CHEMISTRY

BOOKS - G.R. BATHLA & SONS CHEMISTRY (HINGLISH)

AROMATIC HYDROCARBONS (ARENES)

EXAMPLES

1. Show wheter the following compounds exhibit aromaticity.

(a) Pyridine, (b) Cyclo-octateraene, (c) Pyrrole, (d) Cyclobutaiene, (e) Furan, (f) Thiophene.

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2. Suggest the name of a Lewis acid other than anhydrous aluminium chloride which can be used during ethylation of benzene.

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3. Which eylene gives (a) one, (b) two and (c) three, monochloro derivaties ? Give their structures and names.

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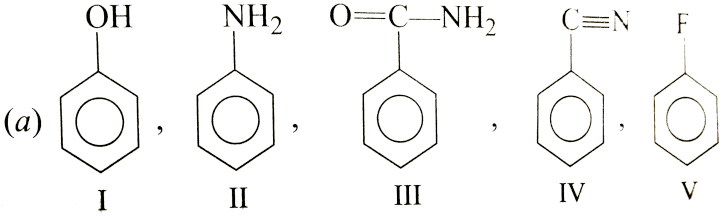
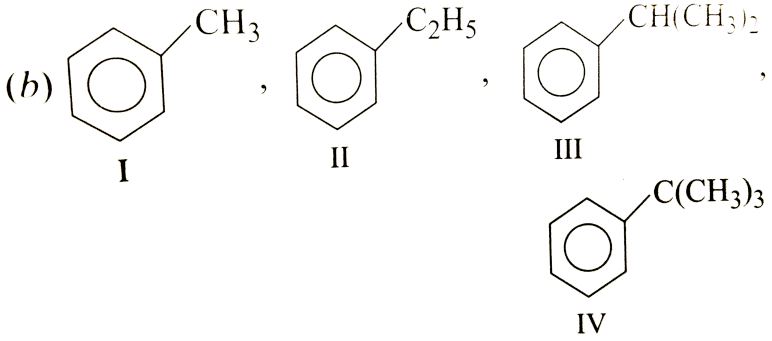
4. Arrange the following compounds in order of decreasing reacivity towards EAS reactions.





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5. Why do alkenes prefer to undergo electrophilec addition reaction while arenes prefer electrophilic substitution reactions ? Explain.

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6. Ethylbenzene is generally prepared by acetylation of benzene followed by reduction and not by the direct alkylation of benzene. Think of a possible reason.

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7. Explain the following with proper reasoning :

(a) Although benzene is highly unsatureted, it does not undergo addition reactions.

(b) Benzene though unsaturated, undergoes substitutions reactions easily reather than addition.

(c) All m-directors are deactivating.

(d) The halogens, as exceptions, are o-p-directors but are deactivating.

(e) Most o- p-directing substituents are activating.

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8. (a) Show the formation of the electrophile in the following reactions :

(i) $CI_2 + AICI_3$, (ii) $HNO_3 + H_2SO_4$, (iii) $Br_2 + Fe$, (iv) H_2SO_4, (v) $H_2S_2O_7$, Fuming sulphuric acid.

(b) How do substituent groups on an aromatic rign influence the course of electrophilic aromatic substituion ? Classify them by their effects.

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9. Give the prencipal monosubstitution products from the following reactions and indicate whether each reaction is faster or slower than with benzene.

(a) Nitration of $PhNHCOCH_3$

(b) Bromination of $PhCBr_3$

(c) Chlorination of $PhC(CH_3)_3$

(d) Nitration of $Ph - Ph$

(e) Nitration of $PhCOOCH_3$

(f) Sulphonation of $PhCH(CH_3)_2$

(g) Nitration of $PhC \equiv N$

(h) Bromination of PhI

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10. Show by an arrow the preferred product of reaction with E^+ of each of the three isomeric, (a) nitrotoluenes, (b) methoxy toluenes and (c) methoxy acetanilides. Explain your choices in each case.

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11. Explain the following percentages of meta electrophilic substitutions.

