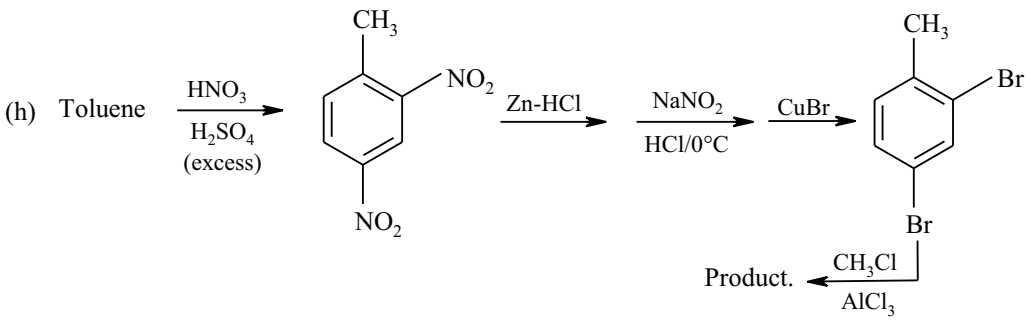


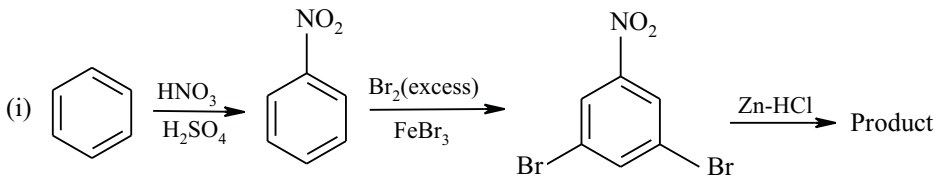
(d) 
HNO3
H2SO4
(Excess)
NO2
NO2
Zn-HCl
NaNO2
HCl/0°C
CuCl
Product

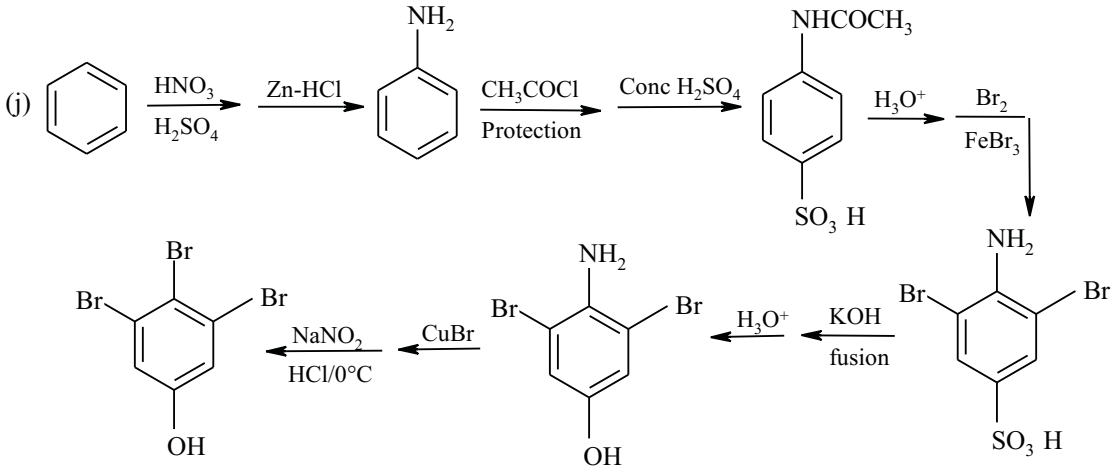
(e) 
NO2
NO2
[from (d)]
Zn-HCl
NaNO2
HCl/0°C
CuCN
Product

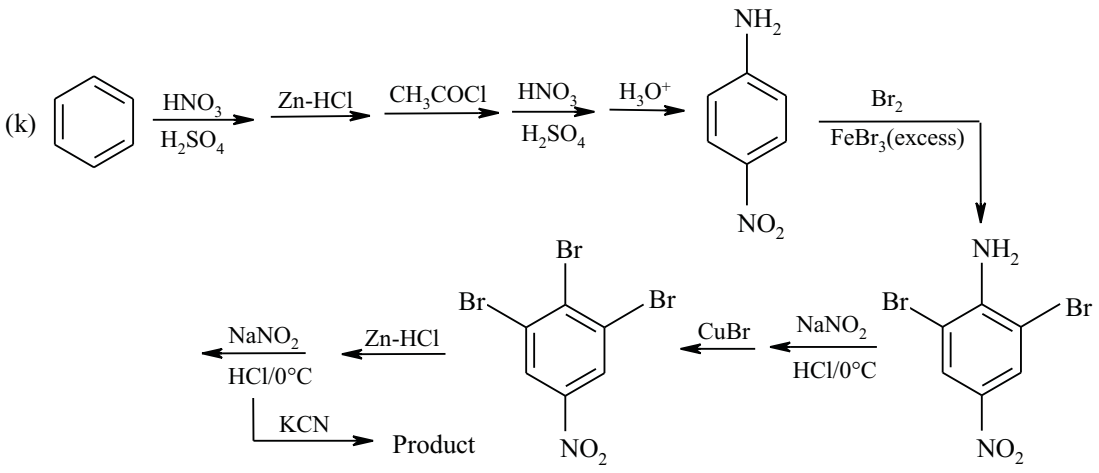
(f) 
NO2
NO2
[from (d)]
Na2S
NO2
NH2
NaNO2
HCl/0°C
KI
NO2
I
Zn-HCl
NaNO2
HCl/0°C
Product.
H2O
Boil

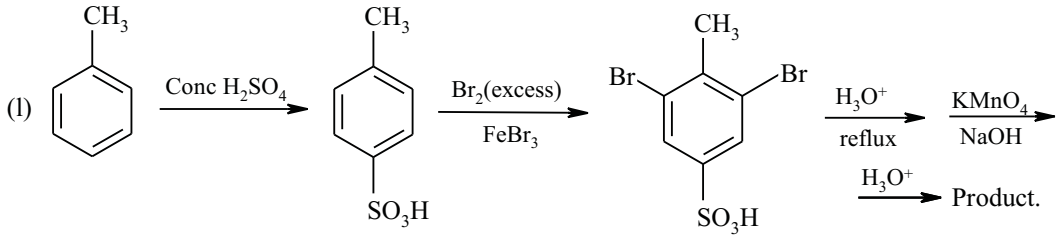
(g) 
NO2
NH2
[from (f)]
NaNO2
HCl/0°C
CuBr
NO2
Br
Zn-HCl
NaNO2
HCl/0°C
KCN
Product.

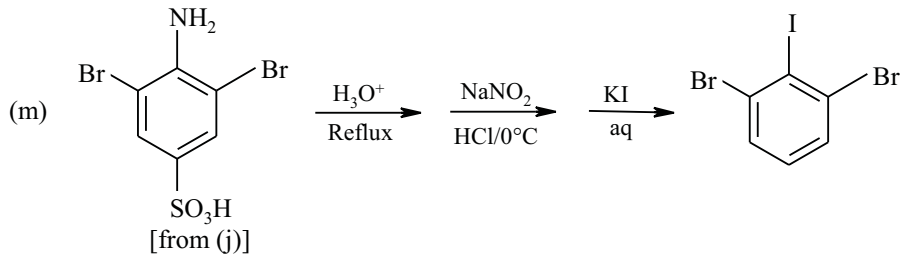
(h) 
Toluene
HNO3
H2SO4
(excess)
CH3
NO2
NO2
Zn-HCl
NaNO2
HCl/0°C
CuBr
CH3
Br
Br
Product.
CH3Cl
AlCl3

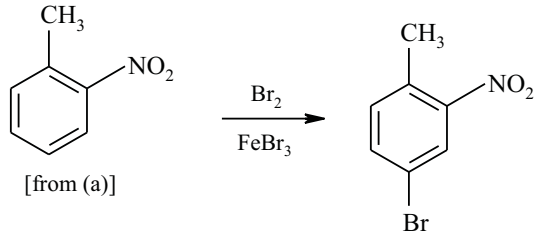
(i) 
HNO3
H2SO4
NO2
Br2(excess)
FeBr3
NO2
Br
Br
Zn-HCl
Product

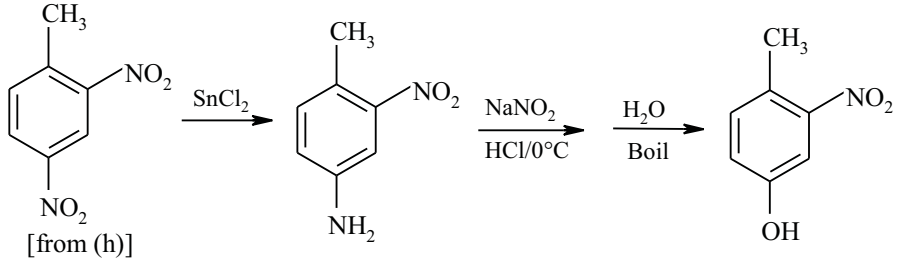

(j)
HNO3
H2SO4
Zn-HCl
NH2
CH3COCl
Protection
Conc H2SO4
NHCOCH3
SO3 H
H3O+
Br2
FeBr3
NH2
Br
Br
SO3 H
KOH
fusion
H3O+
NH2
Br
Br
OH
NaNO2
HCl/0°C
CuBr
Br
Br
Br
OH

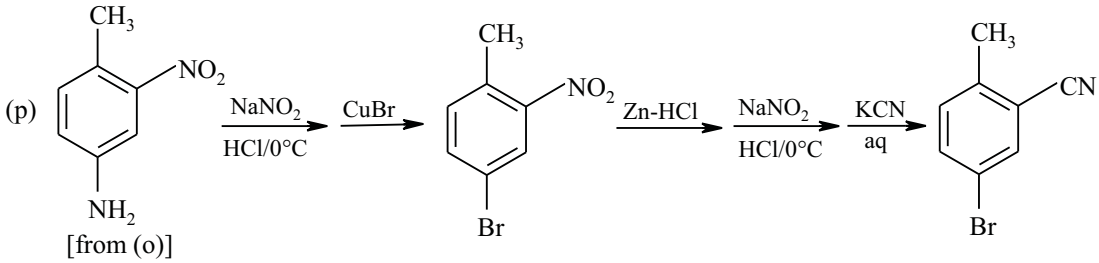

(k)
HNO3
H2SO4
Zn-HCl
CH3COCl
HNO3
H2SO4
H3O+
NH2
NO2
Br2
FeBr3(excess)
NH2
Br
Br
NO2
NaNO2
HCl/0°C
CuBr
Br
Br
Br
NO2
NaNO2
HCl/0°C
Zn-HCl
KCN
Product


(l)
CH3
Conc H2SO4
CH3
SO3H
Br2(excess)
FeBr3
CH3
Br
Br
SO3H
H3O+
reflux
KMnO4
NaOH
H3O+
Product.

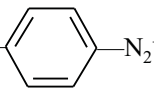

(m)
NH2
Br
Br
SO3H
[from (j)]
H3O+
Reflux
NaNO2
HCl/0°C
KI
aq
I
Br
Br

(n) 

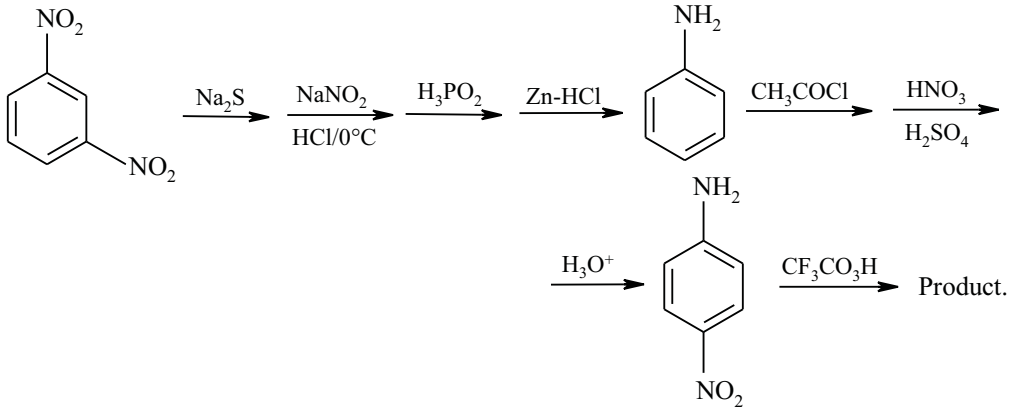
(o) 

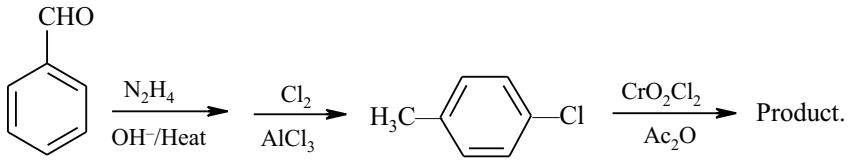
(p) 

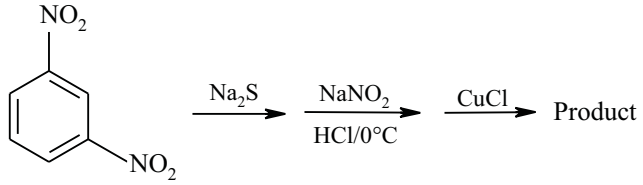
(q) Toluene $\xrightarrow[H_2SO_4]{HNO_3}$ $\xrightarrow{Zn\text{-}HCl}$ $\xrightarrow[HCl/0°C]{NaNO_2}$ H_3C—C_6H_4—$N_2^+Cl^-$ $\xrightarrow{Phenol}$ Product

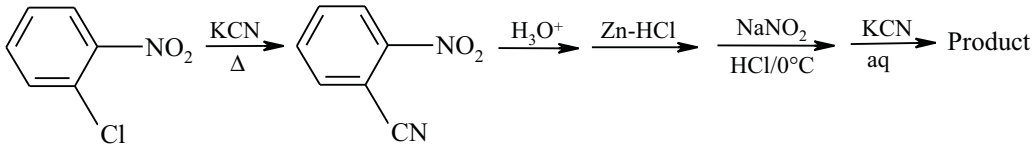
(r) H_3C—C_6H_4—$N_2^+Cl^-$  $\xrightarrow{p\text{-cresol}}$ Product.

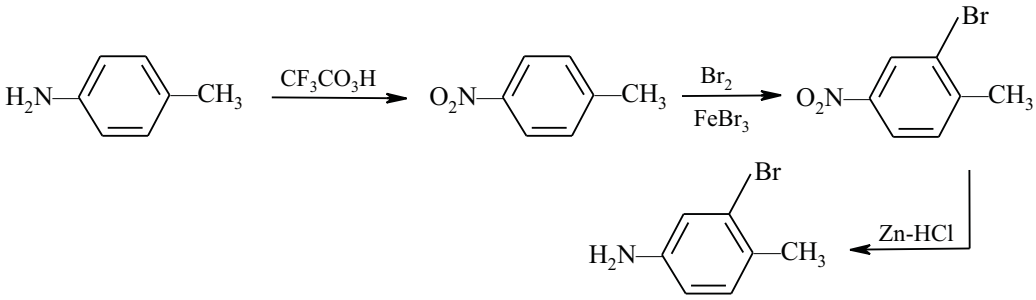
[from (q)]

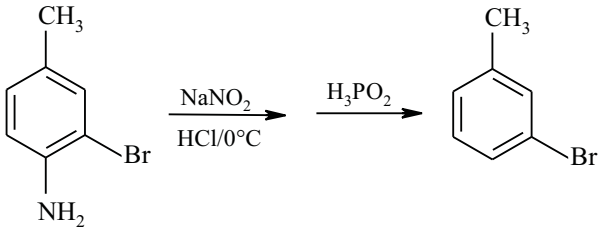
1245. (a) 

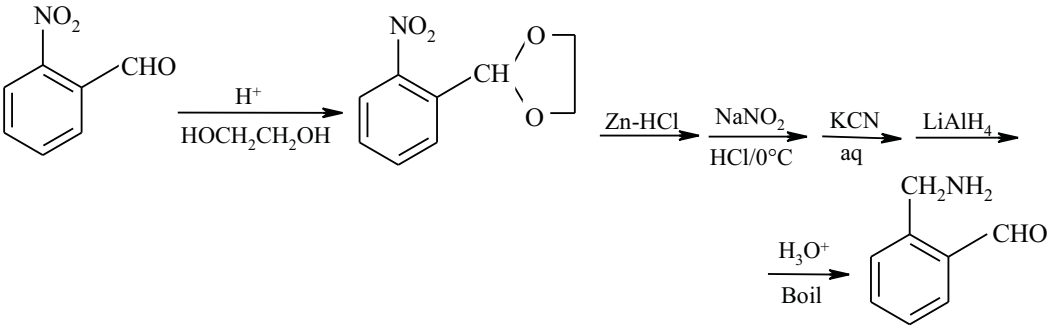
(b) 
CHO
N2H4
OH−/Heat
Cl2
AlCl3
H3C
Cl
CrO2Cl2
Ac2O
Product.

(c) 
NO2
NO2
Na2S
NaNO2
HCl/0°C
CuCl
Product

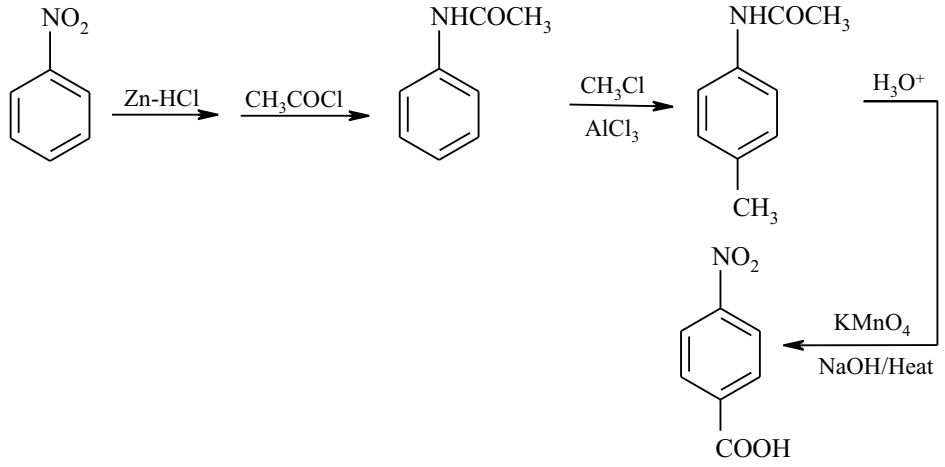
(d) 
NO2
Cl
KCN
Δ
NO2
CN
H3O+
Zn-HCl
NaNO2
HCl/0°C
KCN
aq
Product

(e) 
H2N
CH3
CF3CO3H
O2N
CH3
Br2
FeBr3
O2N
Br
CH3
H2N
Br
CH3
Zn-HCl

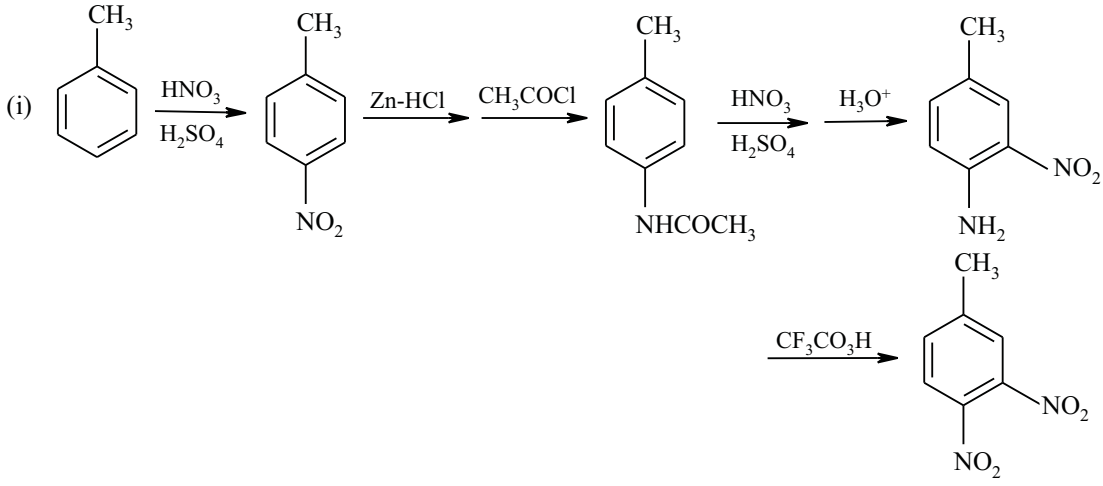
(f) 
CH3
Br
NH2
NaNO2
HCl/0°C
H3PO2
CH3
Br

(g) 
NO2
CHO
H+
HOCH2CH2OH
NO2
CH
O
O
Zn-HCl
NaNO2
HCl/0°C
KCN
aq
LiAlH4
CH2NH2
CHO
H3O+
Boil

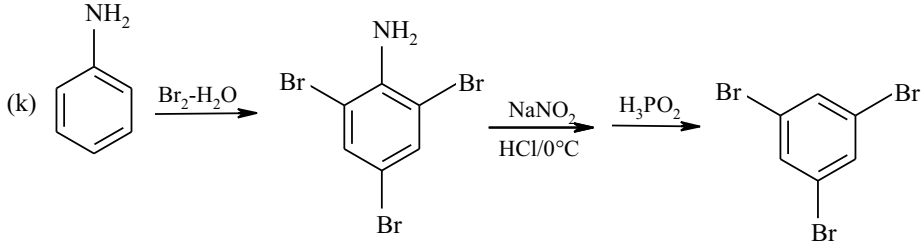
(h)


NO2
Zn-HCl
CH3COCl
NHCOCH3
CH3Cl
AlCl3
NHCOCH3
CH3
H3O+
NO2
KMnO4
NaOH/Heat
COOH

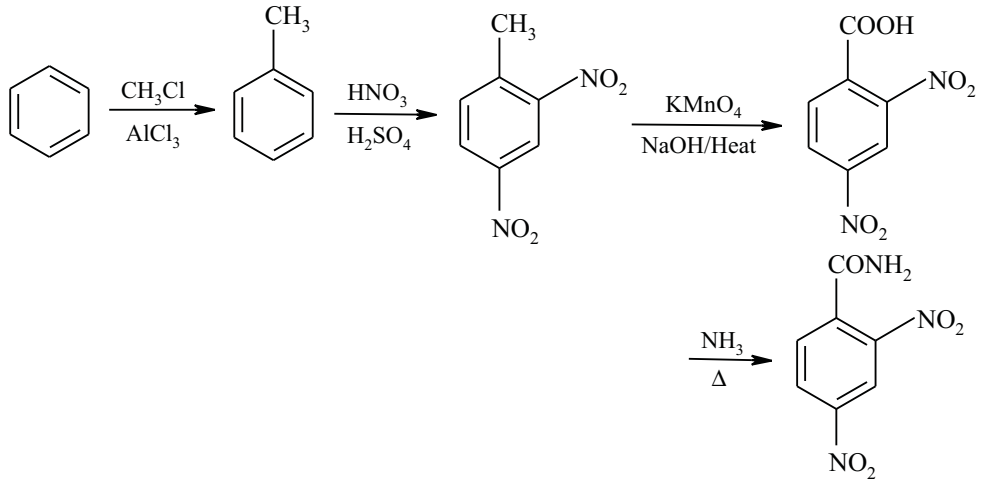
(i)


CH3
HNO3
H2SO4
CH3
NO2
Zn-HCl
CH3COCl
CH3
NHCOCH3
HNO3
H2SO4
H3O+
CH3
NO2
NH2
CF3CO3H
CH3
NO2
NO2

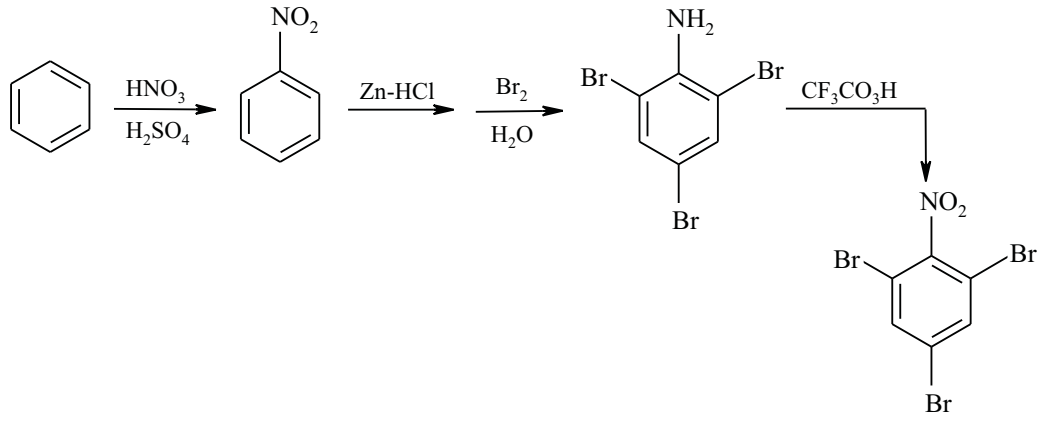
(k)


NH2
Br2-H2O
NH2
Br
Br
Br
NaNO2
HCl/0°C
H3PO2
Br
Br
Br

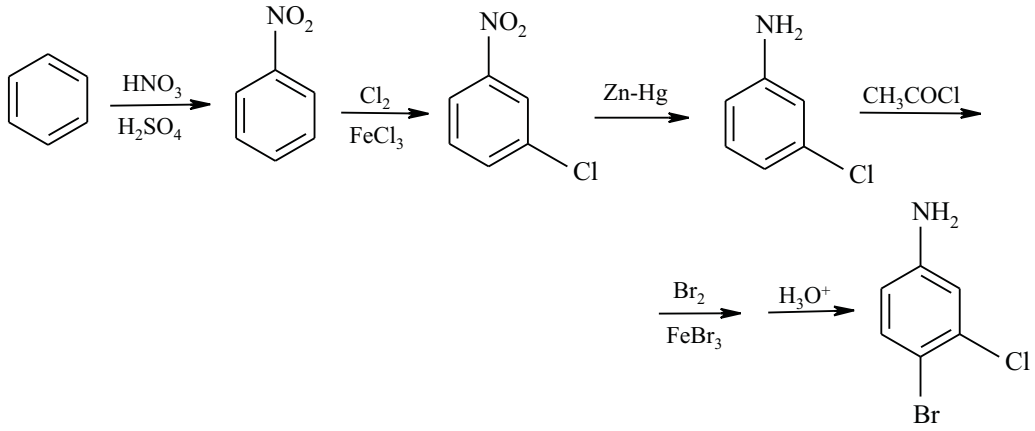
1246. (a)

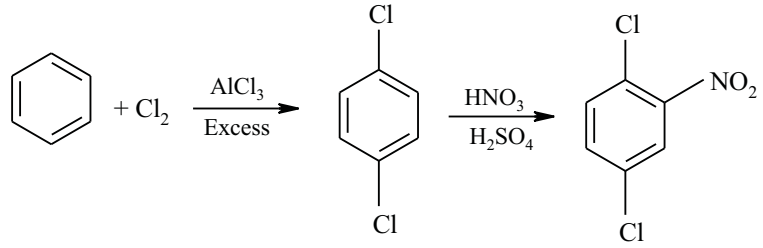

CH3Cl
AlCl3
HNO3
H2SO4
KMnO4
NaOH/Heat
NH3
Δ
CH3
NO2
COOH
CONH2

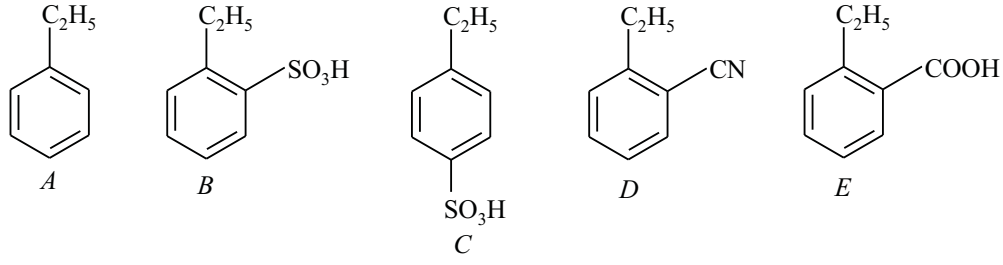
(b)

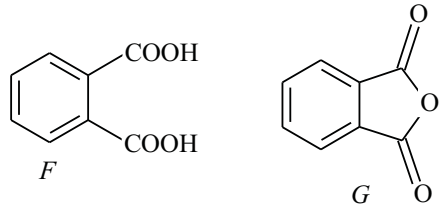

HNO3
H2SO4
Zn-HCl
Br2
H2O
CF3CO3H
NO2
NH2
Br

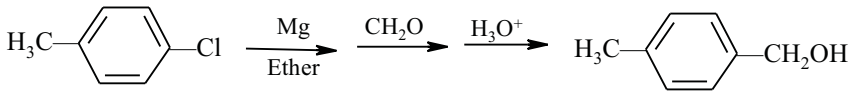
(c)

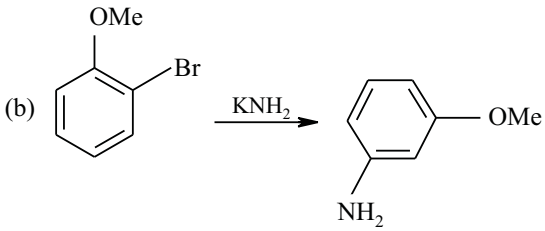

HNO3
H2SO4
Cl2
FeCl3
Zn-Hg
CH3COCl
Br2
FeBr3
H3O+
NO2
NH2
Cl
Br

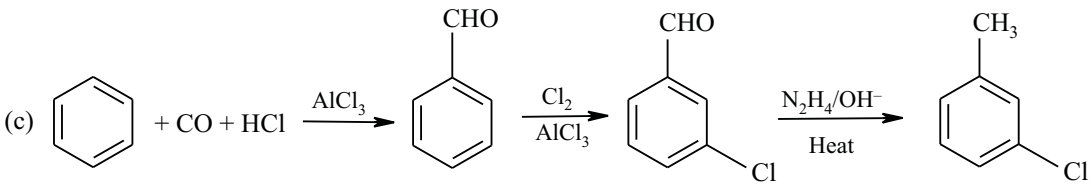
(d) 

1247. 