(a) $\underset{4.4\,\%}{C_6H_5CH_3}, \underset{15.5\,\%}{C_6H_5CH_2CI}, \underset{33.8\,\%}{C_6H_5CHCI_2}, \underset{64.6\,\%}{C_6H_5CCI_3}$

(b) $\underset{100\,\%}{C_6H_5N(CH_3)_3}, \underset{88\,\%}{C_6H_5CH_2N(CH_3)_3}, \underset{19\,\%}{C_6H_5CH_2\overset{+}{N}(CH_3)_3}$

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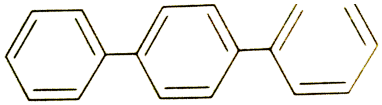
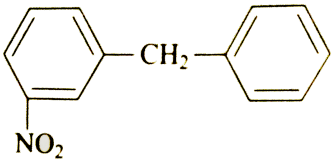
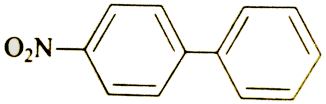
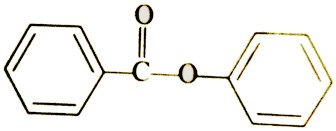
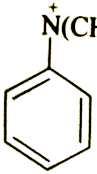
12. Give the monosubstituon product in the following reactions :

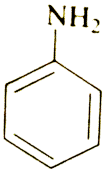
(*i*) 

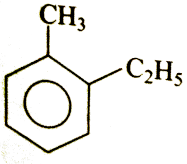
(*ii*) 

(*iii*) 

(*iv*) 

(*v*) 

(*vi*) 

(*vii*) 

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13. The Wurtz-Fitting reaction may be employed to unite aryl and redicals although it is impreactical for the union of unlike aliphatic radicals. Explain.

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14. Predict the product (s) and outling the mechanism for the process when benzene is treated with,

(i) $(CH_3)_3CCI$ in presence of $AICI_3$

(ii) $(CH_3)_2C \Leftrightarrow CH_2$ in presence of H_2SO_4

(iii) $(CH_3)_2CHCH_2$ in presence of $AICI_3$

(iv) $(CH_3)_3COH$ in presence of H_2SO_4.

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15. Sketch the following transformations :

(1) $\underset{\text{Propylbenzene}}{C_6H_5CH_2CH_2CH_3} \rightarrow \underset{1-(\text{p-Clorophenyl})}{p-CIC_6H_4CH \Leftrightarrow CHCH_3}$

(ii) $\underset{\text{Cinnamic acid}}{C_6H_5CH \Leftrightarrow CHCOOH} \rightarrow \underset{\text{Styrene}}{C_6H_5CH \Leftrightarrow CH_2}$

(iii) $C_6H_6 \rightarrow C_6H_5CH \Leftrightarrow CH_2$

(iv) $p - CH_3 - C_6H_6COOH \rightarrow C_6H_5 - CH_3$

(v) $C_6H_5CH = CH \rightarrow \text{Sym} - C_6H_3(CH_3)_3$

(vi) $C_6H_5CH_5 \rightarrow C_6H_6$

(vii) $CH_3 - C = CH \rightarrow \text{Sym} - C_6H_3(CH_3)_6$

(viii) $C_6H_6 \rightarrow 1, 2, 3 - C_6H_3(CH_3)_3$

(ix) $C_6H_6 \rightarrow (C_6H_5)_2C(CH_3)_2$

(x) $C_6H_6 \rightarrow (C_6H_2)_2C(CH_3)_2$

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16. How will you distinguish between : (i) Ethylbenzene and o-xylene ?

(ii) Ethylbenzene and styrene ?

(iii) Phenytl acetylene and styrene ?

(iv) Benzene and toluene ?

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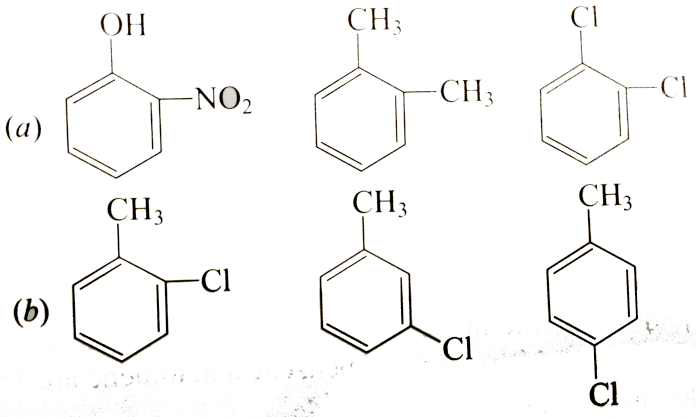
17. Arrange the following in increasing order of dipole moment.



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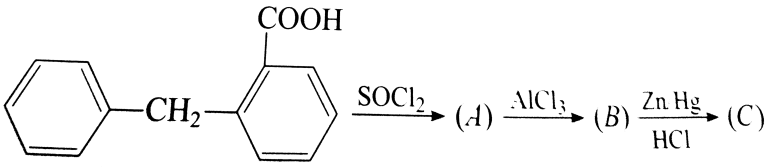
18. What are (A), (B) and (C) in the following scheme of reactions ?



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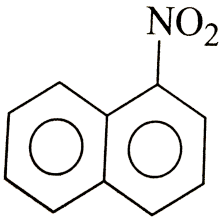
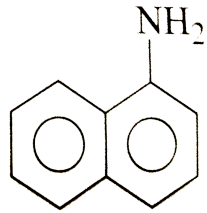
19. What are the oxidation products of the following

(i) 

(ii) 

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20. Classify the following groups as ortho, para or meta directing when present on benzene nucleus.

(i) $-CH_3$,(ii) $-NH_2$, (iii) $-NO_2$, (iv) $-COOH$, (v) $-OH$, (vi) $-SO_3H$, (vii) $-X(\text{halogen})$,

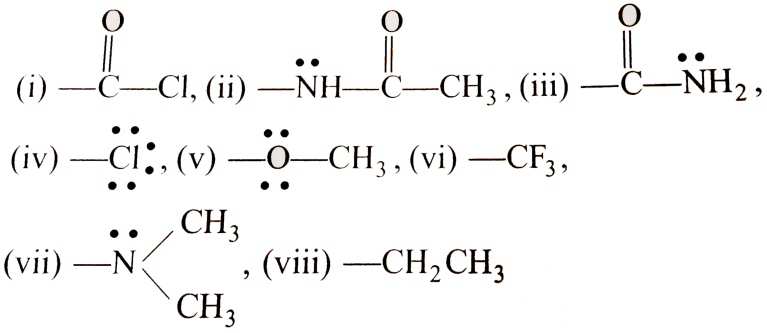
(viii) OCH_3, (ix) $-CHO$, (x) $-CN$

(B) Classify the following goups as activating or deactivating with respect to further electrophilic substitution of the aromatic ring.

(i) $-NH_2$ (ii) $-NO_2$ (iii) $-SO_3H$, (iv) $-CH_3$ (v) $-CI$, (vi) $-CN$.

(C) For each of the following substituents indicate whether in donate

electron or withdraw electron.



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21. Complete the following equations :

(i) $2C_{\cdot}H_5CI + Na \xrightarrow{\text{Ether}}$

(ii) $C_6H_6 + CI_2 \xrightarrow{FeCI_3}$

(iii) $C_6H_6 + H_2C = CH_2 \xrightarrow[370K, Pressure]{AICI_3, HCI}$

(iv) $C_6H_6 + CO + HCI \xrightarrow{air/V_2O_5}$

(v) $C_6H_6 + CO + HCI \xrightarrow{AICI_3}$

(vi) $3C_6H_6 + CHCI_3 \xrightarrow{AICI_3}$

(vii) $C_6H_6 + CH_3CH_2CH_2CI \xrightarrow{AICI_3}$

(viii) $C_6H_6 + (CH_3)_3C - CH_2Br \xrightarrow{AICI_3}$

(xi) $C_6H_6 + (CH_3)_2CHCH_2OH \xrightarrow{H_2SO_4}$

(x) $C_6H_6 + CH_3CH = CH_2 \xrightarrow[523K,\ \text{Pressure}]{H_3PO_4}$

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22. Name the final product of the following reactions : (i) Benzene is treated with methyl chloride in presence of anhydrous aluminium chloride.

(ii) Benzene is treated with acetyl chloride in the presence of anhydrous aluminium chloride.

(iii) Phenol is heated with zinc.

(iv) Sodium benzoate is heated with soda lime.

(v) Benzene is treated with fumining nitric acid in presence of conc. H_2SO_4.

(vi) Benzene is catalytically hydrogenated. (vii) Ozone reacts with benzene.

(viii) Toluene is treated with a mixture of conc. CNO_3 and conc. H_2SO_4.