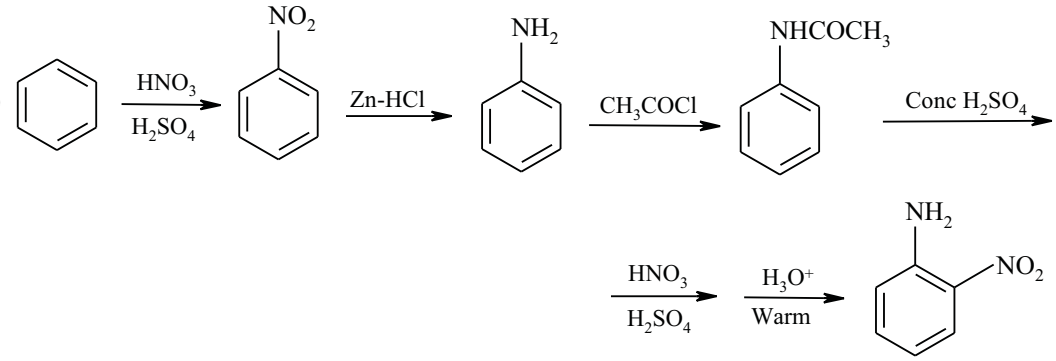


1248. (a) 

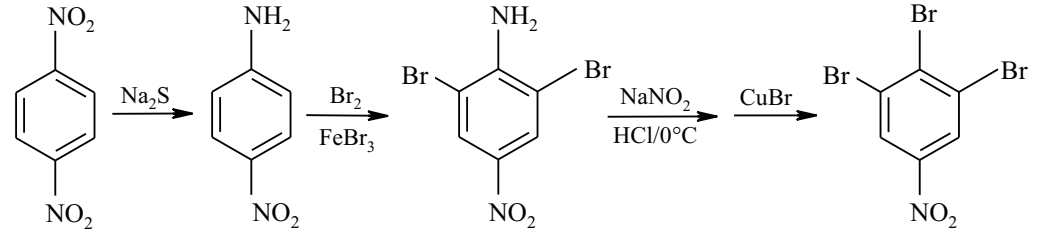
(b) 

(c) 

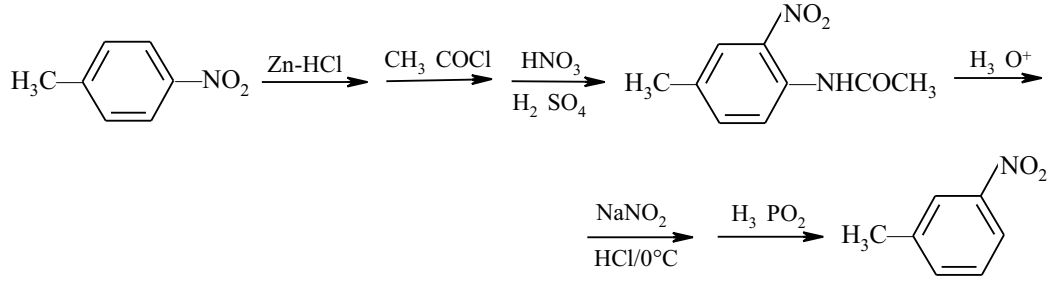
(d)


NO2
HNO3
H2SO4
Zn-HCl
NH2
CH3COCl
NHCOCH3
Conc H2SO4
HNO3
H2SO4
H3O+
Warm
NH2
NO2

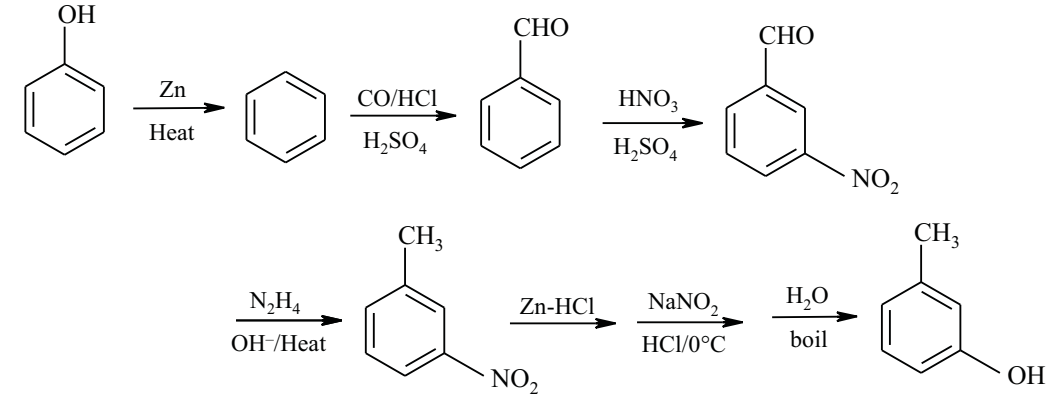
(e)


NO2
NO2
Na2S
NH2
NO2
Br2
FeBr3
NH2
Br
Br
NO2
NaNO2
HCl/0°C
CuBr
Br
Br
Br
NO2

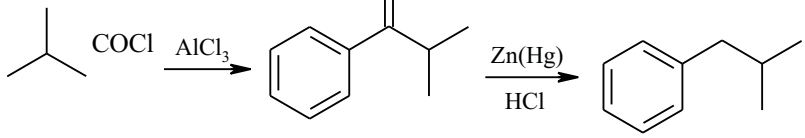
(f)

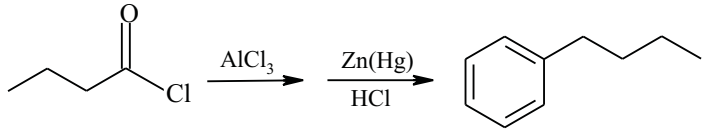

H3C
NO2
Zn-HCl
CH3 COCl
HNO3
H2 SO4
NO2
H3C
NHCOCH3
H3 O+
NaNO2
HCl/0°C
H3 PO2
NO2
H3C

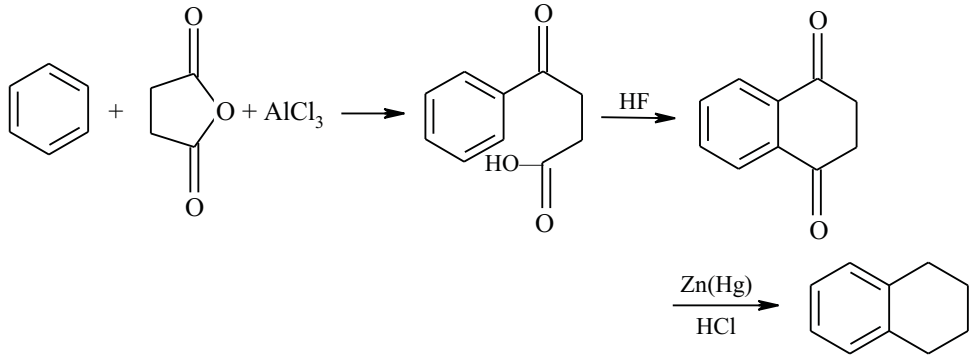
(g)

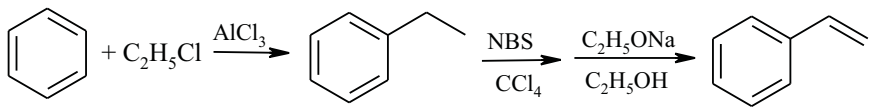

OH
Zn
Heat
CO/HCl
H2SO4
CHO
HNO3
H2SO4
CHO
NO2
N2H4
OH–/Heat
CH3
NO2
Zn-HCl
NaNO2
HCl/0°C
H2O
boil
CH3
OH

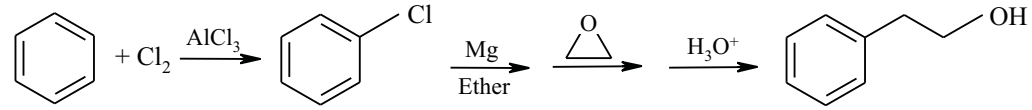
1249. (a) $Ph-\overset{\overset{O}{\|}}{C}-C_2H_5$ (b) $C_2H_5-\overset{\overset{O}{\|}}{C}-OEt$ (c) $C_6H_5-\overset{\overset{O}{\|}}{C}-CH_3$ (d) $C_6H_5CH{=}CH-COOEt$

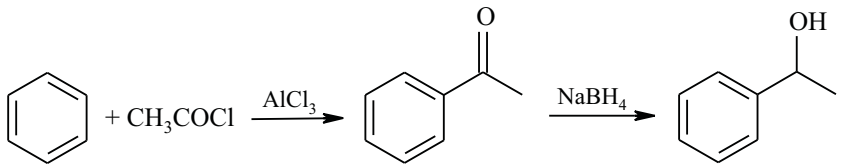
1250. (a) C_6H_6 + 

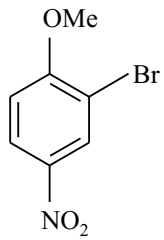
(b) C_6H_6 + 

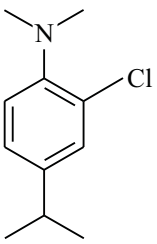
(c) 

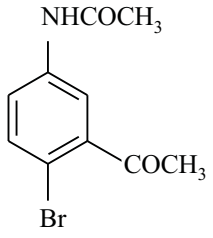
(d) 

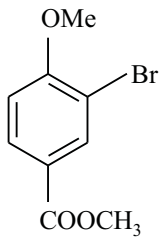
(e) 

(f) 

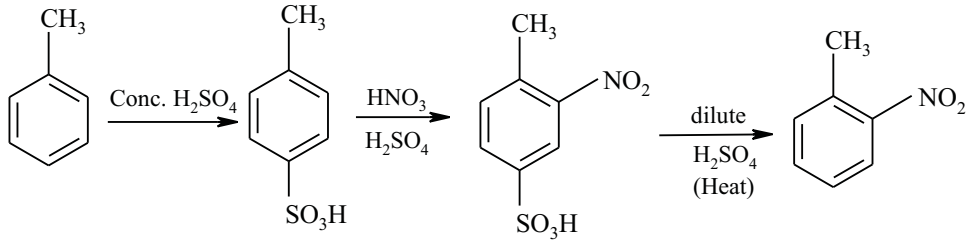
1251. (a) 

(b) 

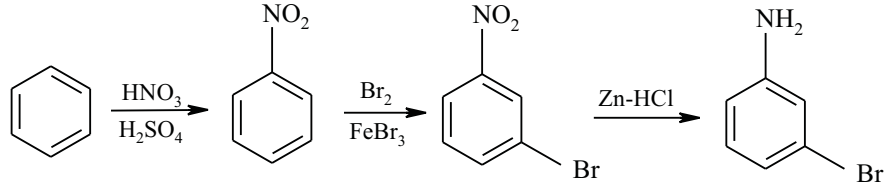
(c) 

(d) 

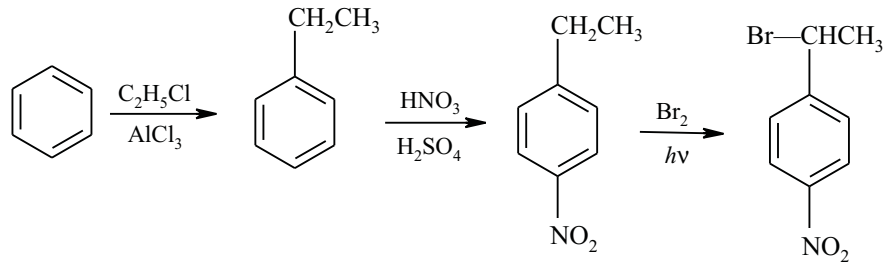
1252. (a)

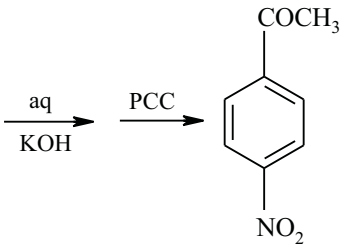


(b)

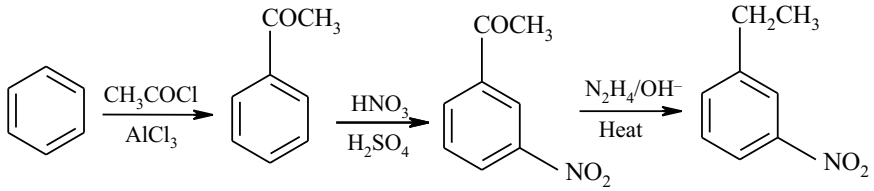


(c)

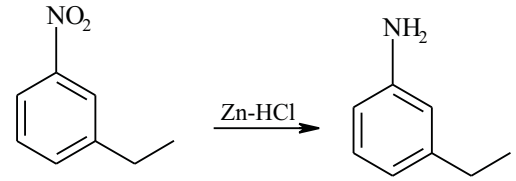




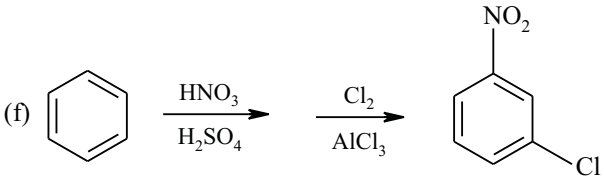
(d)

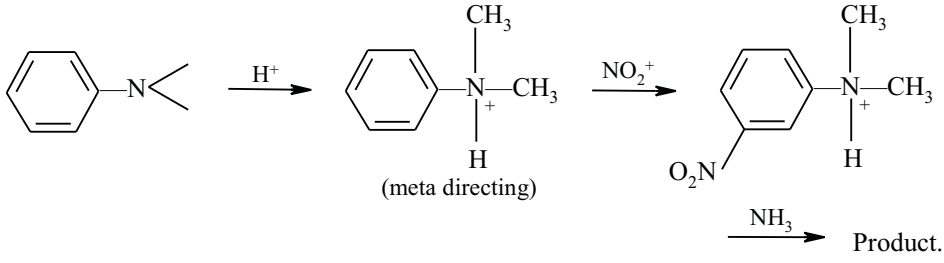


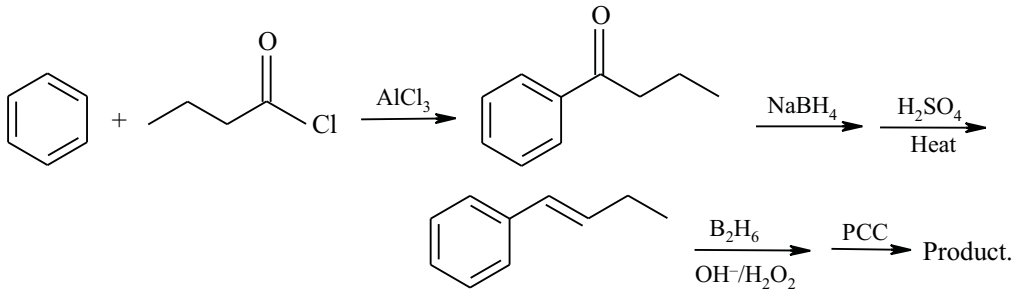
(e)

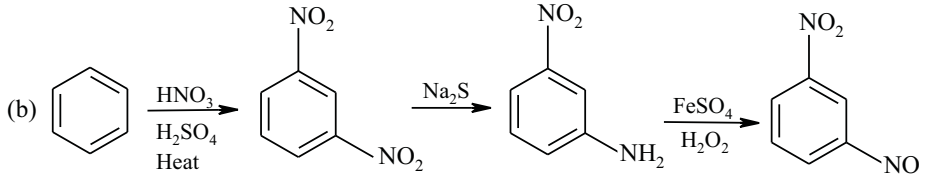


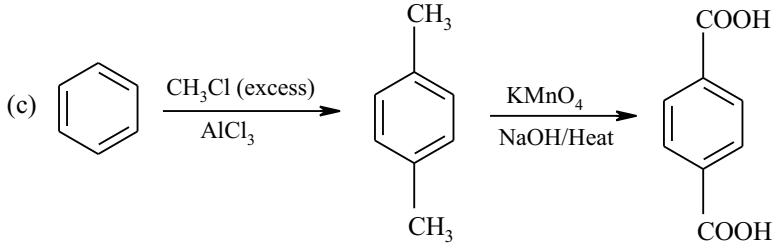
[from (d)]

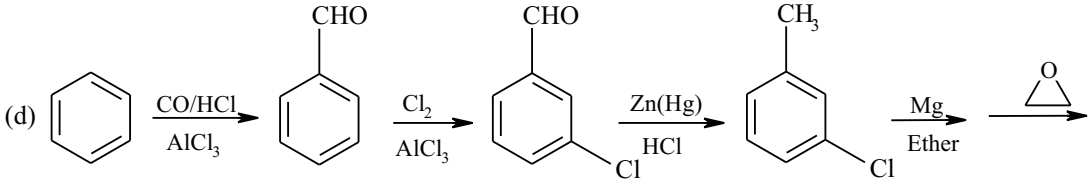
(f) 

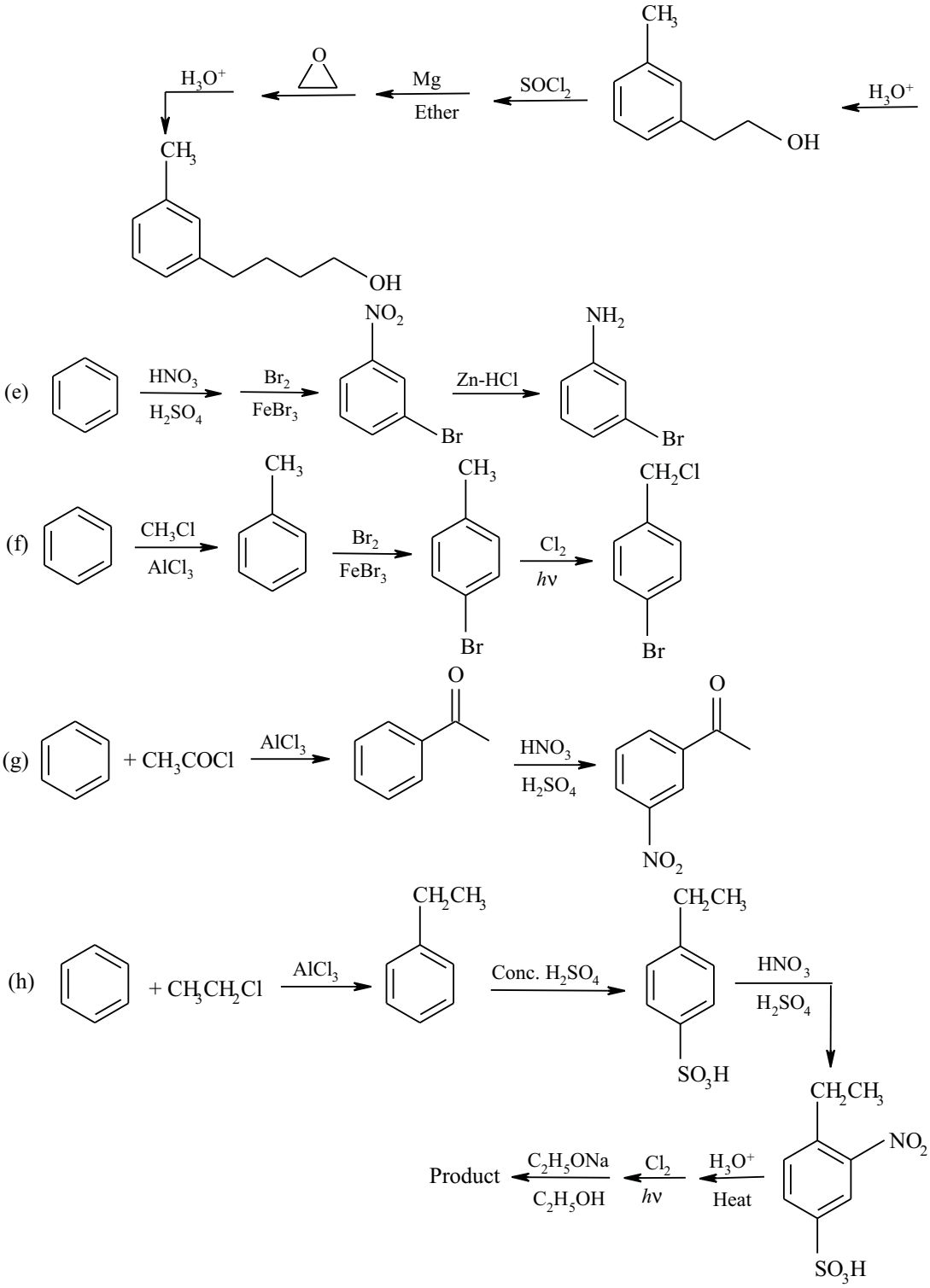
1253. 

1254. (a) 

(b) 

(c) 

(d) 


CH3
H3O+
SOCl2
Mg
Ether
O
H3O+
OH
CH3
OH
(e)
HNO3
H2SO4
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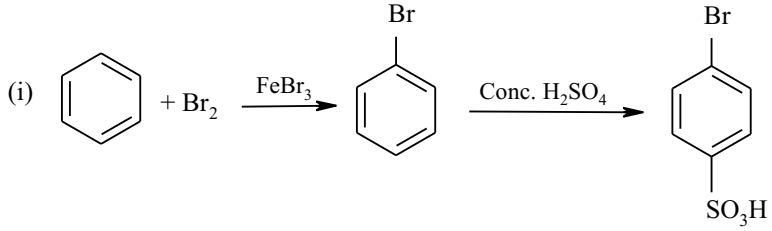
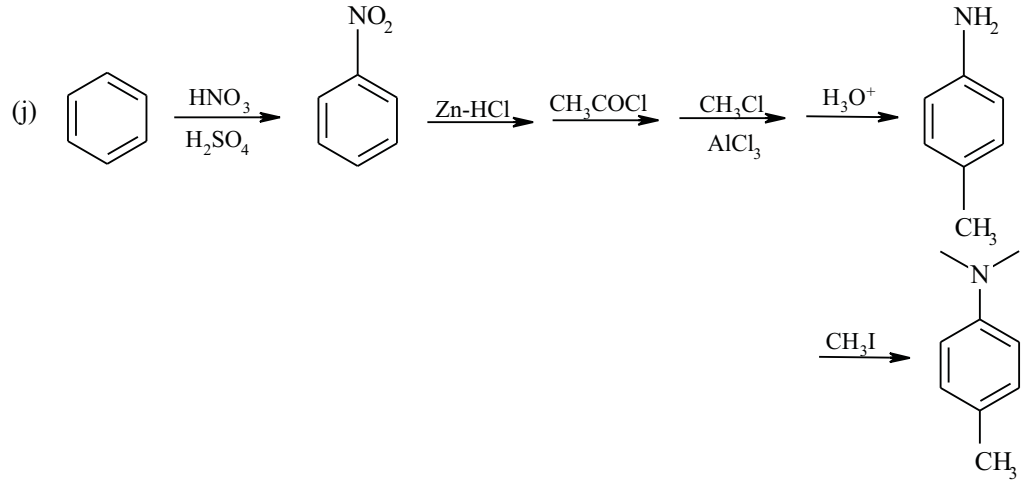
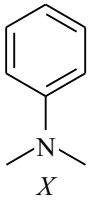
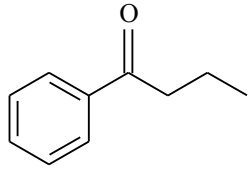
FeBr3
NO2
Br
Zn-HCl
NH2
Br
(f)
CH3Cl
AlCl3
CH3
Br2
FeBr3
CH3
Br
Cl2
hν
CH2Cl
Br
(g)
+ CH3COCl
AlCl3
O
HNO3
H2SO4
O
NO2
(h)
+ CH3CH2Cl
AlCl3
CH2CH3
Conc. H2SO4
CH2CH3
SO3H
HNO3
H2SO4
CH2CH3
NO2
SO3H
Product
C2H5ONa
C2H5OH
Cl2
hν
H3O+
Heat

(i) 

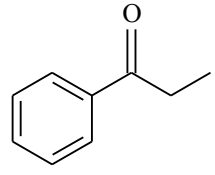
(j) 

1255. (a) 

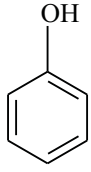
X

(b) 

X

(c) 

X

(d) 

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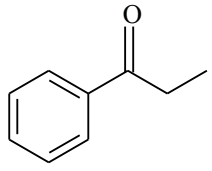
(e) 

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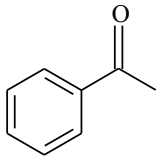
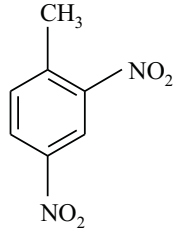
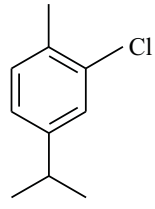
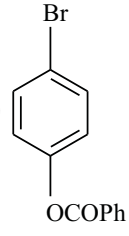
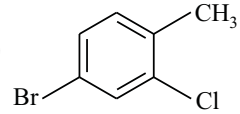
1256. (a) 

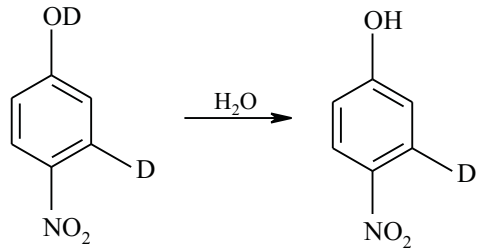
(b) 

(c) 

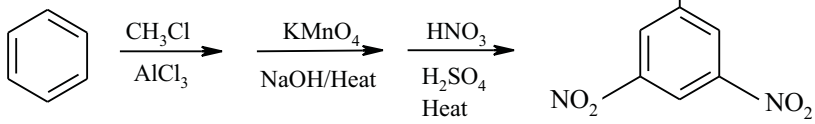
(d) 

(e) 

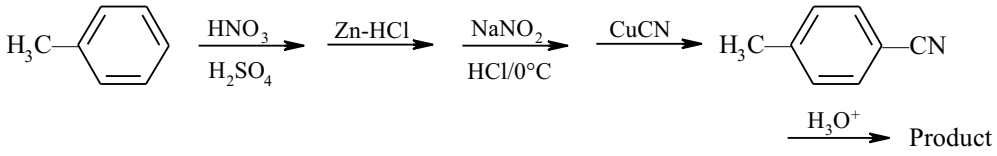
1257.



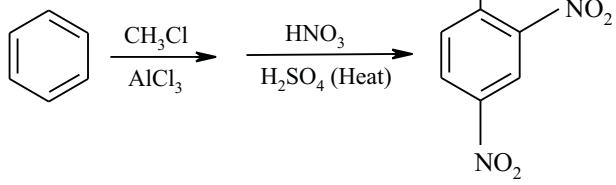
1258. (a)



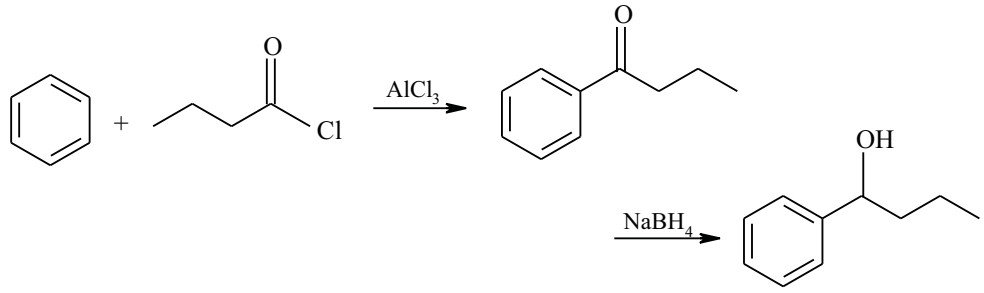
(b)



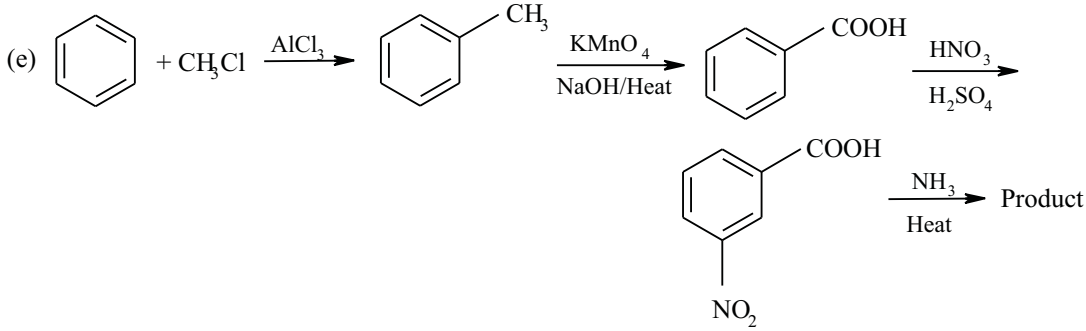
(c)

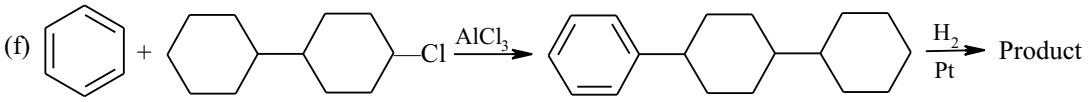


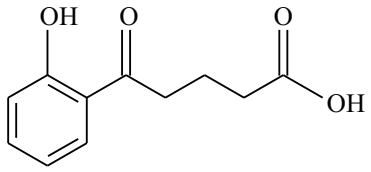
(d)

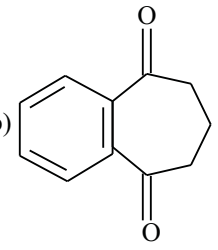


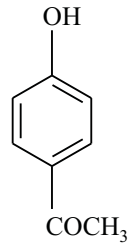
(e)

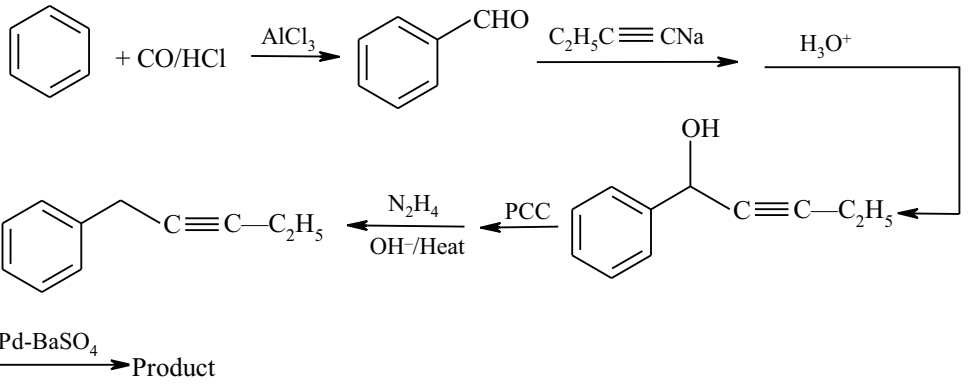


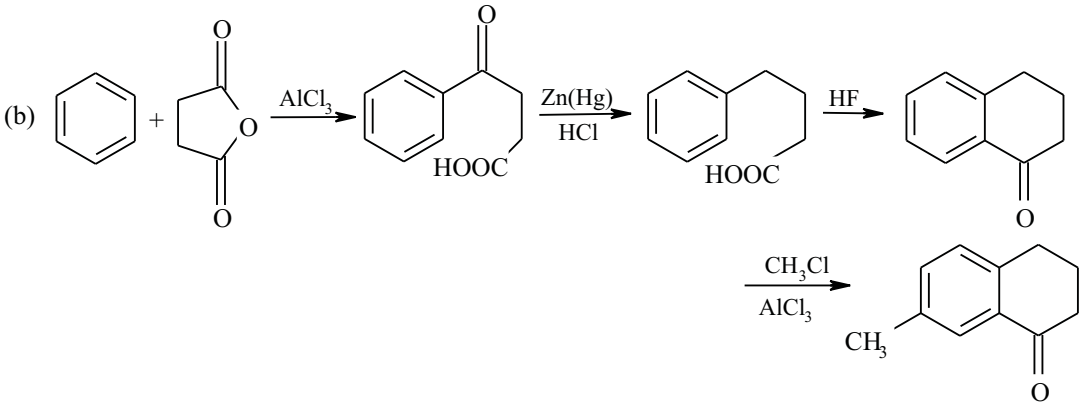
(f) 

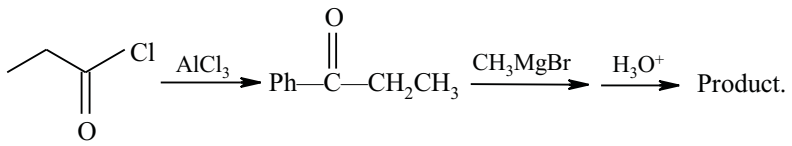
1259. (a) 

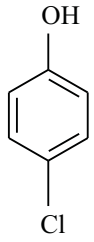
(b) 

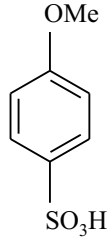
(c) 

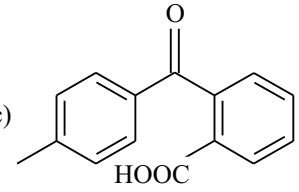
1260. (a) 

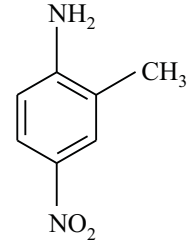
(b) 

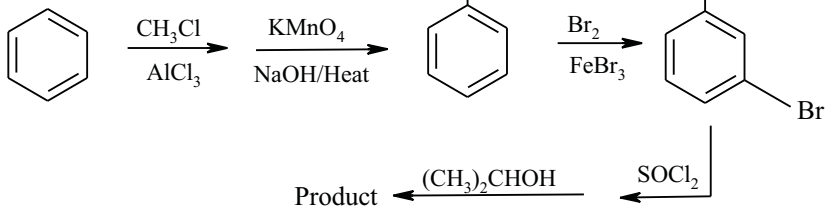
(c) PhH + 

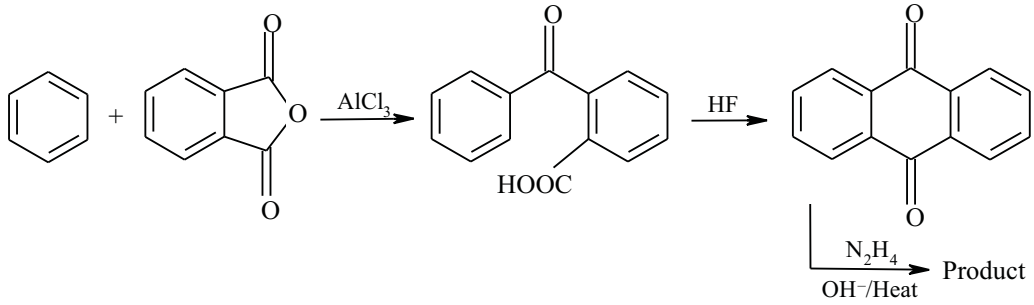
1261. (a) 

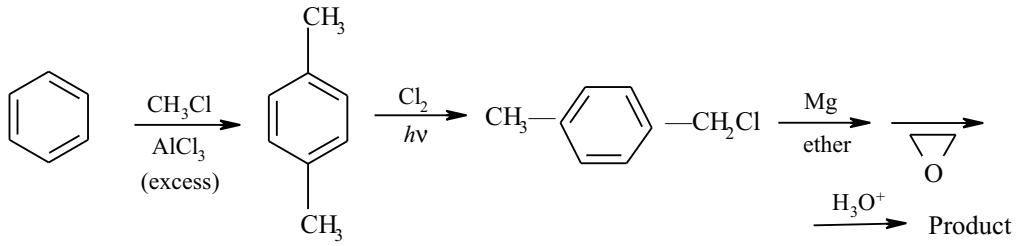
(b) 

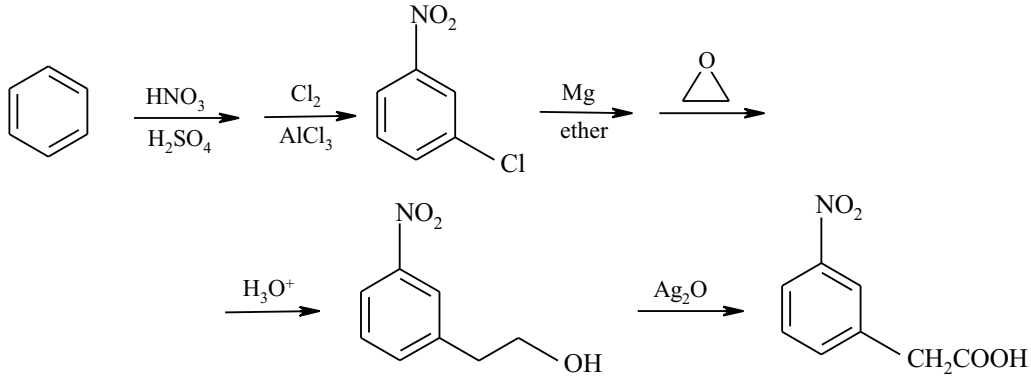
(c) 

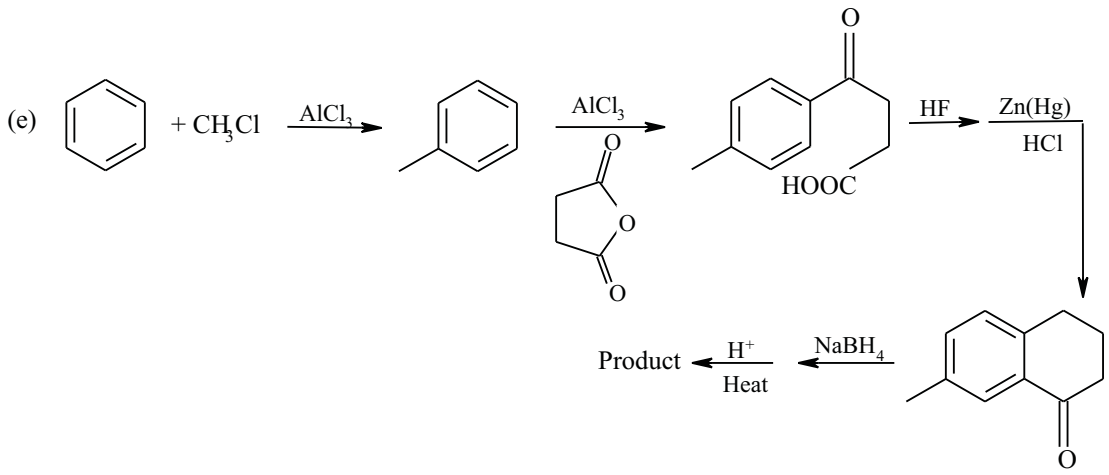
(d) 

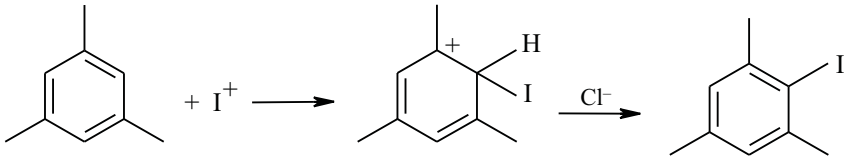
1262. (a) 

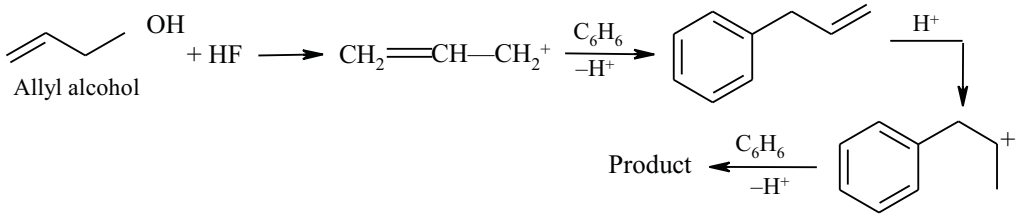
(b) 

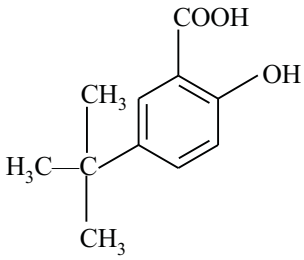
(c) 

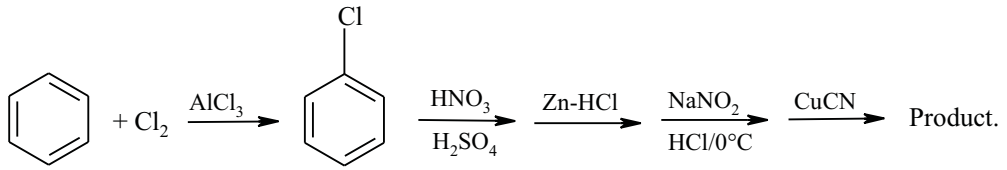
(d) 

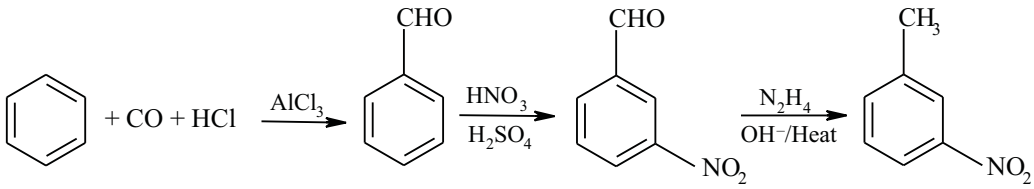
(e) 

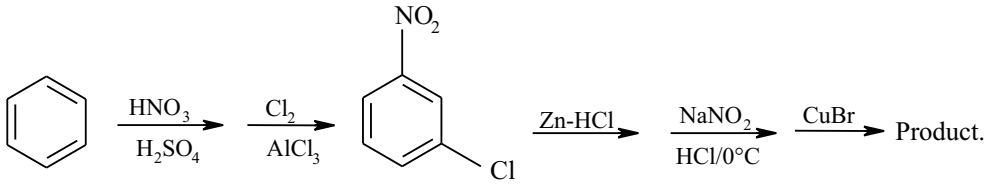
1263. 

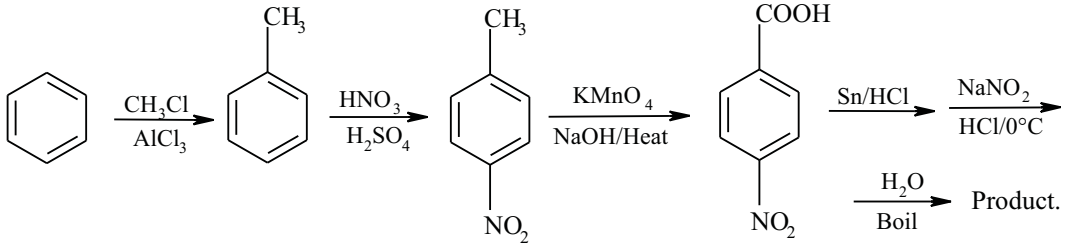
1264. 

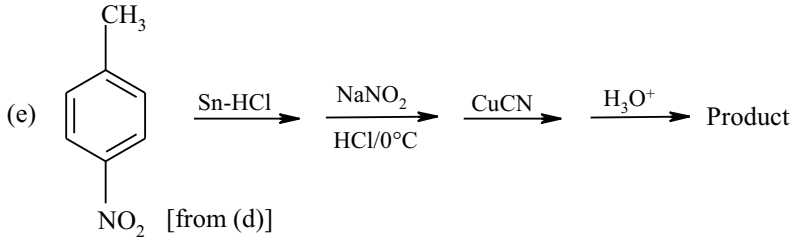
1265. 

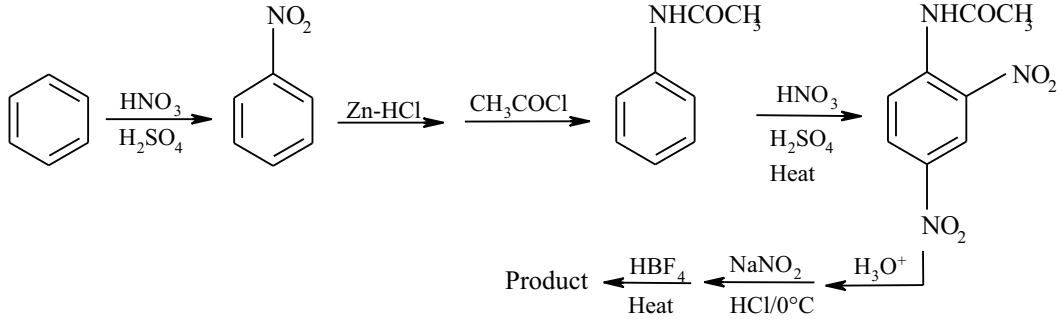
1266. (a) 

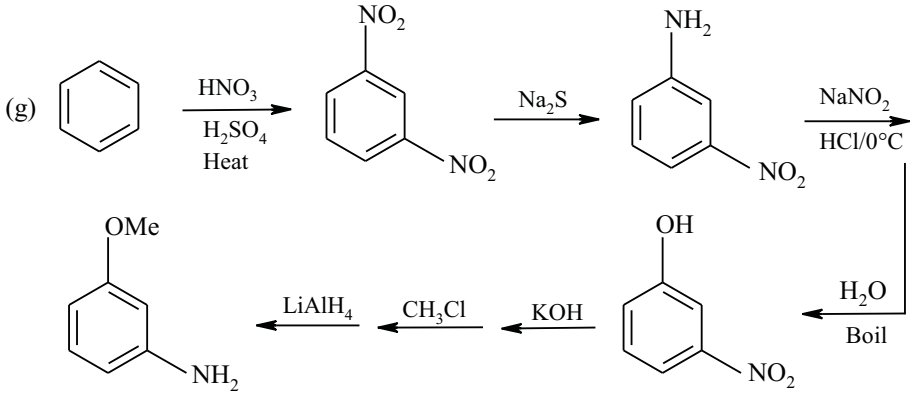
(b) 

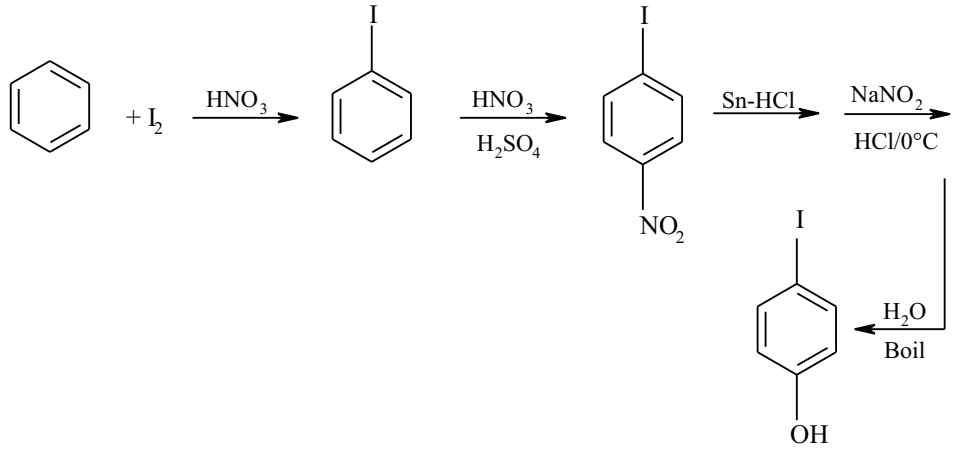
(c) 
HNO3
H2SO4
Cl2
AlCl3
NO2
Cl
Zn-HCl
NaNO2
HCl/0°C
CuBr
Product.

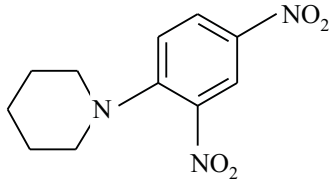
(d) 
CH3Cl
AlCl3
CH3
HNO3
H2SO4
KMnO4
NaOH/Heat
COOH
NO2
Sn/HCl
NaNO2
HCl/0°C
H2O
Boil
Product.

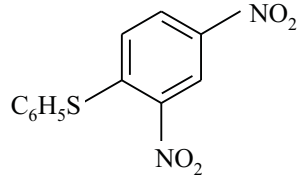
(e) 
CH3
NO2
[from (d)]
Sn-HCl
NaNO2
HCl/0°C
CuCN
H3O+
Product

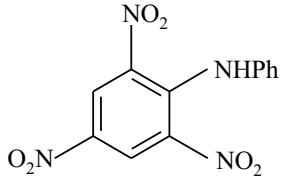
(f) 
HNO3
H2SO4
NO2
Zn-HCl
CH3COCl
NHCOCH3
HNO3
H2SO4
Heat
NO2
H3O+
NaNO2
HCl/0°C
HBF4
Heat
Product

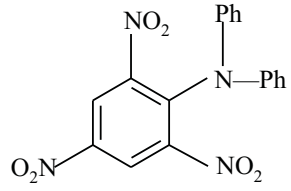
(g) 
HNO3
H2SO4
Heat
NO2
Na2S
NH2
NaNO2
HCl/0°C
H2O
Boil
OH
KOH
CH3Cl
LiAlH4
OMe
NH2

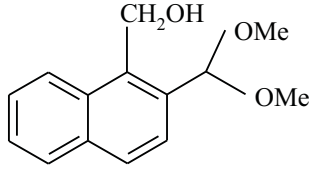
(h) 

1267. (a) 

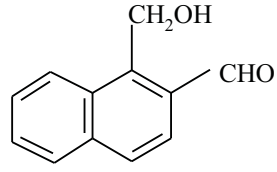
(b) 

(c) 

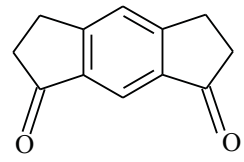
(d) 

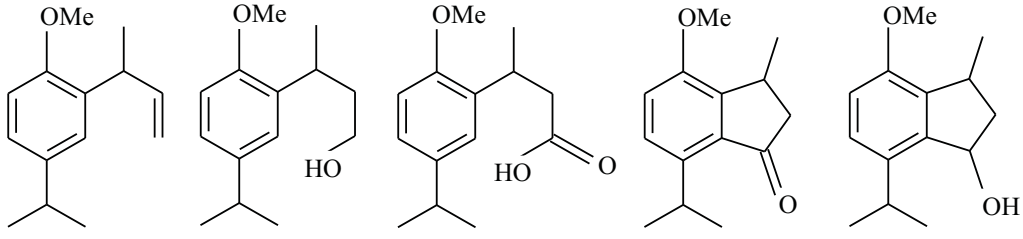
1268. (a) 

A

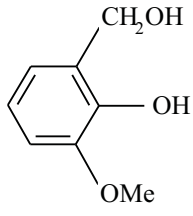


B

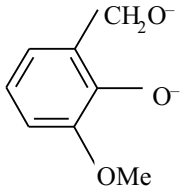
(b) 

(c) 

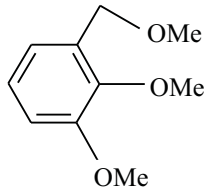
E *F* *G* *H* *I*

(d) 

J

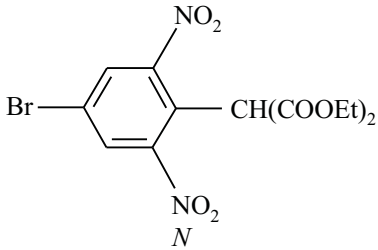


K



L

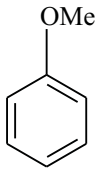
(e) $\bar{C}H(COOEt)_2$
M



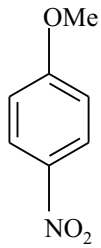
N

(f) NaH/CH_3I(excess) $LiAlH_4$ $Br_2/FeBr_3$
O *P* *Q*

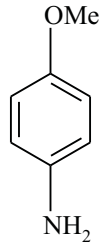
1269. (a)



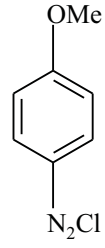
A



B

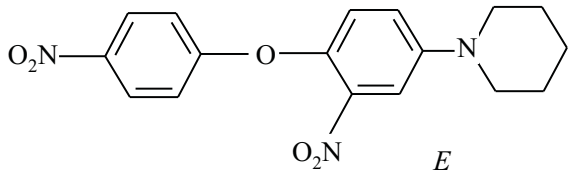


C



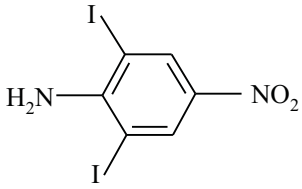
D

(b)

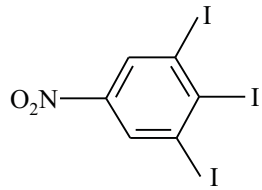


E

(c)

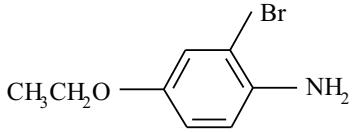


G

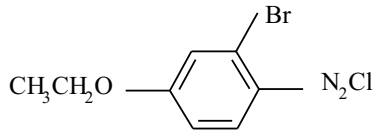


H

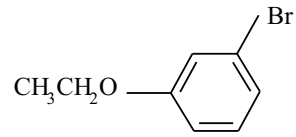
(d)



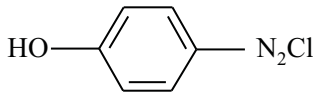
I



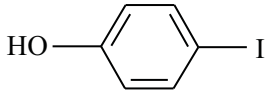
J



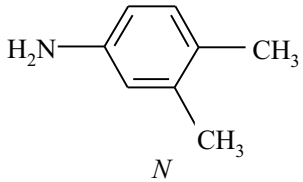
K

(e) 

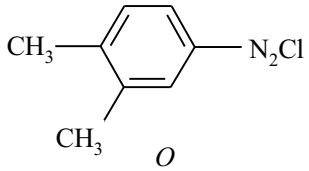
L



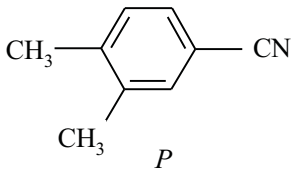
M

(f) 

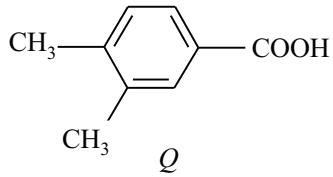
N



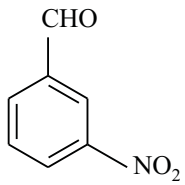
O



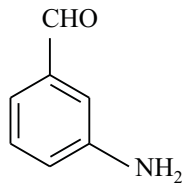
P



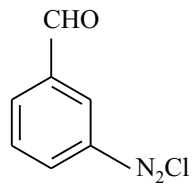
Q

1270. (a) 

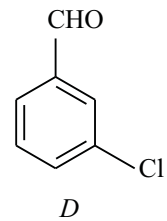
A



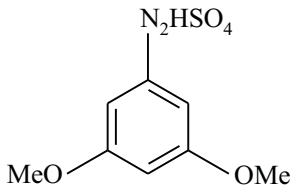
B



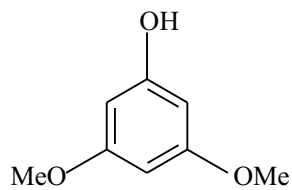
C



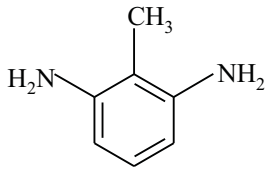
D

(b) 

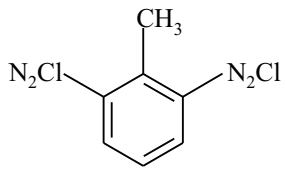
E



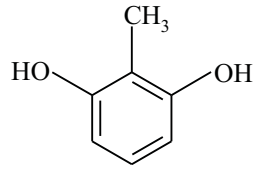
F

(c) 

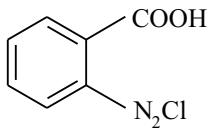
G



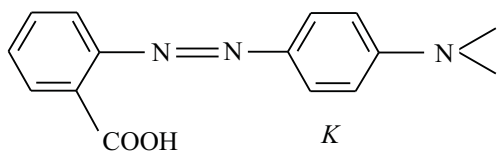
H



I

(d) 

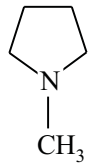
J



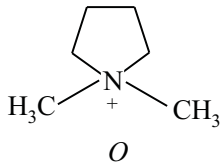
K

(e) No reaction (L)

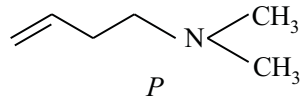
(f)



M

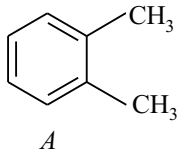


O

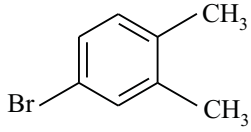


P

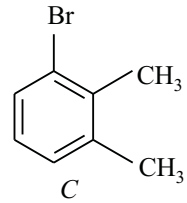
1271.



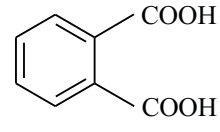
A



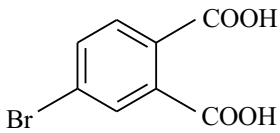
B



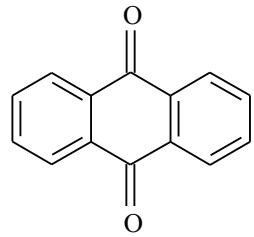
C



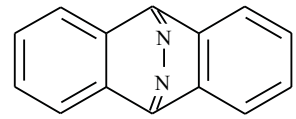
D



E

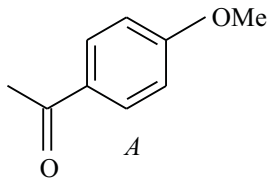


F

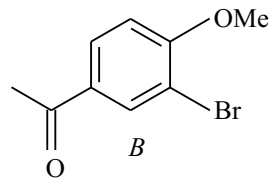


G

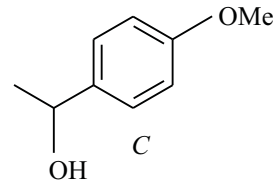
1272.



A

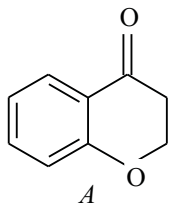


B

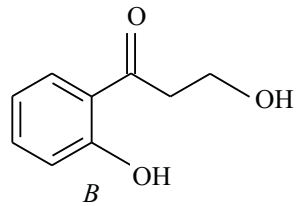


C

1273.



A



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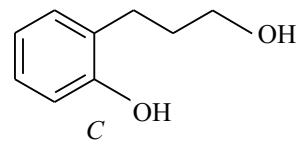
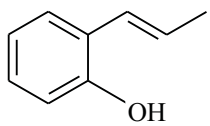
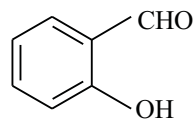


C

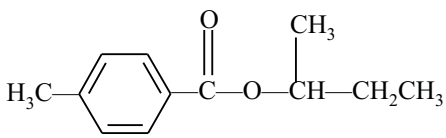


D

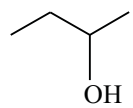


E

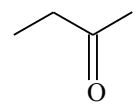
1274.



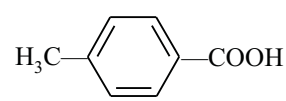
A



B

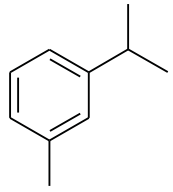


C

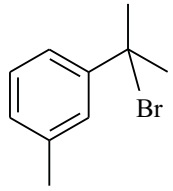


D

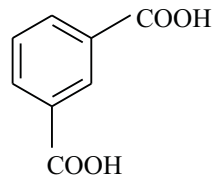
1275.



A

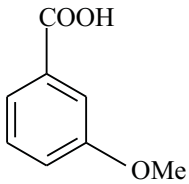


B

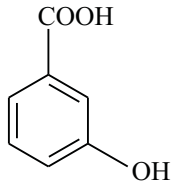


C

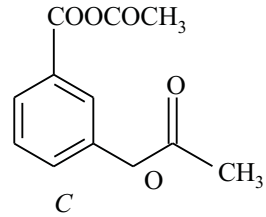
1276.



A



B



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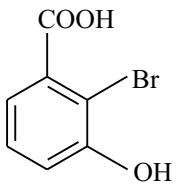
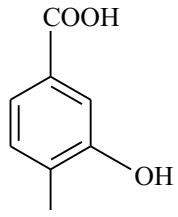
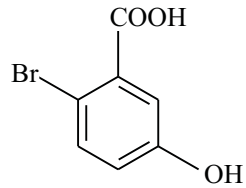


D

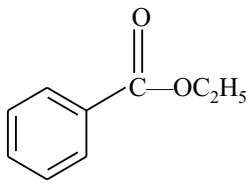


E



F

1277.



A

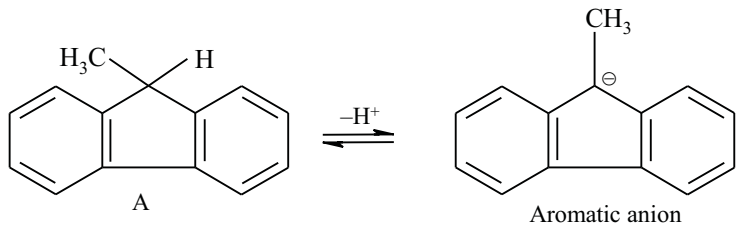
CH_3CH_2OH *B*

CH_3CHO *C*

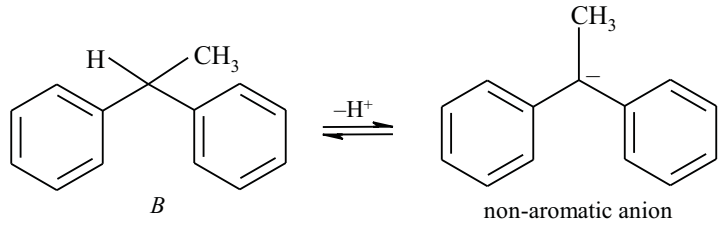
C_6H_5COOH *D*

1278. (a) Aromatic, cyclic and fully conjugated with six π-electrons.
(b) Antiaromatic, cyclic and fully conjugated with 4π-electrons.
(c) Non-aromatic, cyclic but not fully conjugated.
(d) Antiaromatic, cyclic and fully conjugated with 4π-electrons.

1279. Conjugate base of *A* invoke aromatic character in the middle ring therefore, deprotonation of benzylic H in *A* is favoured. On the other hand conjugate base of *B* does not bring any stability by aromaticity deprotonation of benzylic H is not as favoured as in case of *A*.

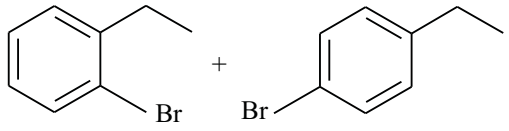


A Aromatic anion

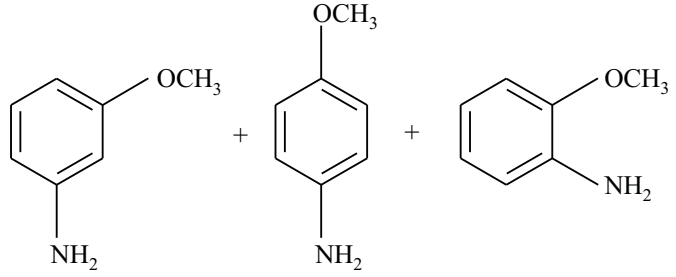


B non-aromatic anion

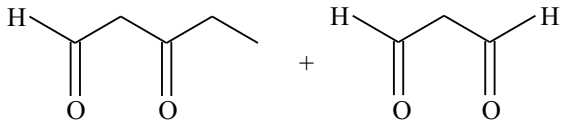
1280. (a)



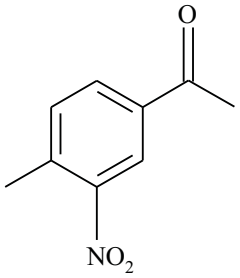
(b)



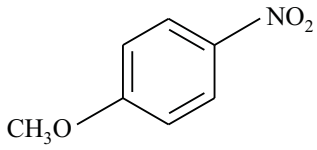
(c)



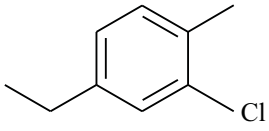
(d)



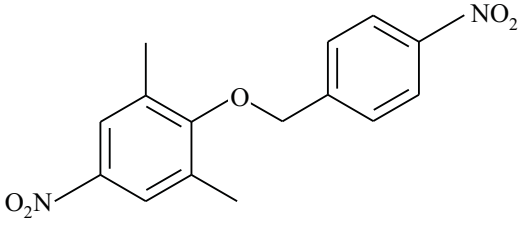
(e)



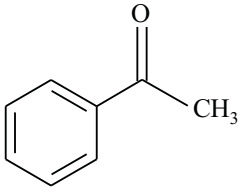
(f)



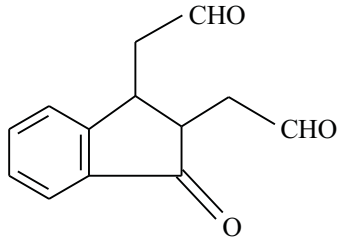
(g)



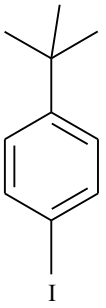
(h)



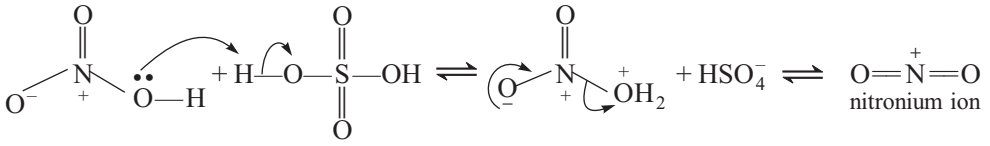
(i)

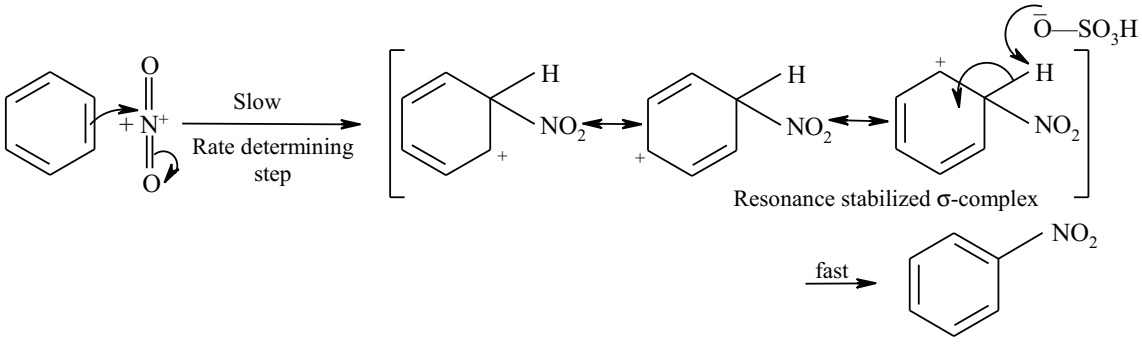


(j)

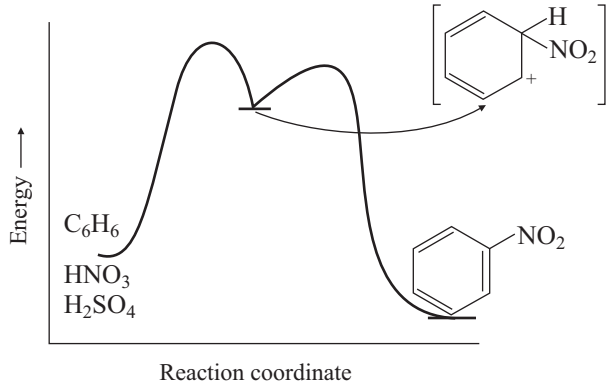


1281. Nitration of benzene proceeds by the following mechanism:

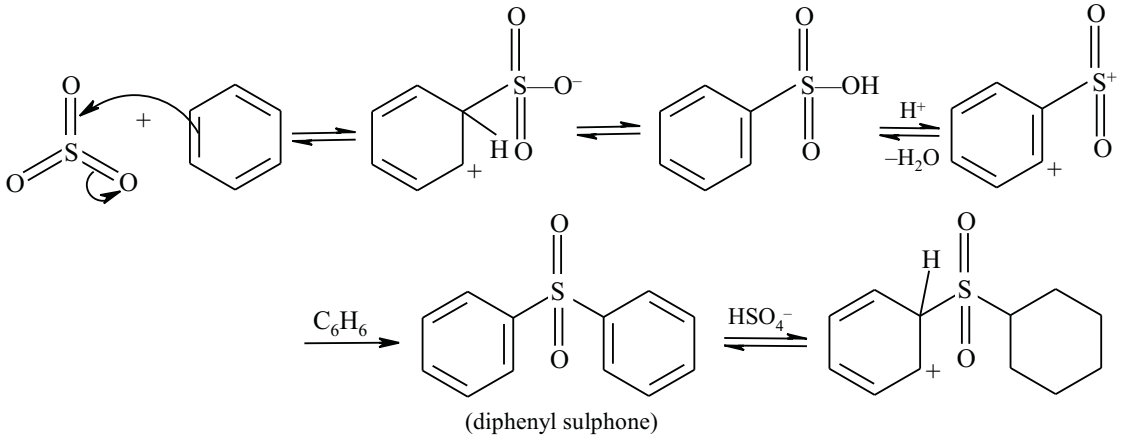




Reaction energy diagram:
The reaction proceeds at same rate for both benzene and hexadeutrobenzene since C—H bond cleavage is not occurring in rate determining step.

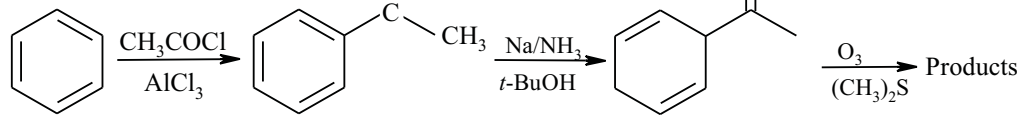


1282. Sulphonation of benzene proceeds by the following mechanism:



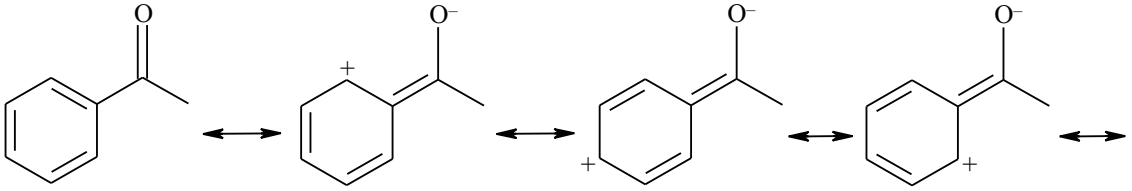
(diphenyl sulphone)

1283.



1284. (a) $CH_3COCl/AlCl_3$, $Br_2/FeBr_3$, (b) PCC/CH_2Cl_2, NBS/hν,
(c) H_2/Rh/Pressure, $NaIO_4$, (d) $CH_3COCl/AlCl_3$, HNO_3/H_2SO_4,
(e) $(CH_3)_2CHCOCl/AlCl_3$, Na/NH_3/EtOH, Zn(Hg)/HCl,
(f) NBS/hν, Mg/ether, CH_2O, PCC(*g*) $Br_2/FeBr_3$, HNO_3/H_2SO_4.

1285. The reaction will be slower with acetophenone than with benzene as the acyl group is a deactivating group in electrophilic aromatic substitution.

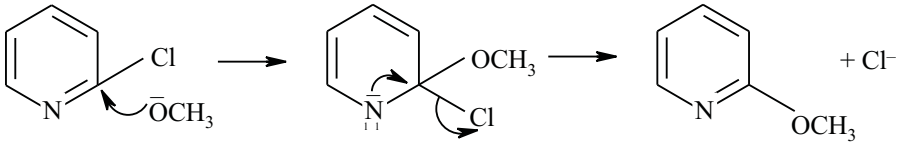


Acetophenone

As shown above, electron withdrawing (—R) effect of acyl group decreases the electron density from the aromatic ring making it less susceptible for attack to an electrophile (Br^+ in bromination reaction).

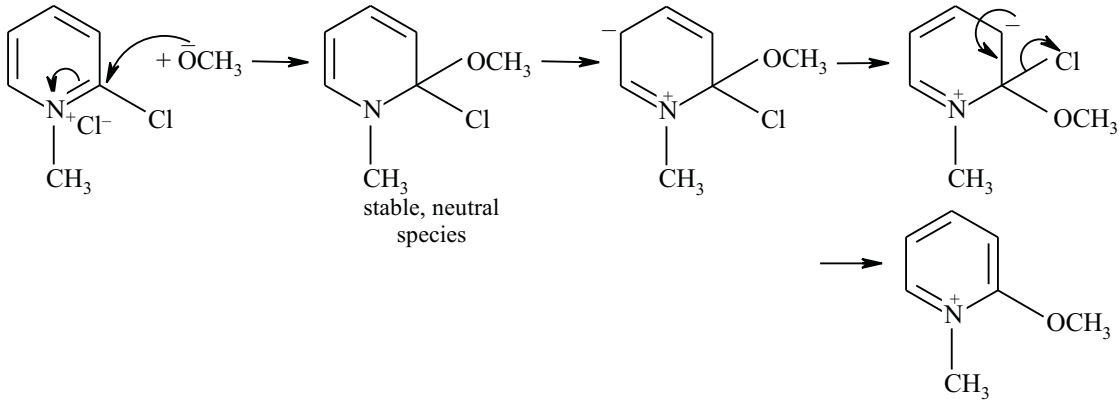
Also, acyl group, by resonance, brings positive charge on ortho and para positions, hence, meta-positions are relatively richer in electrons compared to the ortho/para positions. Hence, electrophile, if attacks at all, it attacks at meta positions only.

1286. The mechanism of substitution reaction is:

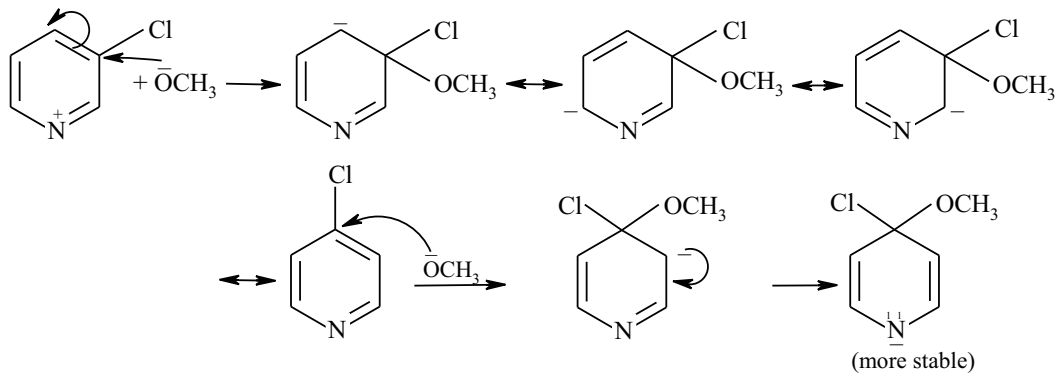


On the basis of above mechanism, it can be concluded that the order of reactivity will be: $A < C < B$.

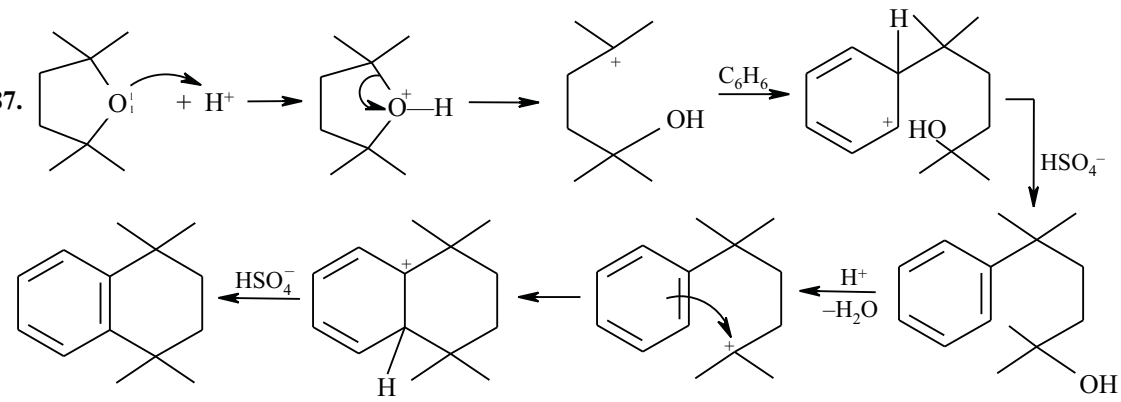
The reason for the above order are : For the pyridinium salt, one of the resonance forms bear no charge. This will be a stable, neutral species and the activation energy is, accordingly, low relative to others *A* and *C*.



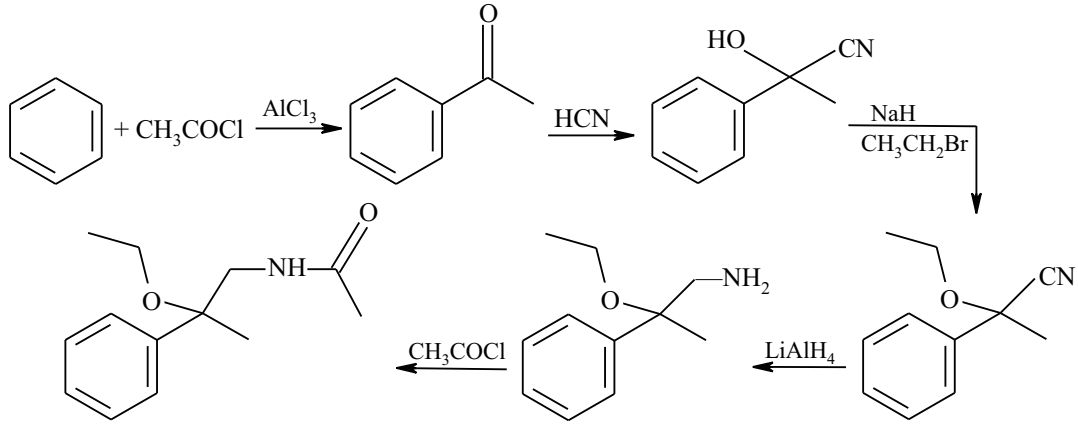
In the case of 3-chloropyridine, the negative charge on intermediate can't be delocalized, therefore, this reaction would be expected to be slower than 4-chloropyridine where the negative charge is delocalized.



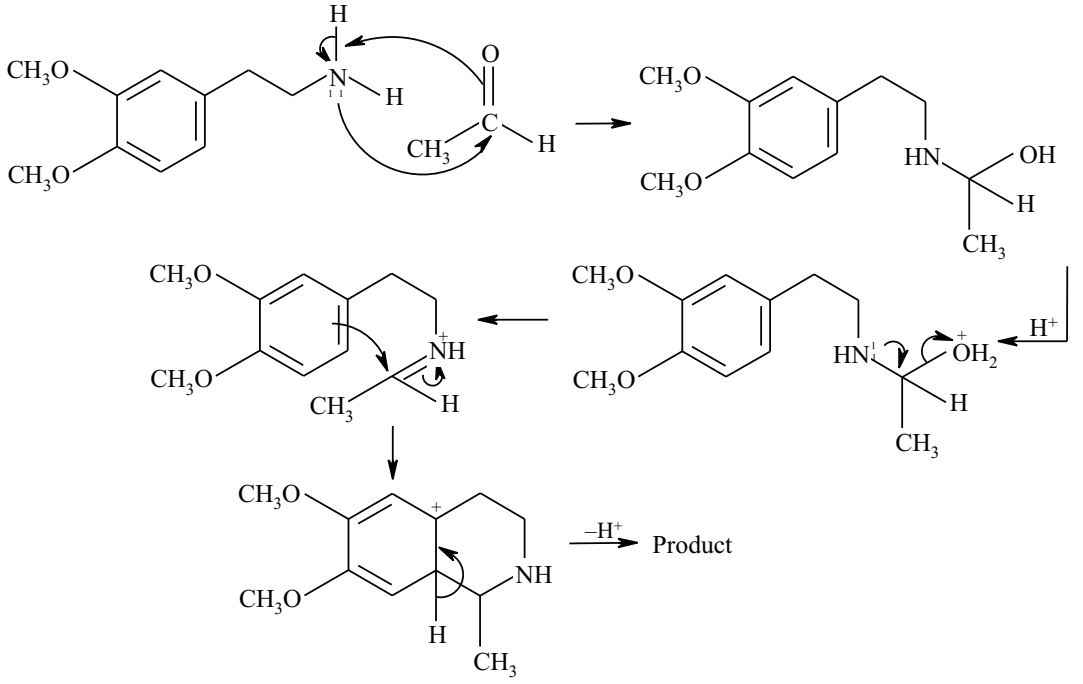
1287.



1288.

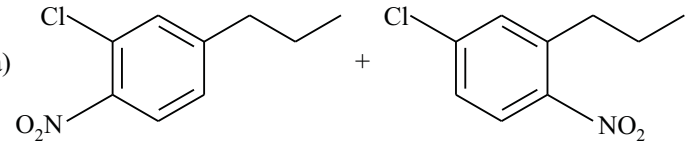


1289.

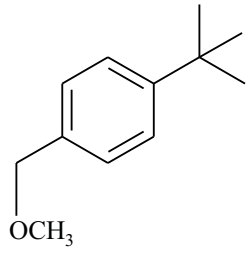


1290. (a) Antiaromatic, fully conjugated, planar with 4π-electrons.
(b) Aromatic, planar, fully conjugated, 6π-electrons (two from ring oxygen).
(c) Non-aromatic, planar fully conjugated, 7π-electrons (one from radical).
(d) Non-aromatic, not fully conjugated.

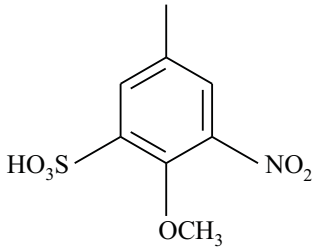
1291. (a)



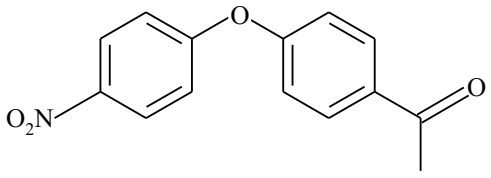
(b)



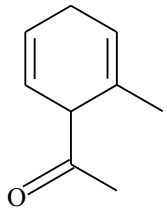
(c)



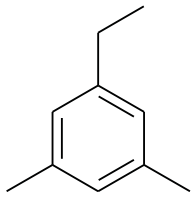
(d)



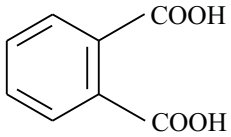
(e)



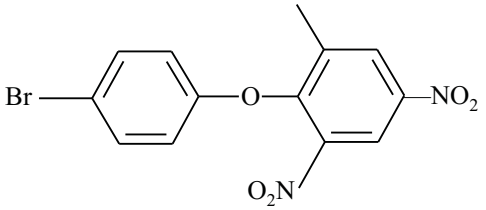
(f)



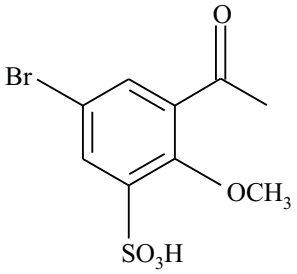
1292. (a)



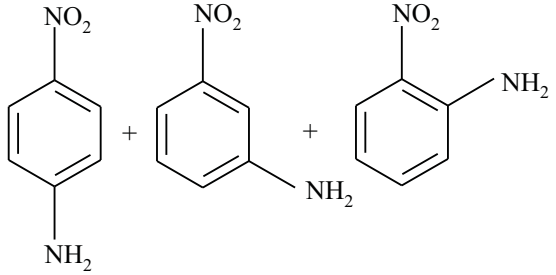
(b)



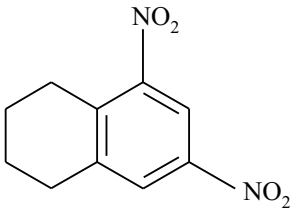
(c)



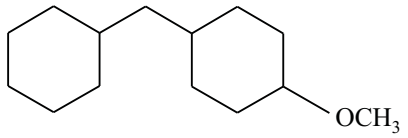
(d)



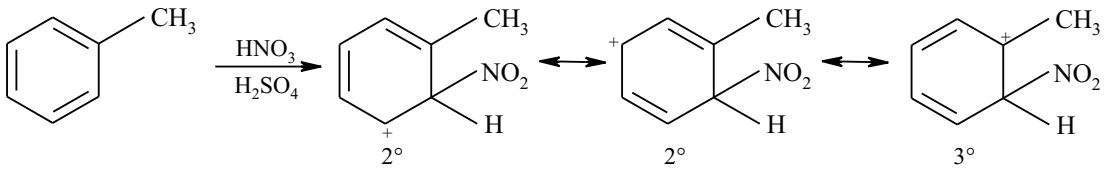
(e)

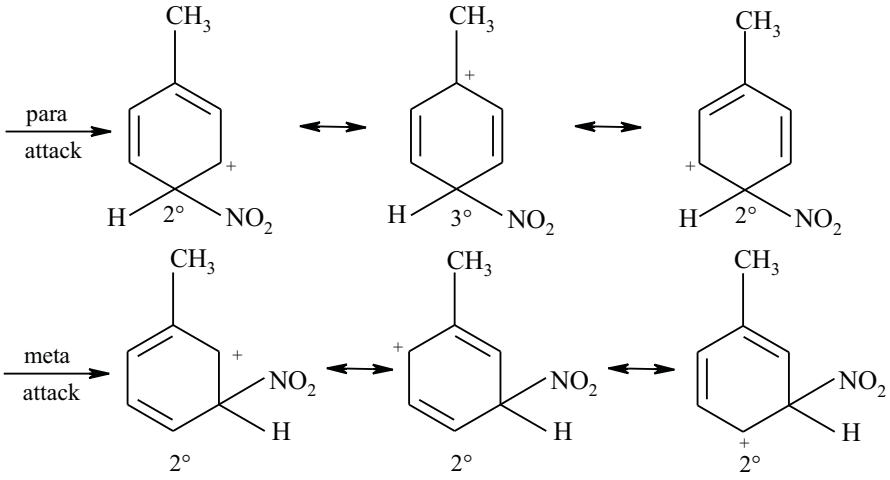


(f)



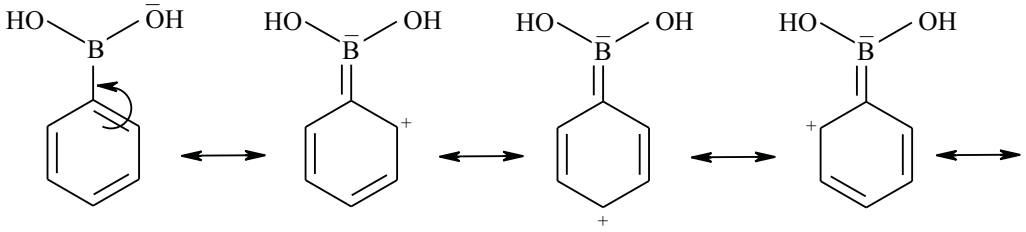
1293. The σ-complexes formed by attack at ortho, para and meta positions are as follows:





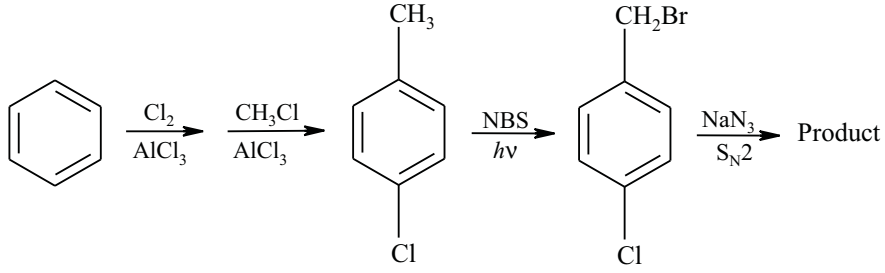
1294. (a) $CH_3Cl/AlCl_3$, NBS/hν, CH_3ONa,
(b) $CH_3COCl/AlCl_3$, Fe(Hg)/HCl, Na/NH_3/EtOH,
(c) H_2SO_4/H_2O^-/heat, $KMnO_4$/NaOH/heat,
(d) $CH_3(CH_2)_2COCl/AlCl_3$, NBS/hν, CH_3ONa, $Rh/H_2/\Delta$.

1295. —$B(OH)_2$ is a meta directing group due to following resonance phenomena:

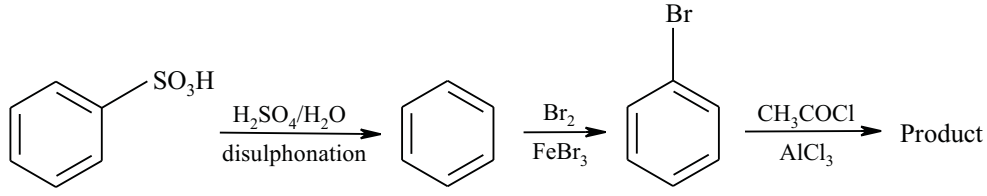


The above resonance structures reveals that —$B(OH)_2$ withdraw electrons from ortho/para positions deactivating the ring for attack of electrophile. Even, if the compound is subjected to electrophilic attack, it occurs at meta position.

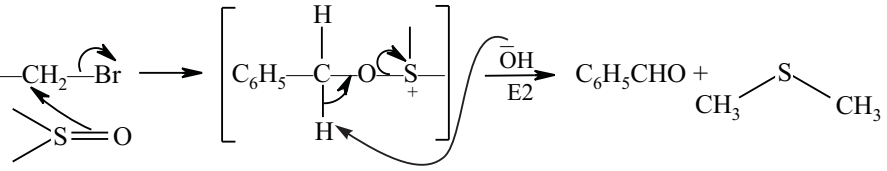
1296. (a)



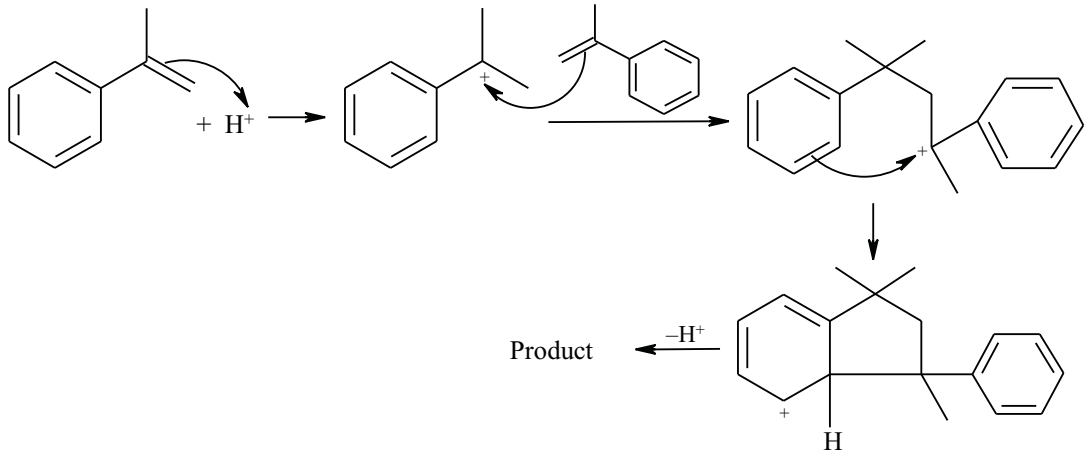
(b)



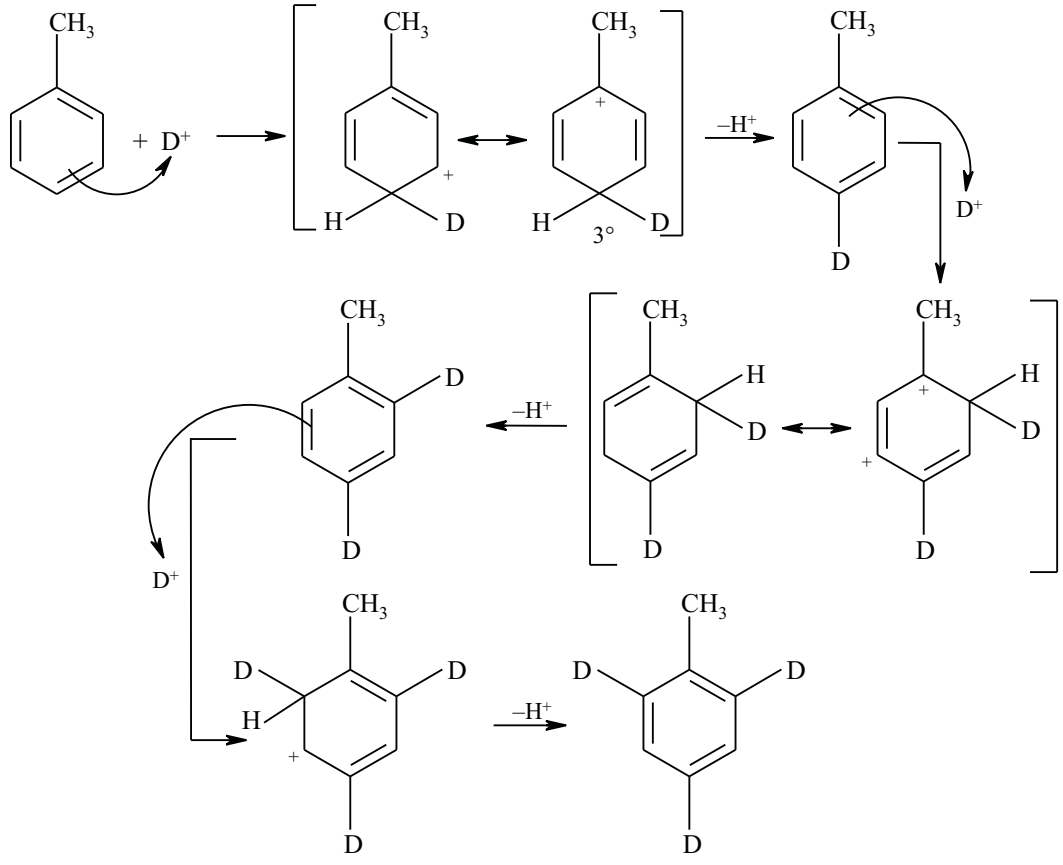
1297.



1298.

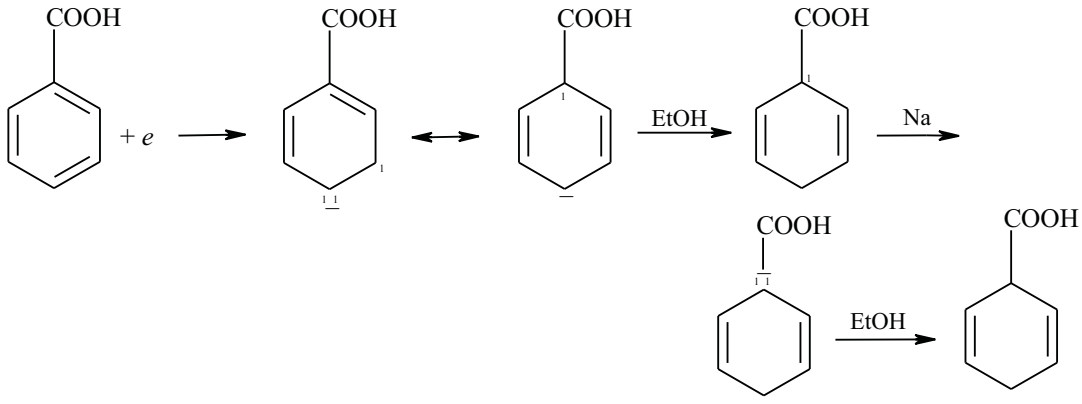


1299.



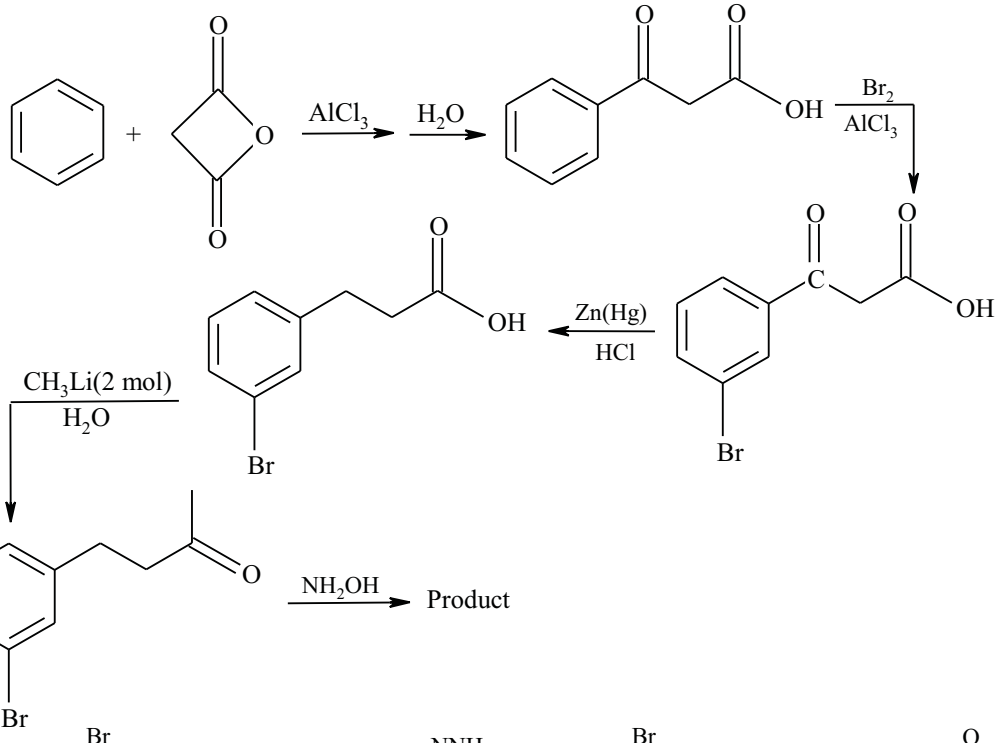
1300. Benzoic acid.

The mechanism involves addition of electrons to form a radical anion in the first step as:

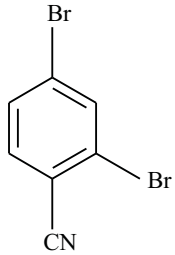


Stabilized by
electron withdrawing group

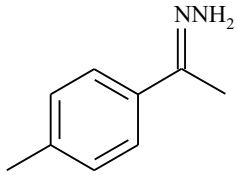
1301.



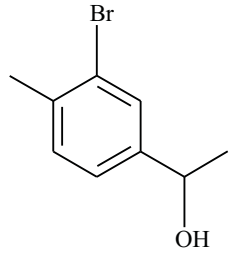
1302. (a)



(b)

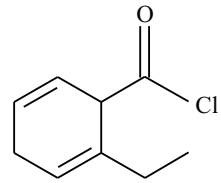


(c)

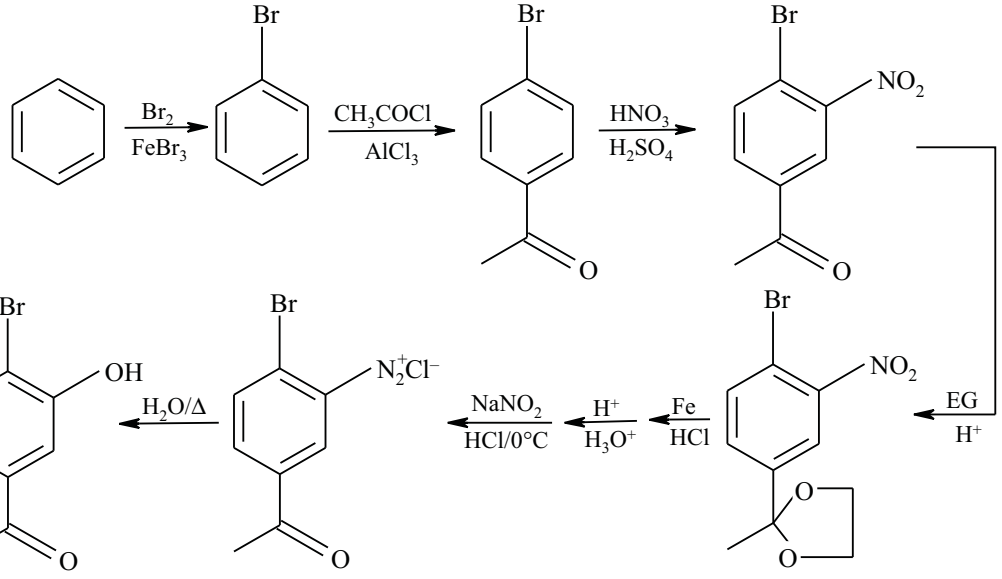


enantiomers

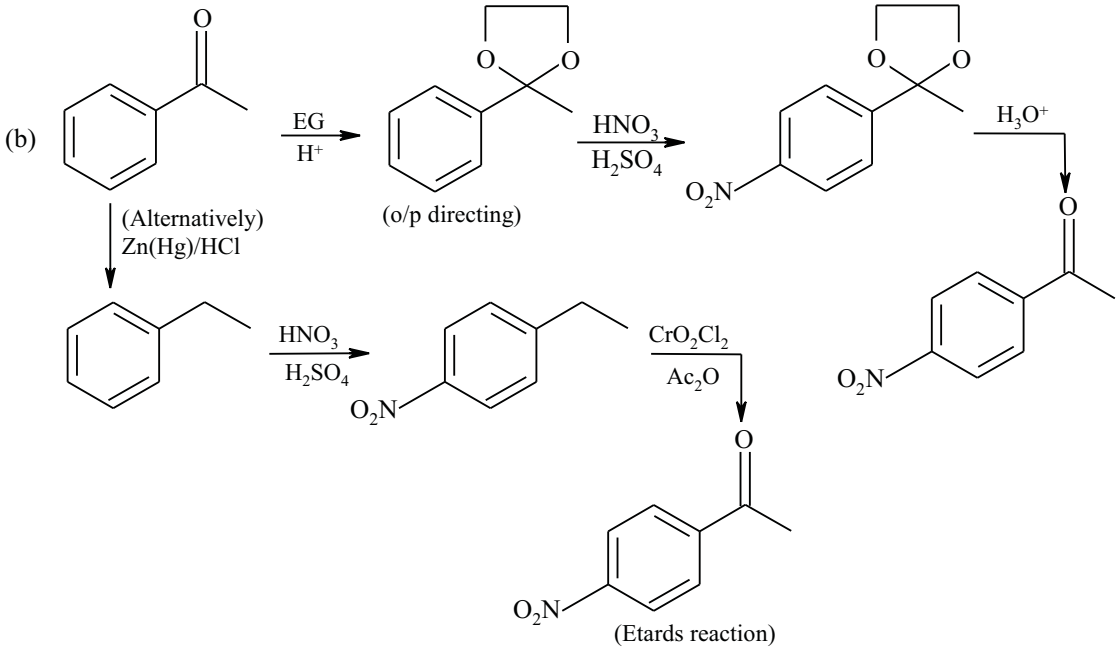
(d)



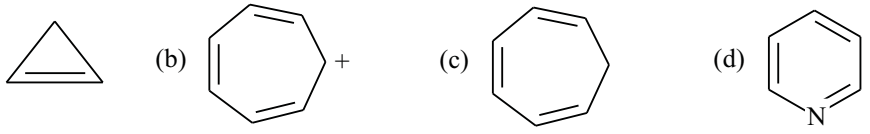
1303. (a)

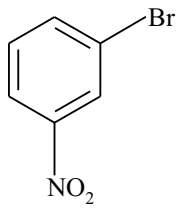


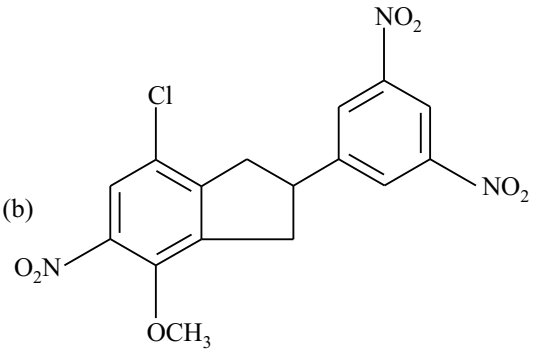
(b)

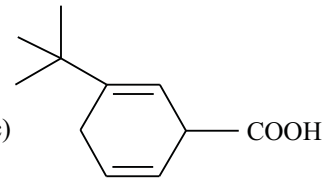


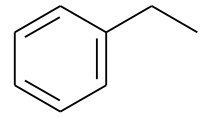
1304. (a) (b) + (c) (d)

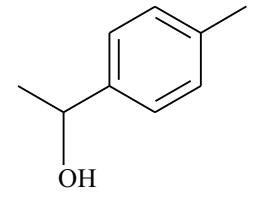


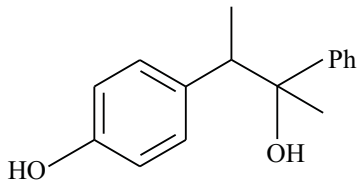
1305. (a) 

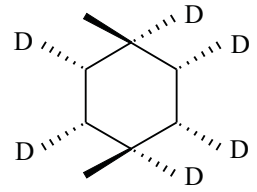
(b) 

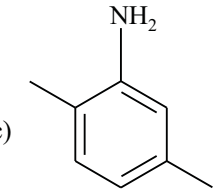
(c) 

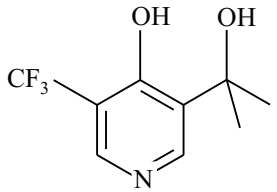
(d) 

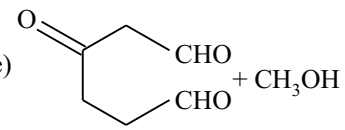
(e) 

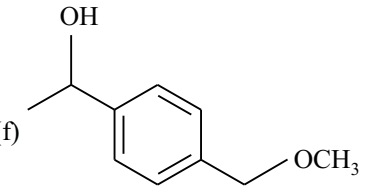
1306. (a) 

(b) 

(c) 

(d) 

(e) 

(f) 

1307. (a) $(CH_3)_2CHCOCl/AlCl_3$, $Ph_3P{=}CH_2$,

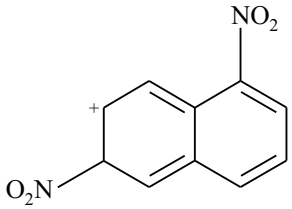
(b) $O_3/Zn{-}H_2O$, Zn(Hg)/HCl,

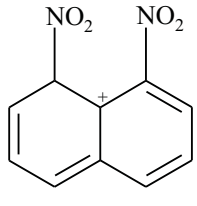
(c) $Br_2/FeBr_3$, HNO_3/H_2SO_4, Mg/ether/oxirane/H_3O^+, PCC/CH_2Cl_2,

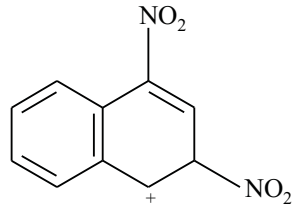
(d) Alternative : $CH_3Cl/AlCl_3$, H_2SO_4/HNO_3, NBS/hν, Mg/ether/CH_2O, PCC/CH_2Cl_2.

1308. $\underset{A}{CH_3OCH{=}PPh_3}$ $\underset{B}{C_6H_5CH{=}CHOCH_3}$ $\underset{C}{C_6H_5CH_2CHO}$

1309. Only *B*, *D* and *G* are formed. In order to rationalize, we need to see the sigma complex in each case. In sigma complex leaging to *C*, *E*, *F*, *H*, one of the resonance form places the positive charge on C_1, which is the carbon bearing nitro group. These products are then all disfavoured.

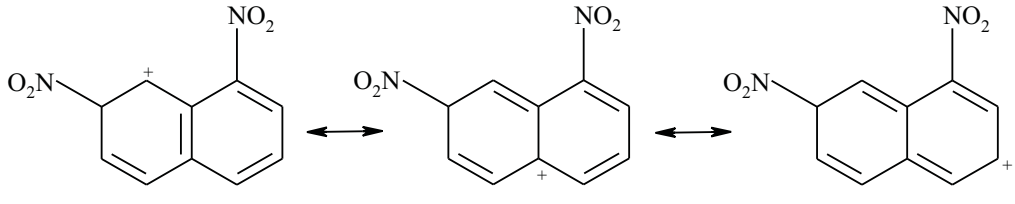

σ-complex of *B*

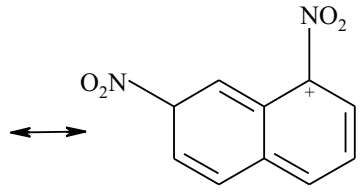

σ-complex of *D*


σ-complex of *G*

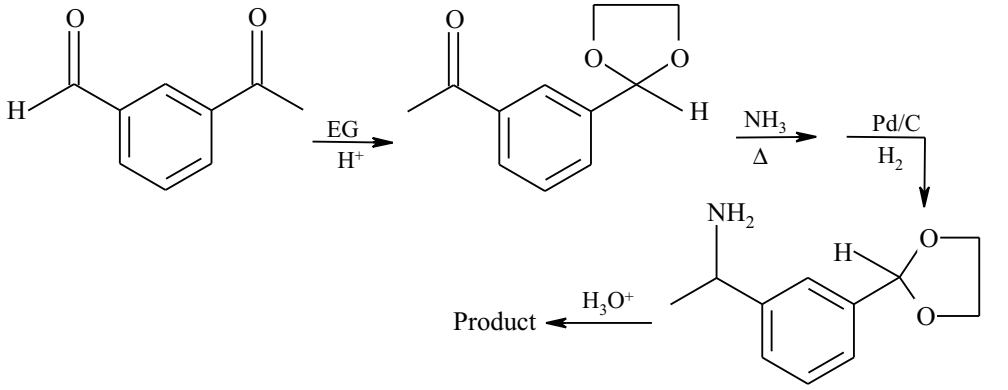
In none of the resonance forms of the above σ-complex it is possible to place positive charge (+) on carbon bearing —NO_2 group.

Sigma complex of remaining four places positive charge on C-bearing —NO_2 in one of their resonance form:

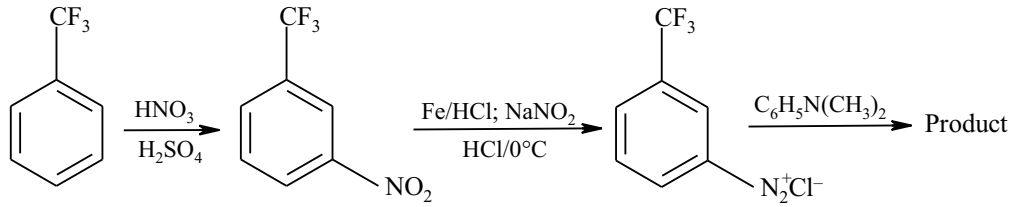

σ-complex of *C*


not favoured resonance form

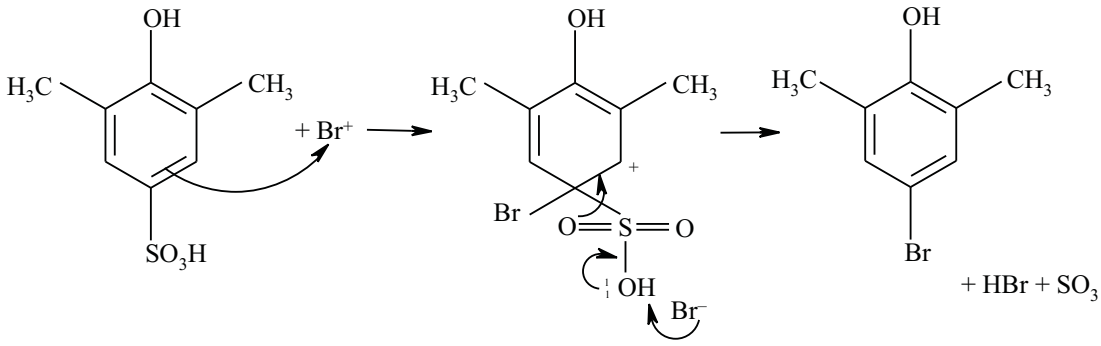
1310. (a)



(b)

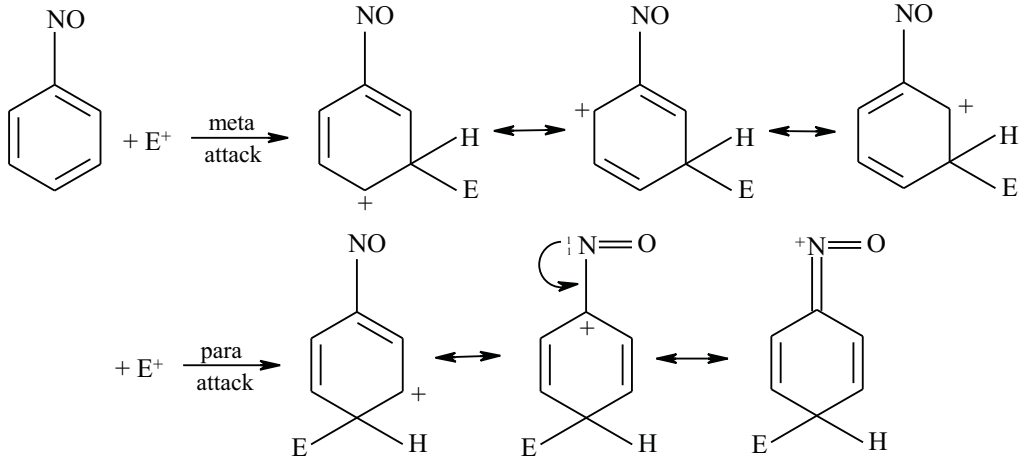


1311. $Br_2 + FeBr_3 \longrightarrow Br^+ + FeBr_4^-$



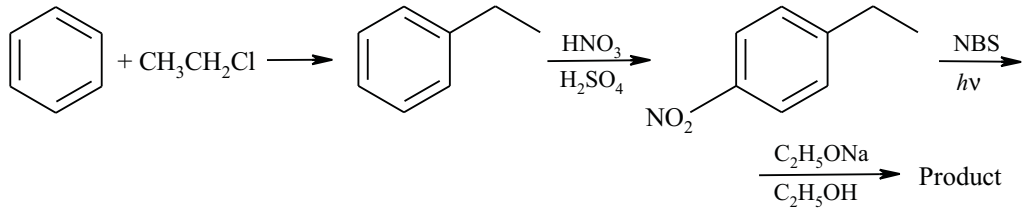
1312. (a) I, (b) I, (c) I, (d) I, they are all aromatic.
1313. (a) III < II < I, (b) II < I < III, (c) III < II < I.

1314.

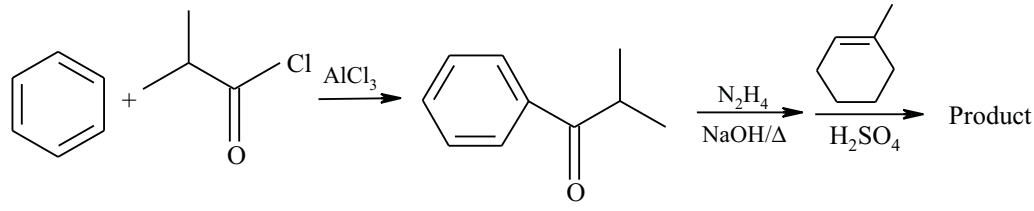


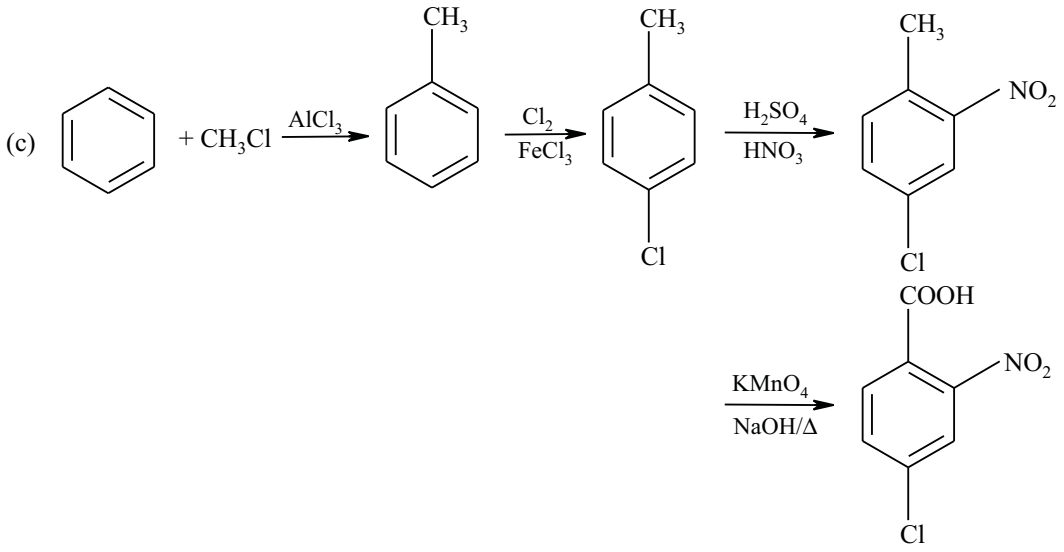
σ-complex is stabilized by +*R* effect of —NO functional group.

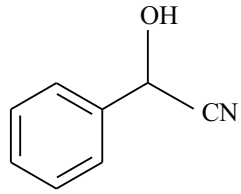
1315. (a)

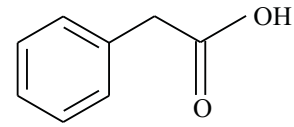


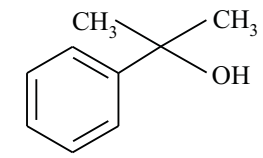
(b)

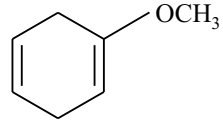


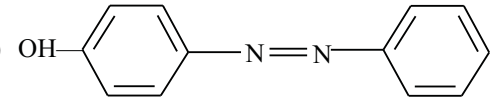
(c) 

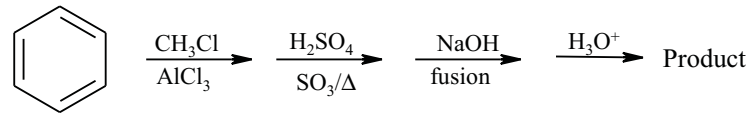
1316. (a) 

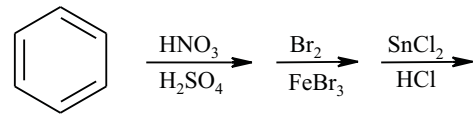
(b) 

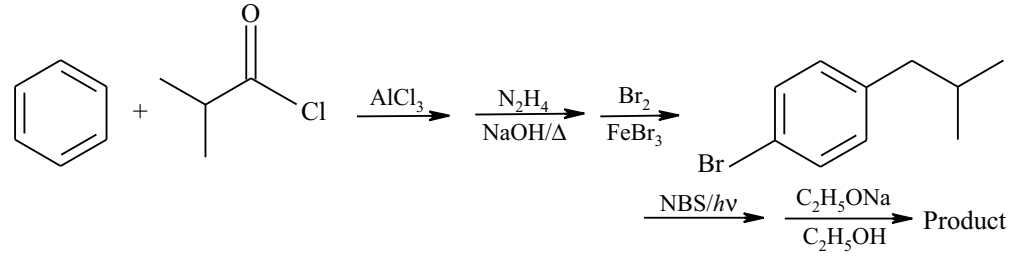
(c) 

(d) 

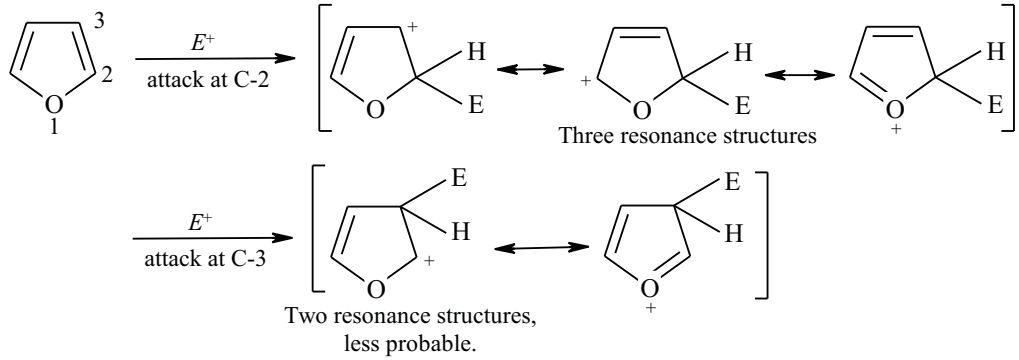
(e) 

1317. (a) 

(b) 

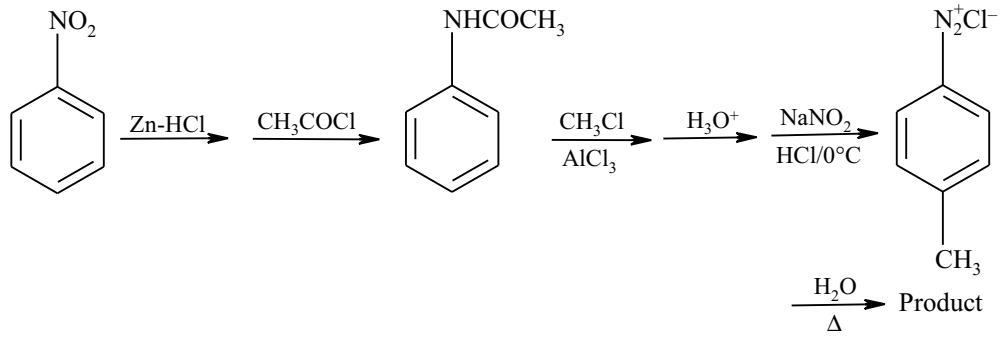
(c) 

1318.

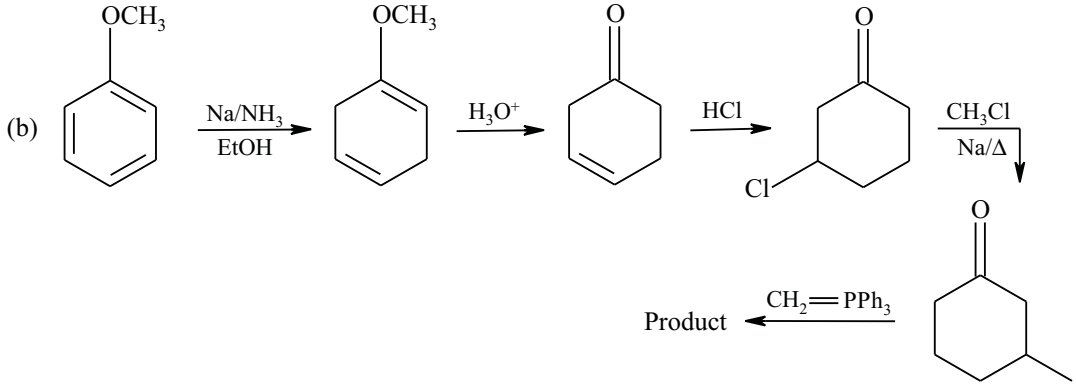


Therefore, electrophile is most likely to attack at C–2 position.

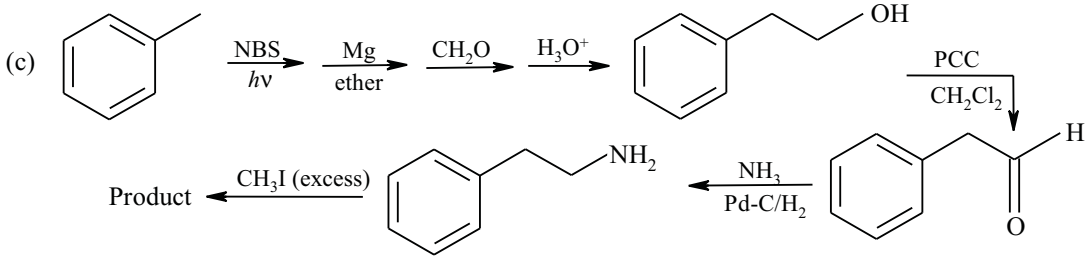
1319. (a)



(b)



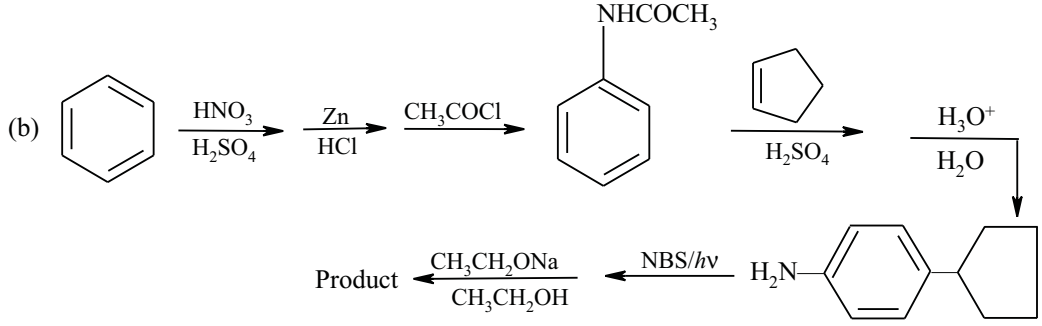
(c)



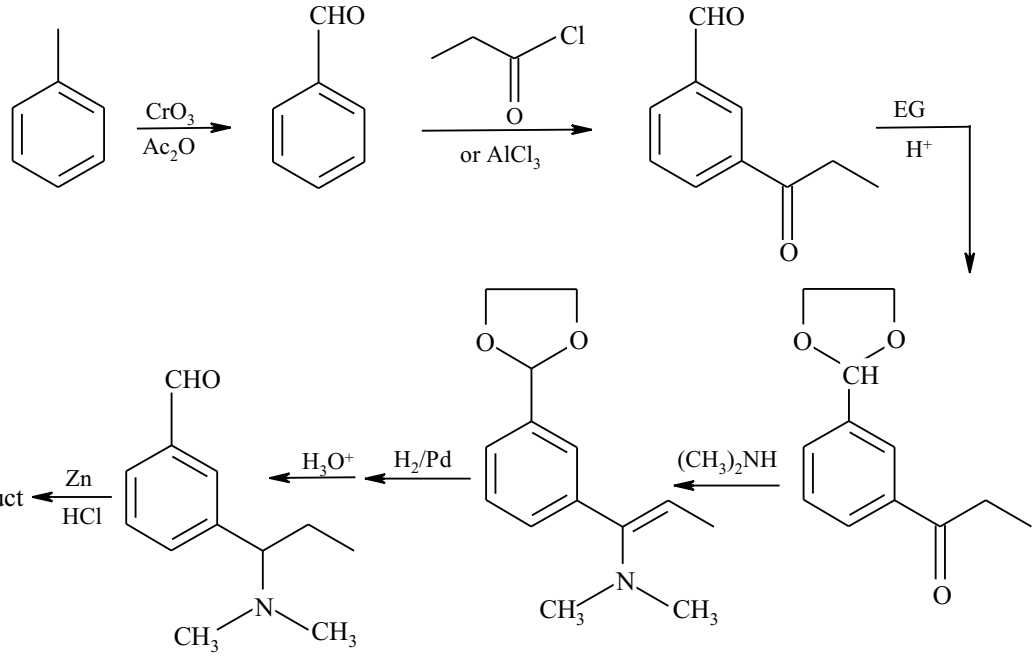
1320. (a) II, (b) I.
1321. (a) III < I < II, (b) I < II < III, (c) I < II < III.

1322. (a)

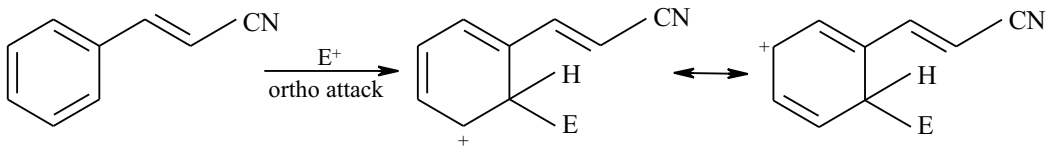
(b)

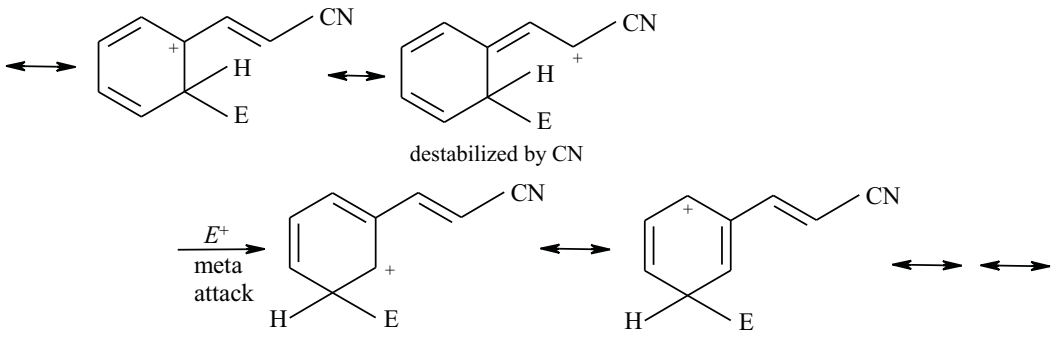


1323.



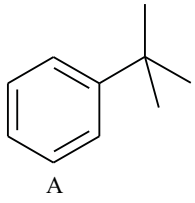
1324.





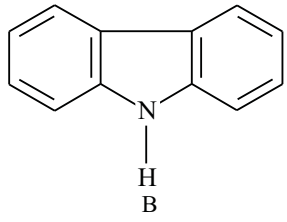
Meta attack of E^+ avoides the electron withdrawing effect of —CN group as positive charge can't interact directly with CN group. Therefore, meta attack is favoured over ortho/para attack of electrophile.

1325. (a)



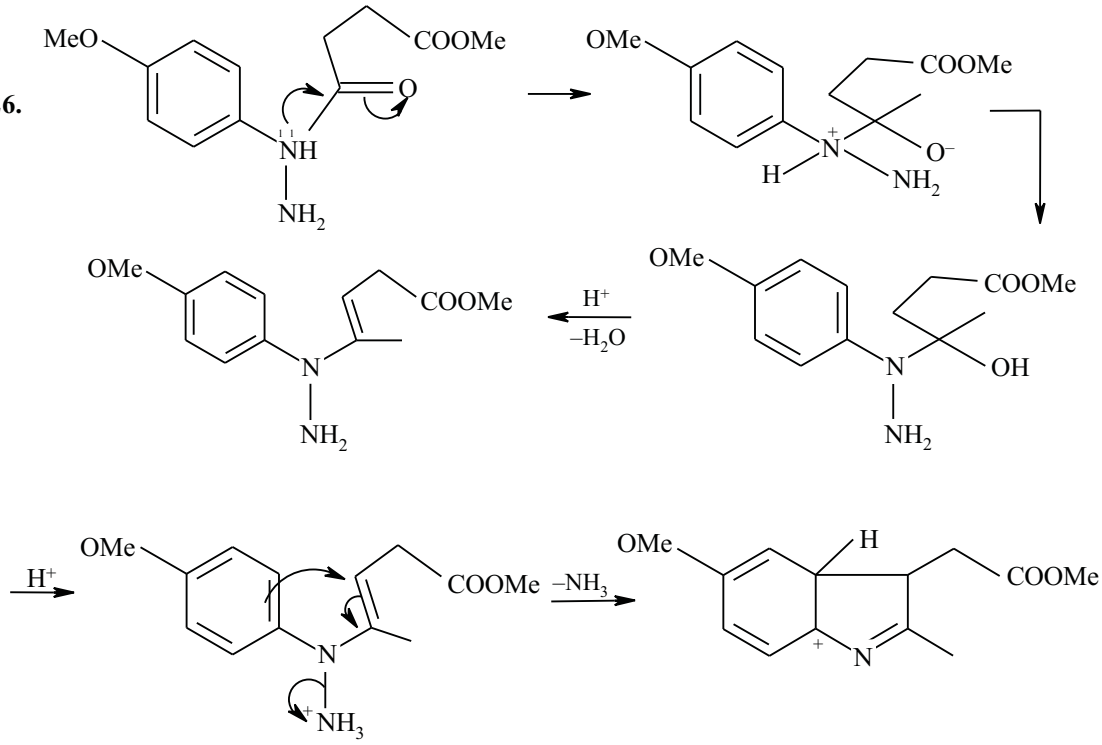
A

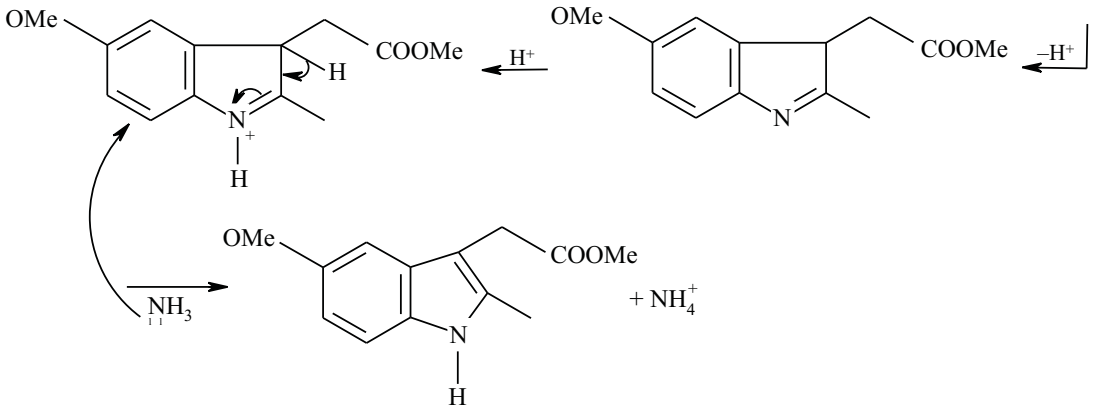
(b)



B

1326.



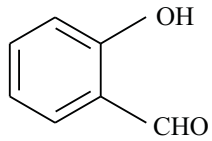


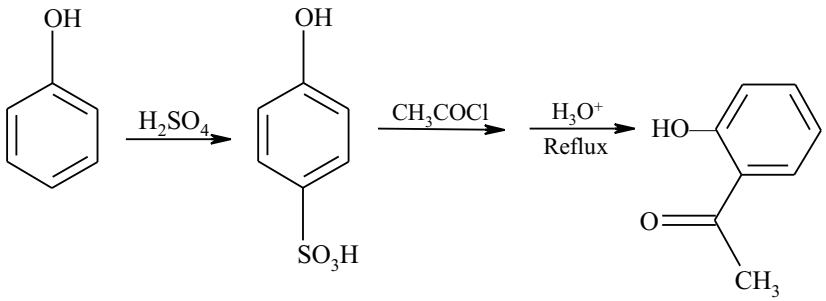
1327. (a) $PhBr \xrightarrow[Et_2O]{Mg} \xrightarrow{CH_2O} \xrightarrow[CH_2Cl_2]{PCC}$ Product

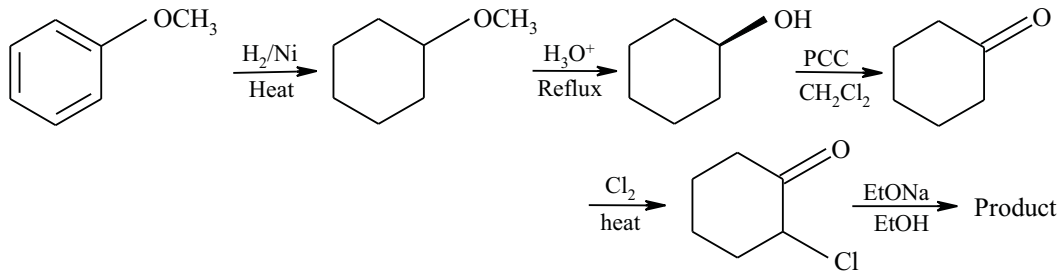
(b) $Ph—CH_3 \xrightarrow[CCl_4]{NBS/h\nu} \xrightarrow{\text{aq. NaOH}} \xrightarrow[CH_2Cl_2]{PCC}$ Product

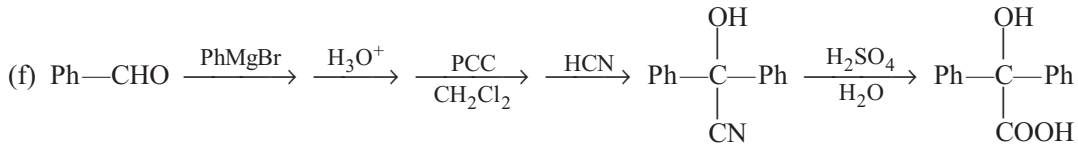
or $Ph—CH_3 \xrightarrow[Ac_2O]{CrO_3} Ph—CHO$

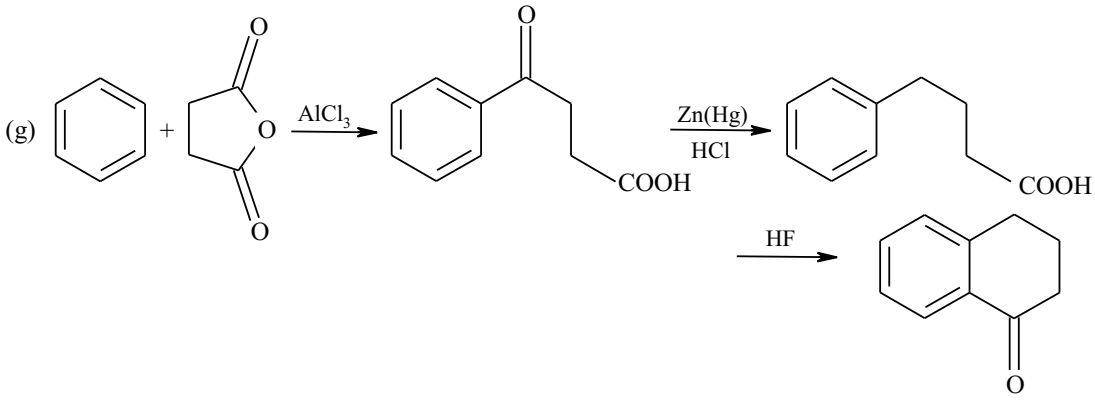
(Etard's reaction)

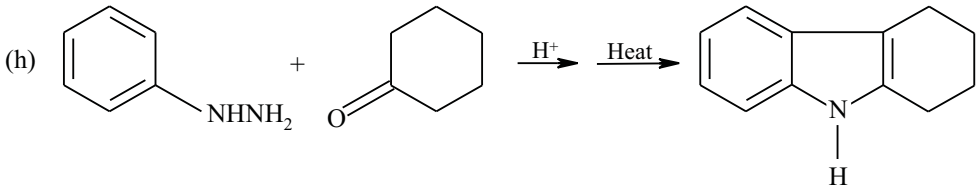
(c) $Ph—OH \xrightarrow[\text{Reimer-Tiemann Reaction}]{CHCl_3/NaOH}$ 

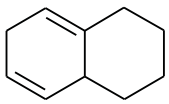
(d) 

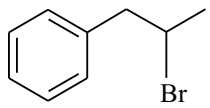
(e) 

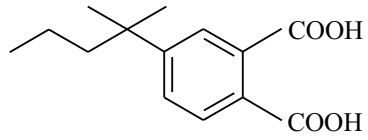
(f) 

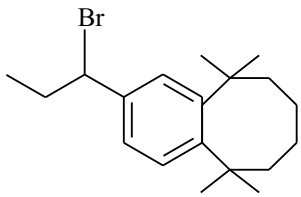
(g) 

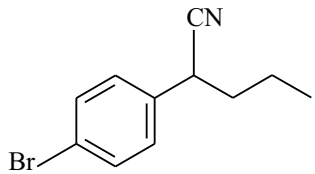
(h) 

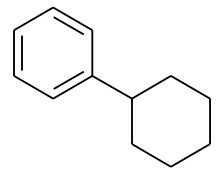
1328. (a) 

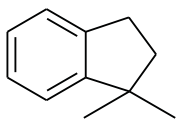
(b) 

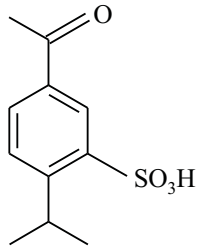
(c) 

(d) 

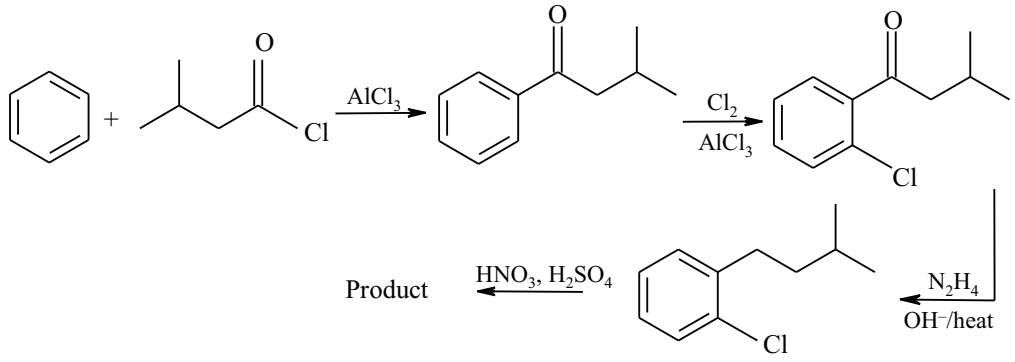
(e) 

(f) 

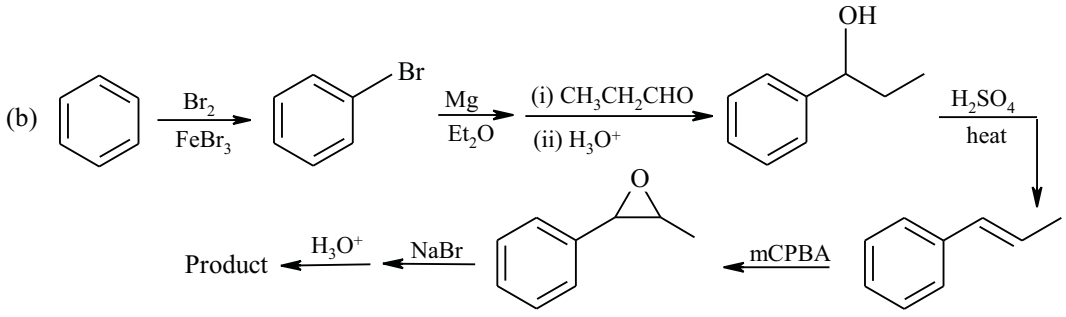
(g) 

(h) 

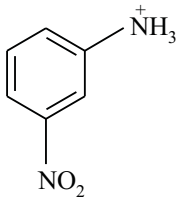
1329. (a)



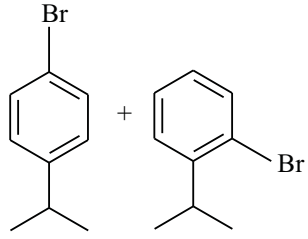
(b)



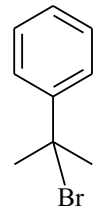
1330. (a)



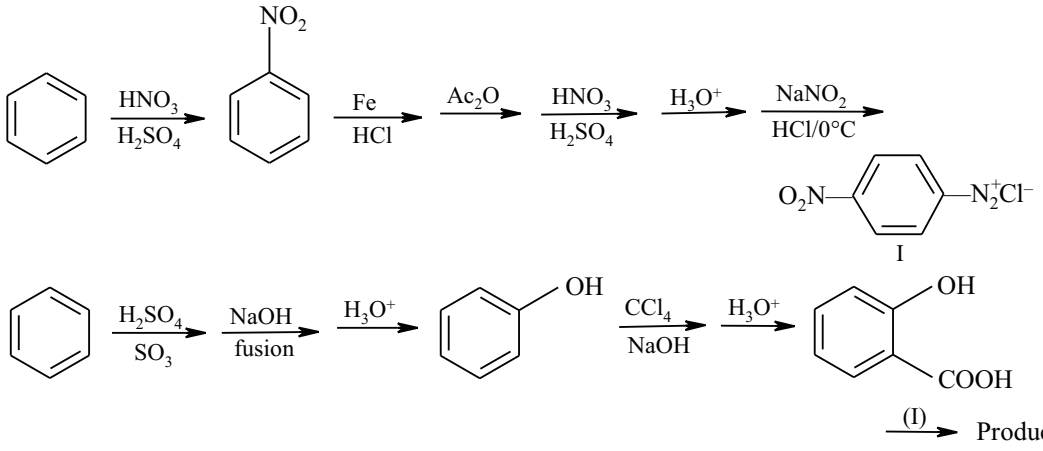
(b)



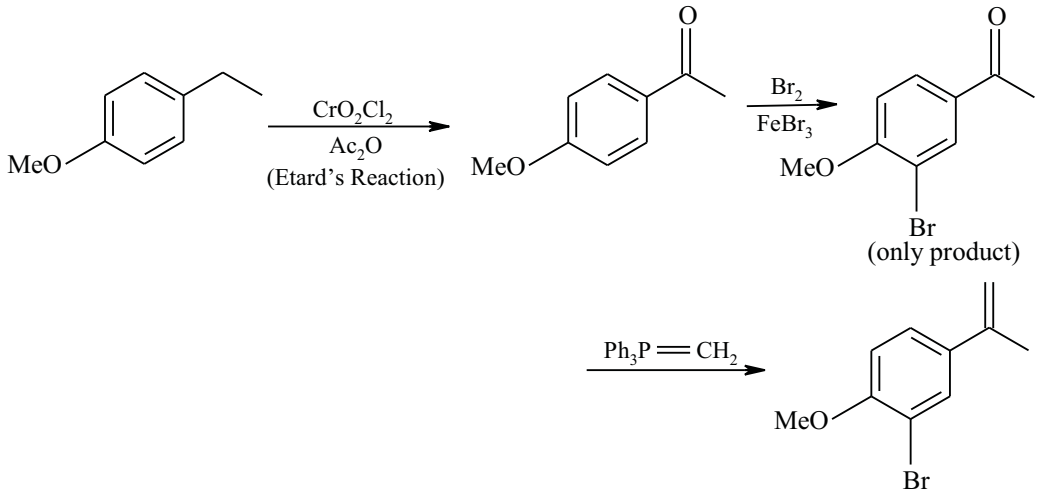
(c)



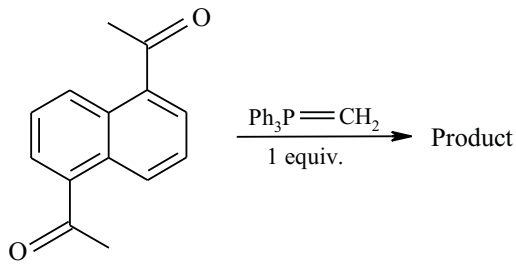
1331.



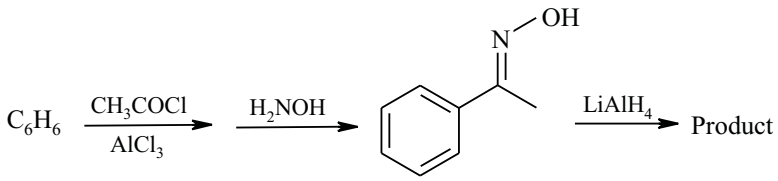
1332. (a)



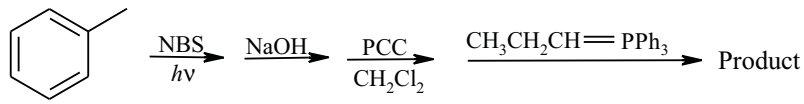
(b)



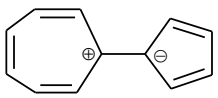
(c)



(d)



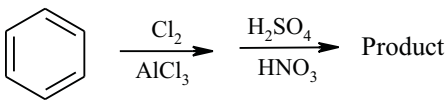
1333. (a) Non-aromatic, (b) Aromatic, (c) Aromatic, (d) Nonaromatic, (e) Aromatic, (f) Aromatic.
1334. Since, both rings are aromatic with the following resonance structure:

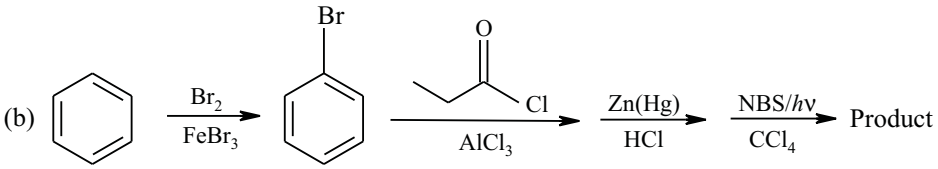


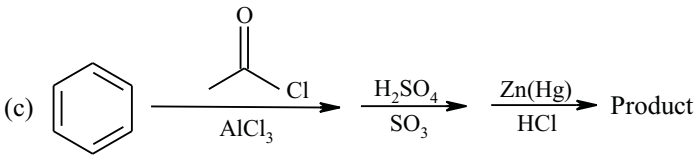
both the rings are now aromatic hence double bond character between the rings are very less, therefore less barrier to rotation,

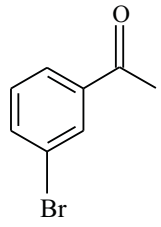
1335. (a) Deactivated, (b) Deactivated, (c) Activated, (d) Activated, (e) Deactivated, (f) Activated.

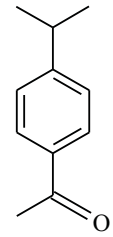
1336. (a)

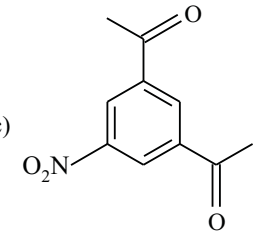


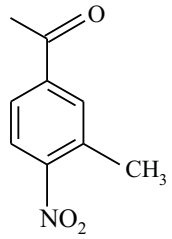
(b) 

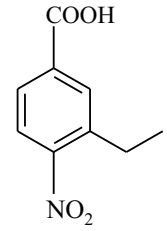
(c) 

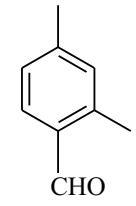
1337. (a) 

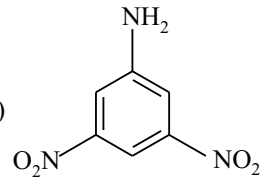
(b) 

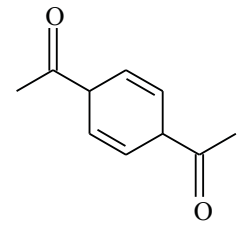
(c) 

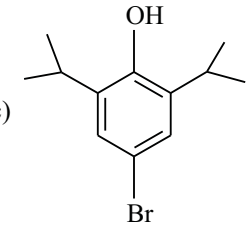
(d) 

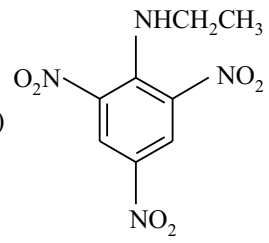
(e) 

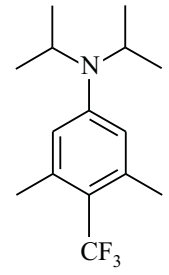
(f) 

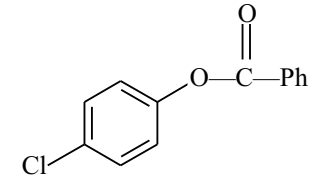
1338. (a) 

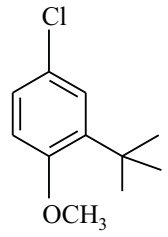
(b) 

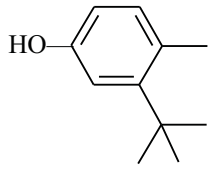
(c) 

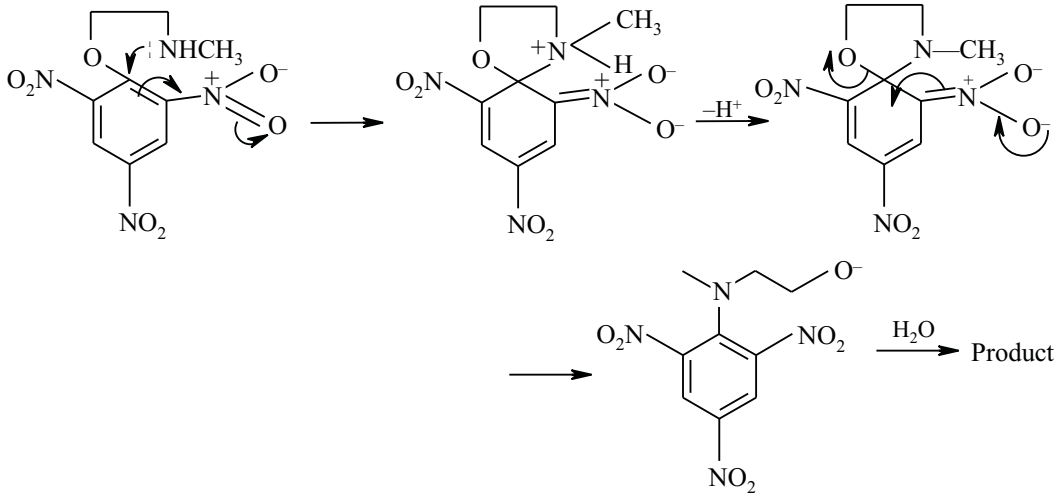
(d) 

(e) 

(f) 

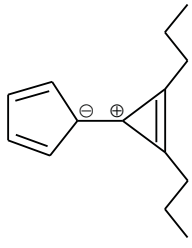
(g) 

(h) 

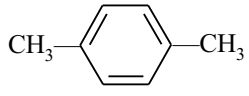
1339. 

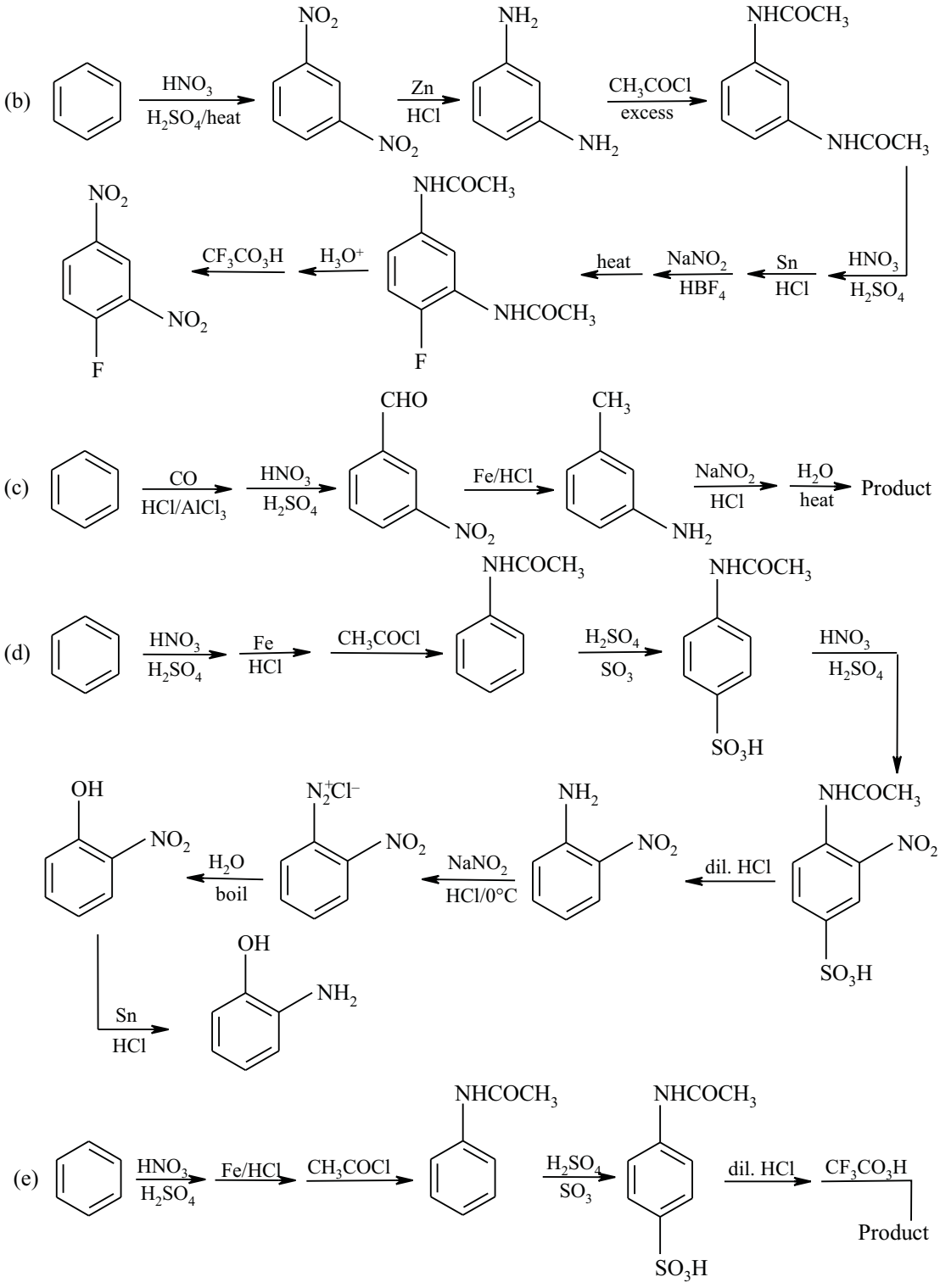
1340. (a) Non-aromatic, (b) Non-aromatic, (c) Antiaromatic, (d) Antiaromatic, (e) Antiaromatic, (f) Aromatic, (g) Aromatic, (h) Aromatic.

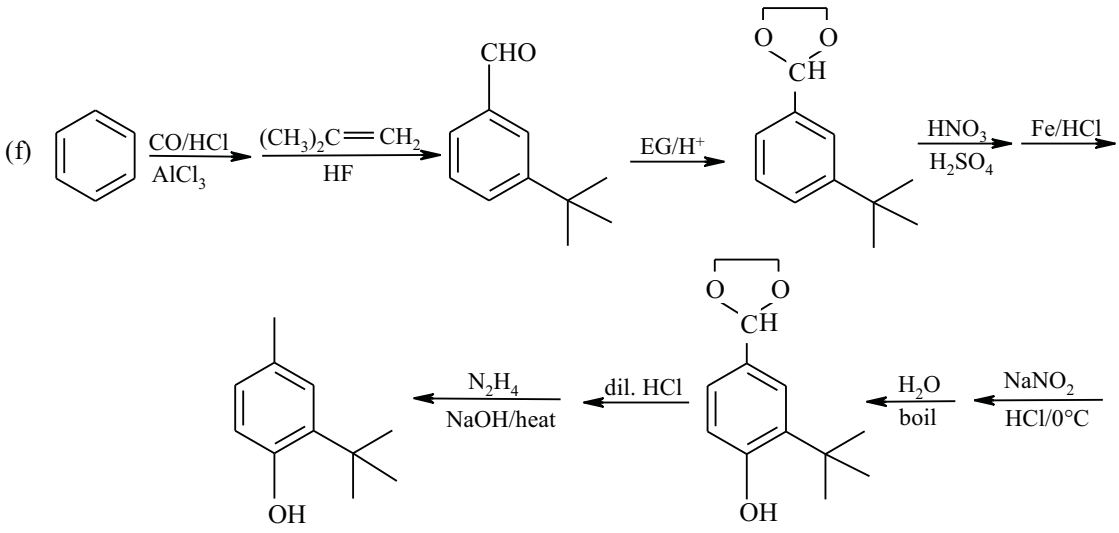
1341. Since, double bond is in resonance and involved in aromaticity as:

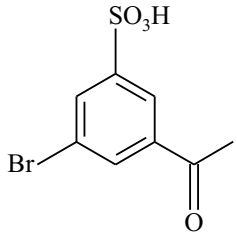


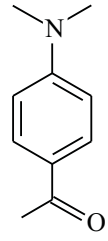
Here, both the rings are aromatic, therefore, this resonance form is a major contributor. Due to this resonance structure the double bond between the two rings has acquired significant single bond character giving low energy barrier to rotation.

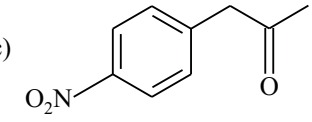
1342. (a) C_6H_6 $\xrightarrow[AlCl_3]{CH_3Cl\ (excess)}$  $\xrightarrow[NaOH/Heat]{KMnO_4}$ $\xrightarrow{H_3O^+}$ Product

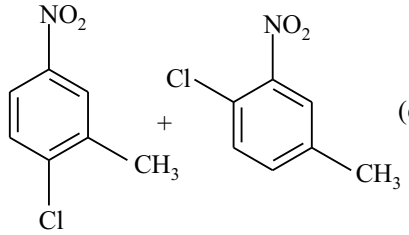

(b)
HNO3
H2SO4/heat
NO2
NO2
Zn
HCl
NH2
NH2
CH3COCl
excess
NHCOCH3
NHCOCH3
HNO3
H2SO4
Sn
HCl
NaNO2
HBF4
heat
NHCOCH3
F
H3O+
CF3CO3H
NO2
NO2
F
(c)
CO
HCl/AlCl3
HNO3
H2SO4
CHO
NO2
Fe/HCl
CH3
NH2
NaNO2
HCl
H2O
heat
Product
(d)
HNO3
H2SO4
Fe
HCl
CH3COCl
NHCOCH3
H2SO4
SO3
NHCOCH3
SO3H
HNO3
H2SO4
NHCOCH3
NO2
SO3H
dil. HCl
NH2
NO2
NaNO2
HCl/0°C
N2+Cl−
NO2
H2O
boil
OH
NO2
Sn
HCl
OH
NH2
(e)
HNO3
H2SO4
Fe/HCl
CH3COCl
NHCOCH3
H2SO4
SO3
NHCOCH3
SO3H
dil. HCl
CF3CO3H
Product

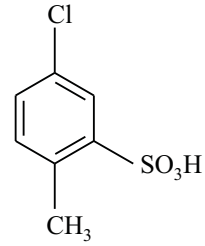
(f) 

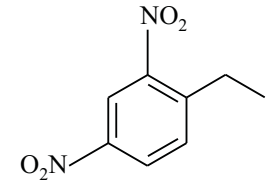
1343. (a) 

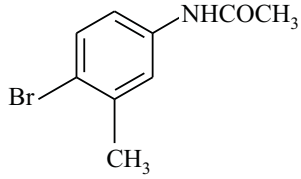
(b) 

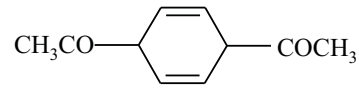
(c) 

(d) 

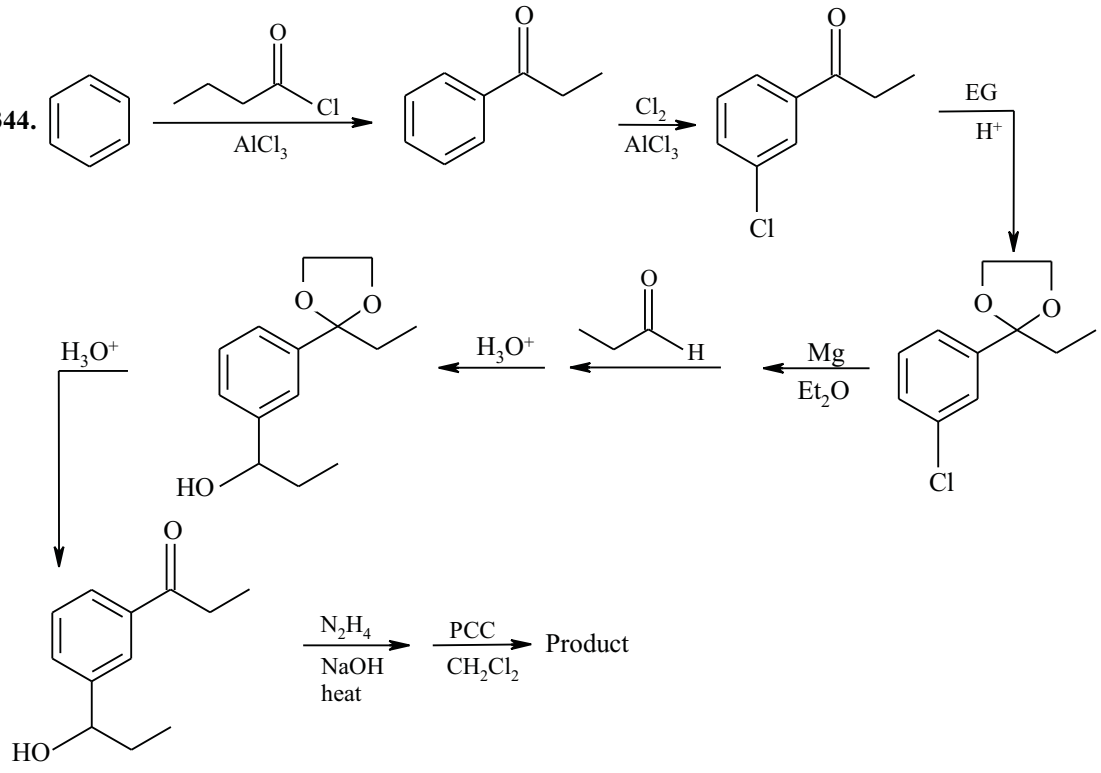
(e) 

(f) 

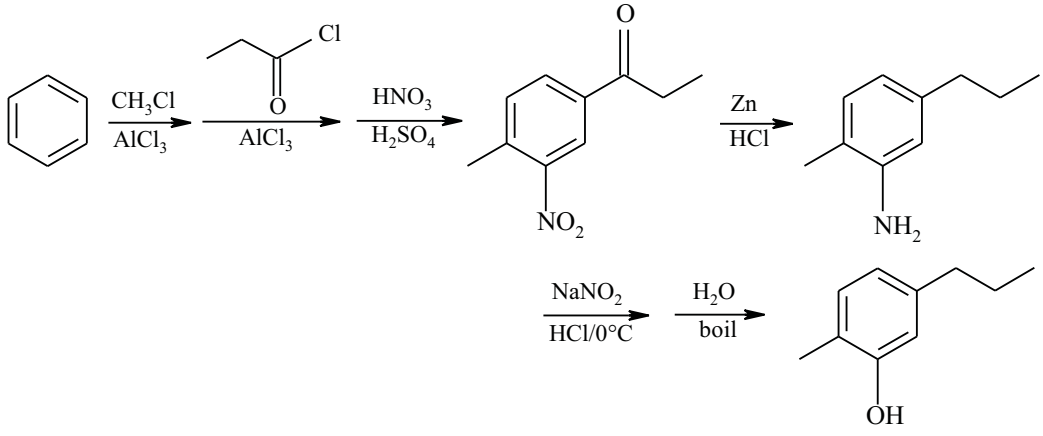
(g) 

(h) 

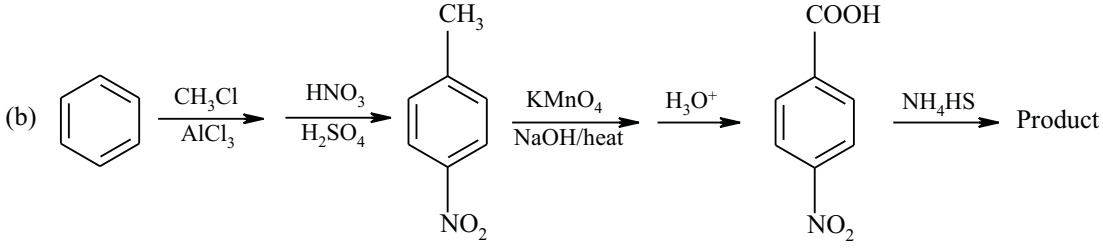
1344.


O
Cl
AlCl3
Cl2
AlCl3
EG
H+
Mg
Et2O
H
H3O+
H3O+
HO
N2H4
NaOH
heat
PCC
CH2Cl2
Product

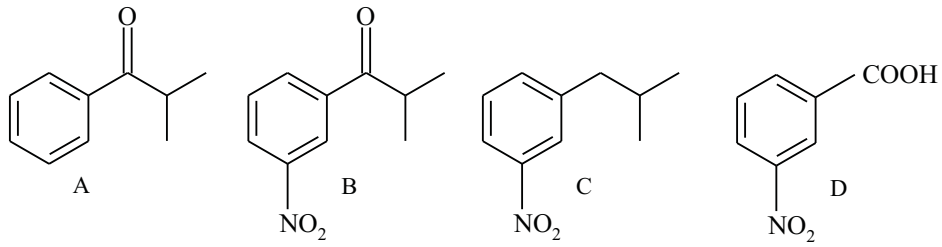
1345. (a)


CH3Cl
AlCl3
Cl
O
AlCl3
HNO3
H2SO4
NO2
Zn
HCl
NH2
NaNO2
HCl/0°C
H2O
boil
OH

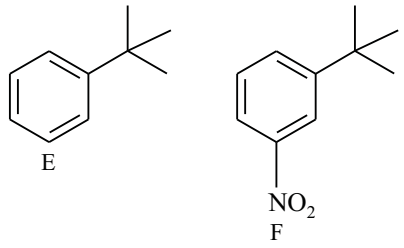
(b)


CH3Cl
AlCl3
HNO3
H2SO4
CH3
NO2
KMnO4
NaOH/heat
H3O+
COOH
NO2
NH4HS
Product

1346. (a)

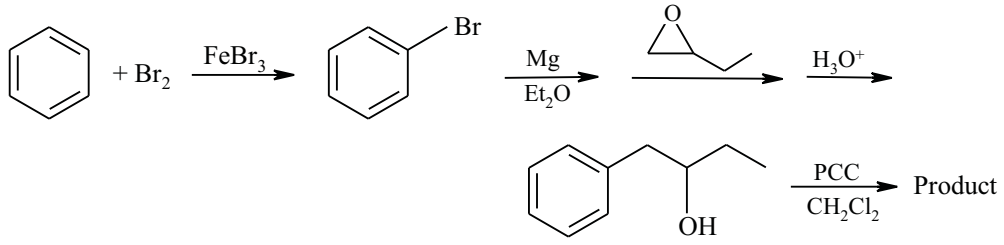


(b)

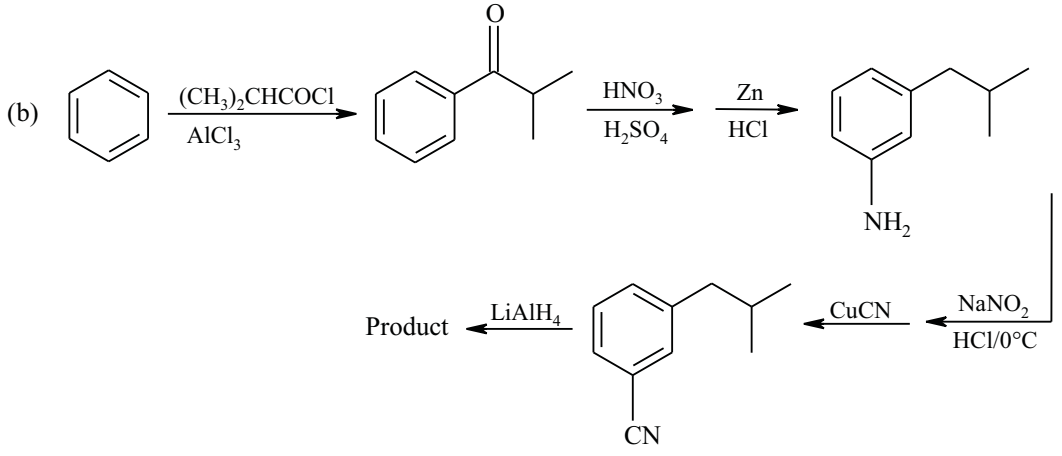


$\xrightarrow[AcOH/HBr/O_2]{Co(OAc)_2}$ No reaction since there is no α—H to phenyl ring.

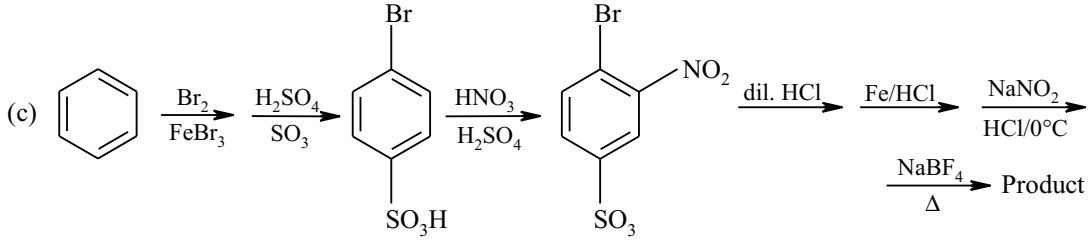
1347. (a)

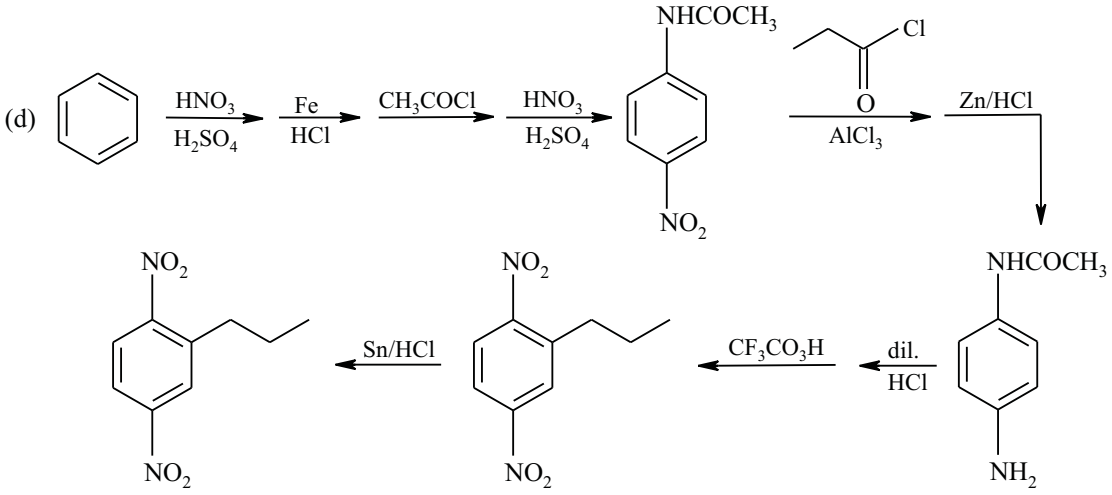


(b)

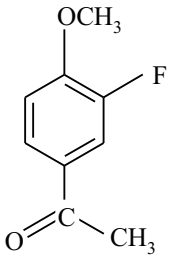


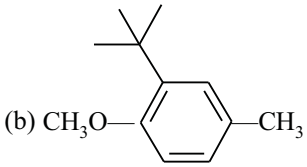
(c)

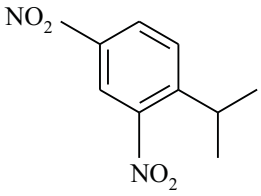


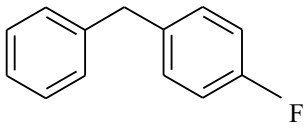
(d) 

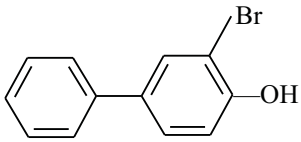
1348. (a) Non-aromatic since, it has a sp^3 carbon. (b) Aromatic.

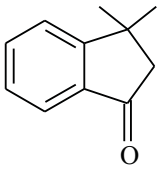
1349. (a) 

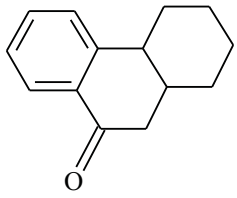
(b) 

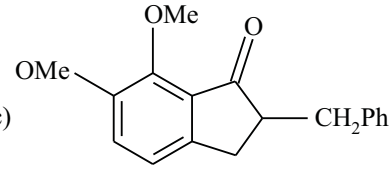
(c) 

(d) 

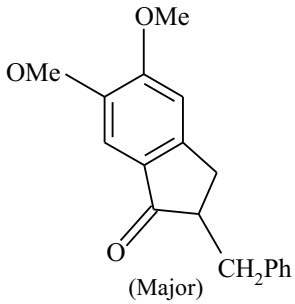
(e) 

1350. (a) 

(b) 

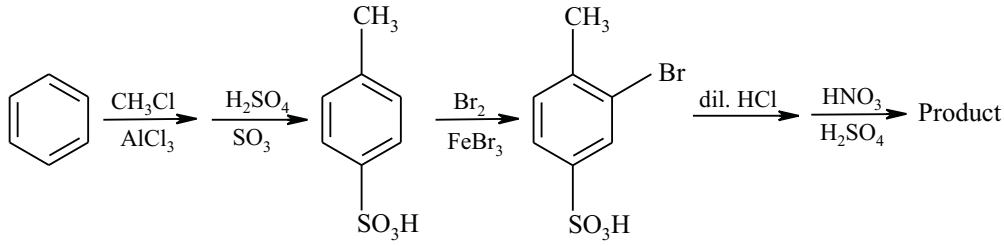
(c) 

(Minor)

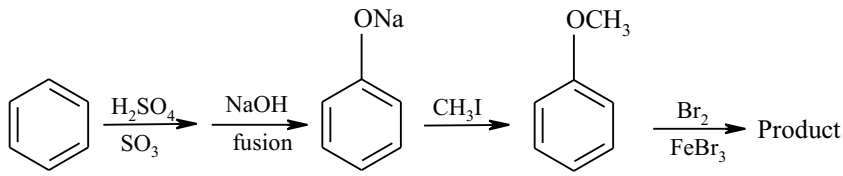


(Major)

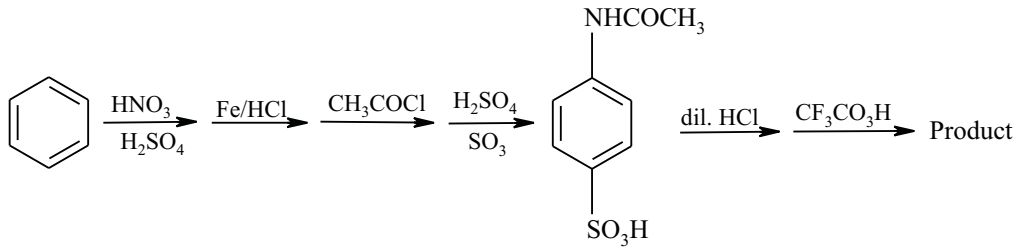
1351. (a)



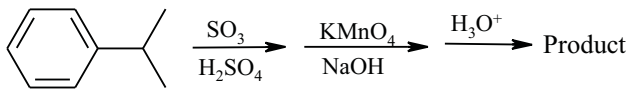
(b)



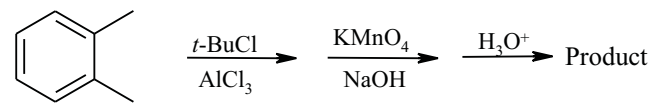
(c)



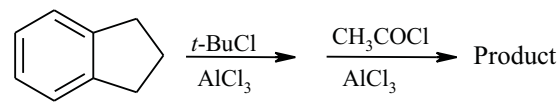
1352. (a)



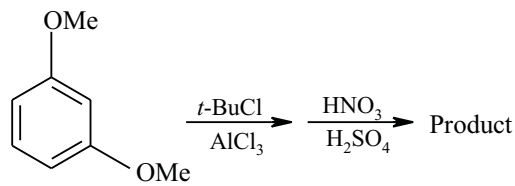
(b)



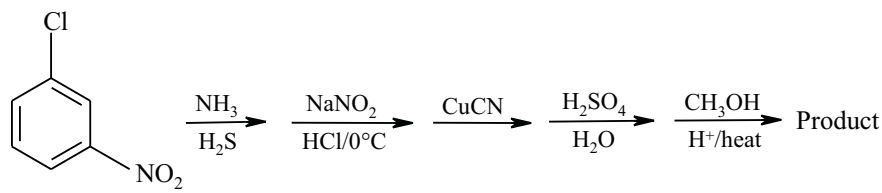
(c)

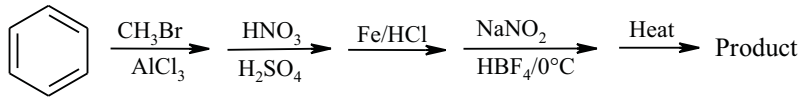


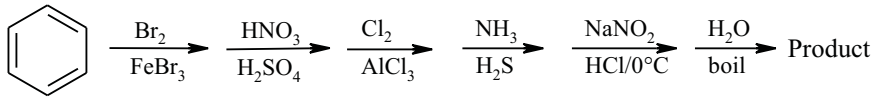
(d)

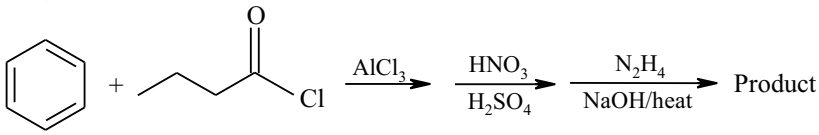


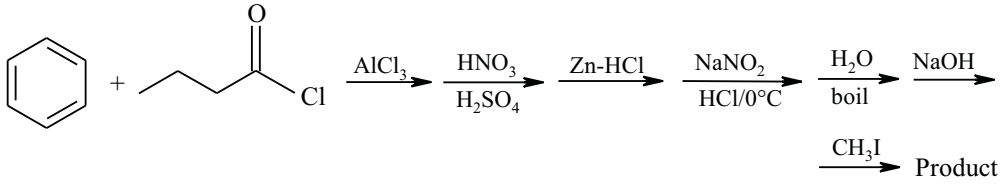
(e)

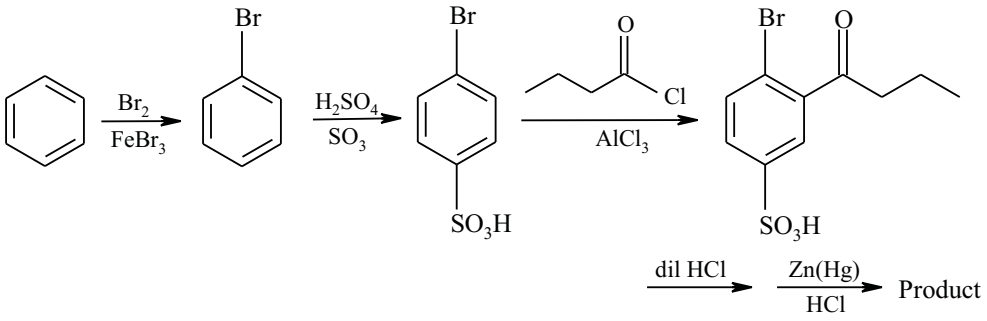


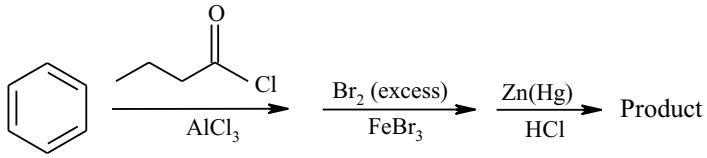
(f) 

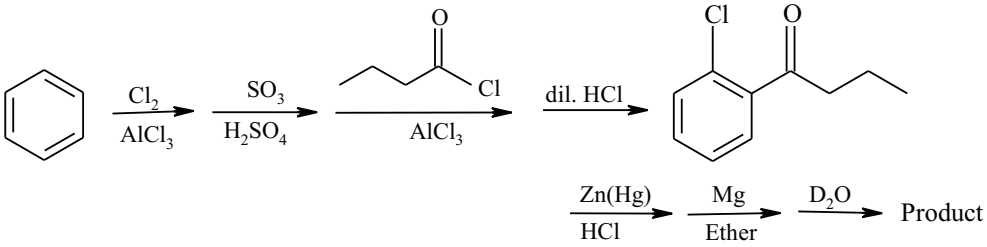
(g) 

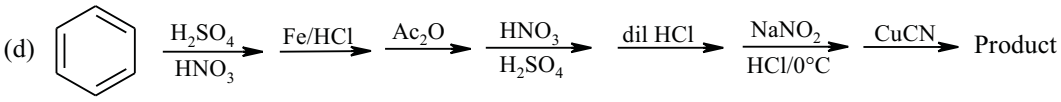
(h) 

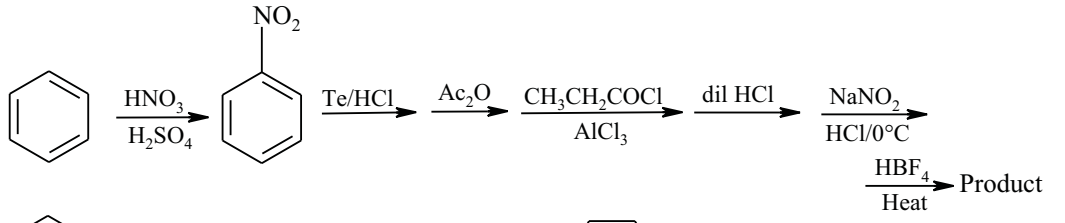
(i) 

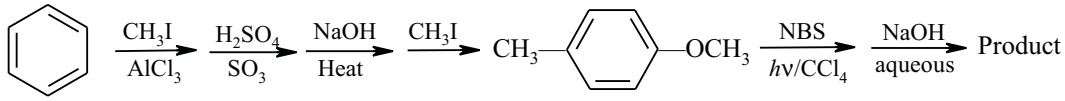
1353. (a) 

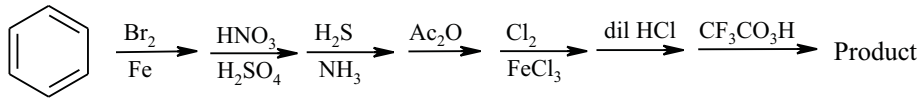
(b) 

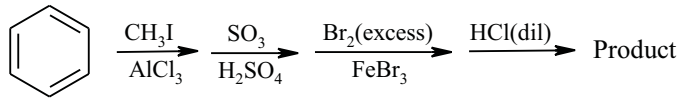
(c) 

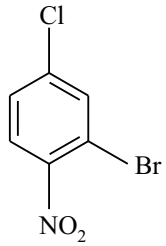
(d) 

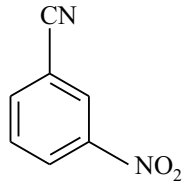
(e) 

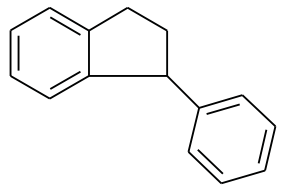
(f) 

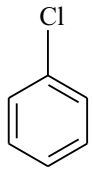
(g) 

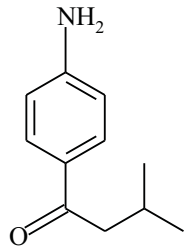
(h) 

1354. (a) 

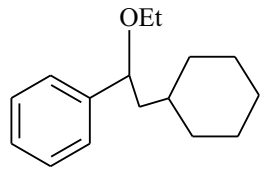
(b) 

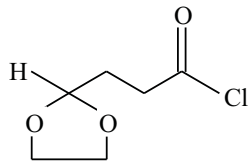
(c) 

(d) 

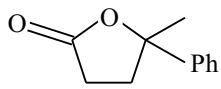
(e) 

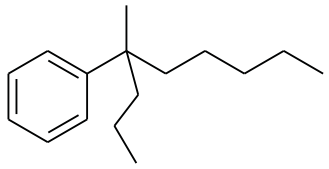
(like Fries rearrangement)

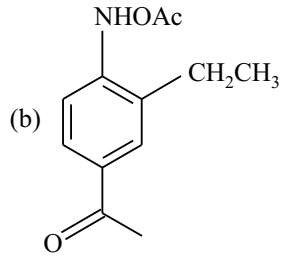
(f) 

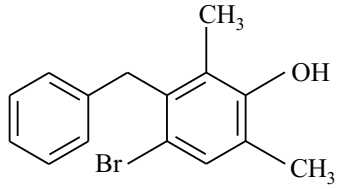
1355. A : 

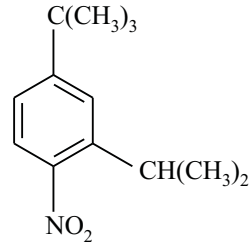
and $AlCl_3$; B: $MeMgBr/H_2O$; C: H_2SO_4/H_2O;

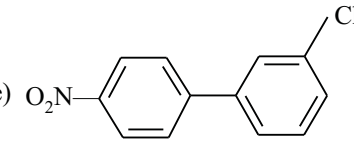
D: Ag_2O/H_2O; E : 

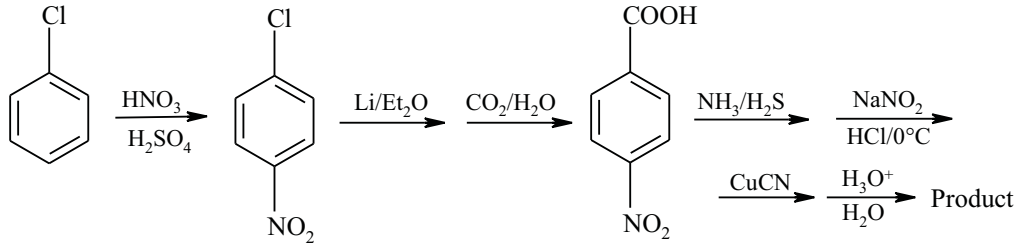
1356. (a) 

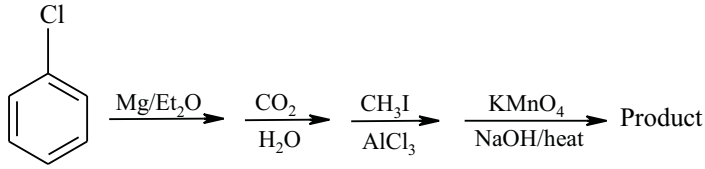
(b) 

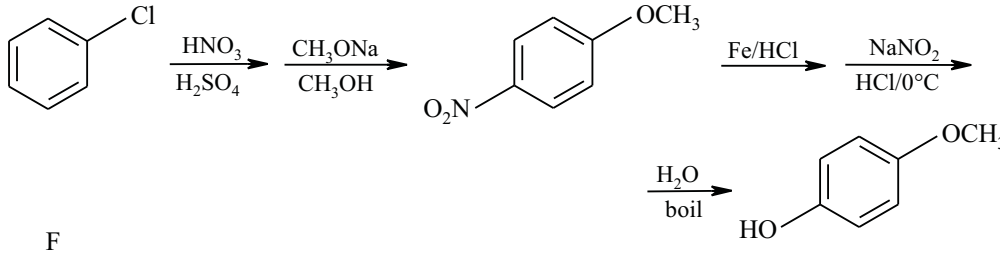
(c) 

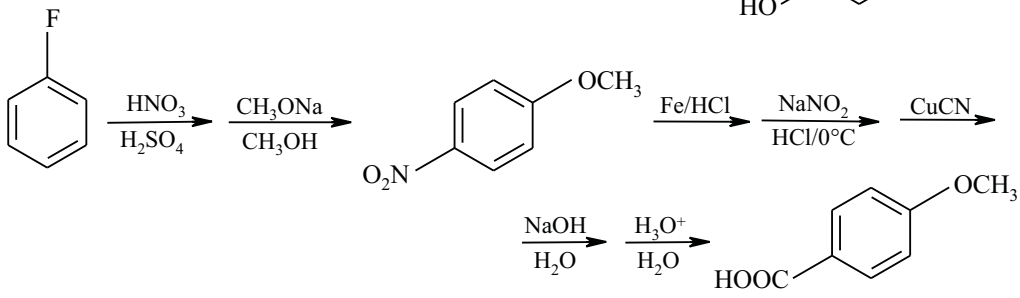
(d) 

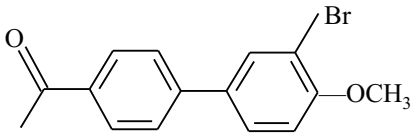
(e) 

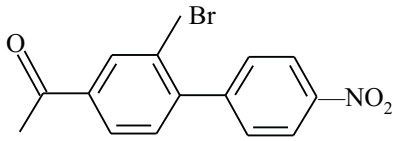
1358. (a) 

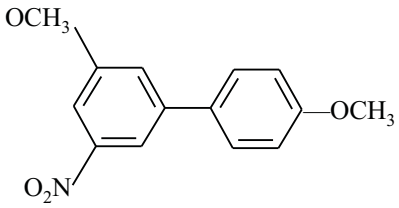
(b) 

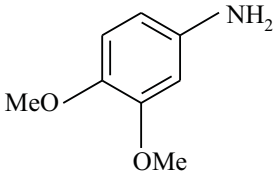
(c) 

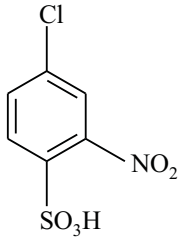
(d) 

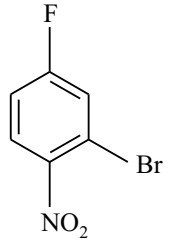
1359. (a) 

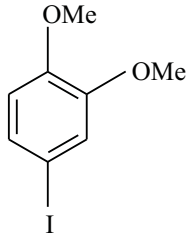
(b) 

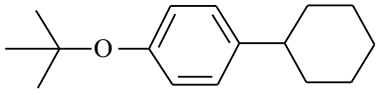
(c) 

1360. (a) 

(b) 

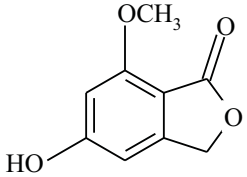
(c) 

(d) 

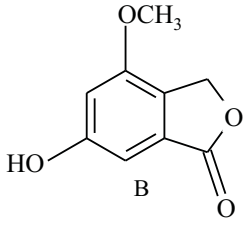
(e) 

1362. (a) Aromatic,
(b) Not aromatic, it has a sp^3 carbon which prevent delocalization,
(c) Aromatic,
(d) Not aromatic.

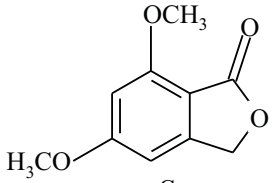
1363. A: $KMnO_4$/NaOH/heat; B: $SOCl_2$; C: $Et_2NCH_2CH_2OH$; D: Na_2S.

1364. 

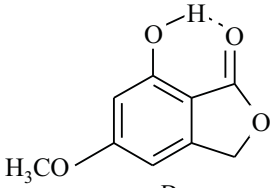
A



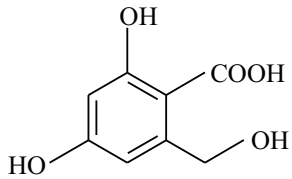
B



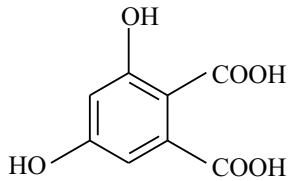
C



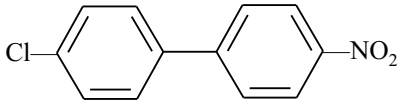
D

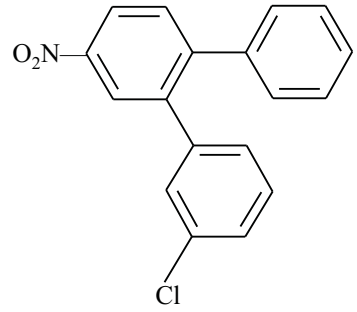


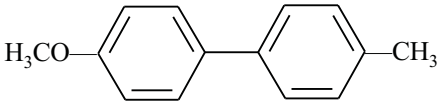
E

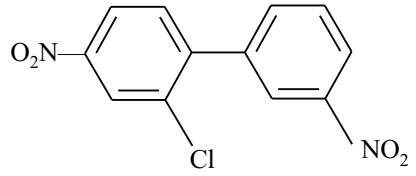


F

1365. (a) 

(b) 

(c) 

(d) 

1366.