(ix) Chlorine is passed through boiling toluene. (x) Toluene is heated with acidic potassium premanganate solution. (xi) Toluene in carbon

tetrachloride is oxidised by chromyl chloride. (xii) Ortho-xylene is oxidised with hot acidic $K_2Cr_2O_7$ solution.

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23. How will you prepare benzene from ? (i) Phenol, (ii) Benzoic acid, (iii) Acetylene, (iv) Benzene sulphonic acid, (v) Aniline, (vi) Nitrobenzene, (vii) Toluene, (viii) Chlorobenzene.

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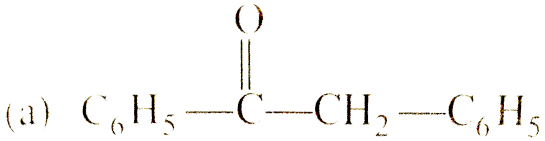
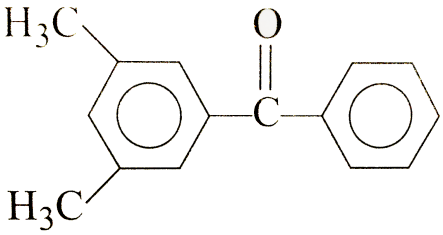
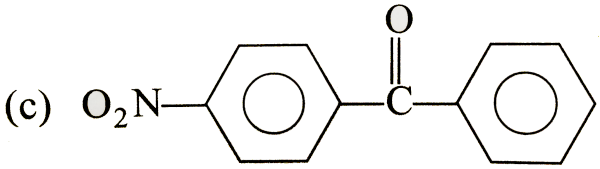
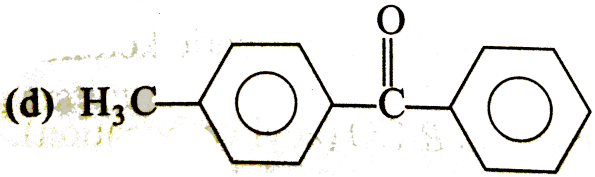
24. What combination of acyl chloride or acid anhydride and arene are choosen to prepare the following compounds ?

(a) 

(b) 

(c) 

(d) 

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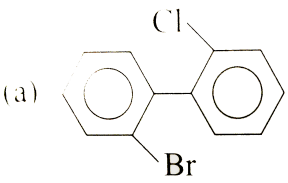
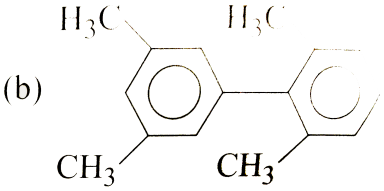
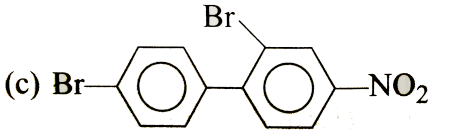
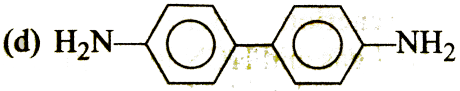
Others

1. Name each of the following substituted biphenyls :









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2. Write the structures and names for all the possible isomers of benzene derivatives having the molecular formulae : (a) C_8H_{10}, (b) C_9H_{12}, (c) $C_2H_2F_4$.

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3. Which xylene gives : (a) one (b) two and (c) three monochloro derivatives ? Indicate the position of chlorine atom by an arrow.

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4. Why is benzene extra ordinarily stable though it contains three double bonds ?

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5. Why does benzene undergo electrophilic substitution reactions easily and nucleophilic substitutions with difficulty?

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6. How will you distinguish between :

(i) Benzene and toluene ?

(ii) Ethyl benzene and o-xylene ?

(iii) Ethyl benzene and styrene ?

(iv) Phenyl acetylene and styrene ?

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7. How will you obtain the following compounds from benzene ?

(a) p-Beromobenzoic aicd

(b) m-Chlorophenol

(c) 2-Phenyl ethanoic acid

(d) 4-Methyl-l-n-propylbenzene

(e) O-chlorotuene

(f) Phenyl ethyne

(g) i-Ethyl-4-methylbenzene

(h) 2-Methyl-5-nitrophenol

(i) m-Nitrochlorobenzene

(j) p-Nitrochlorobenzene

(k) Benzyl alcohol

(L) Phenol

(m) m-Dichlorobenzene

(n) 1,3,5-Trinitrobenzene (TNB)

(o) p-Nitrobenzaldehyde.

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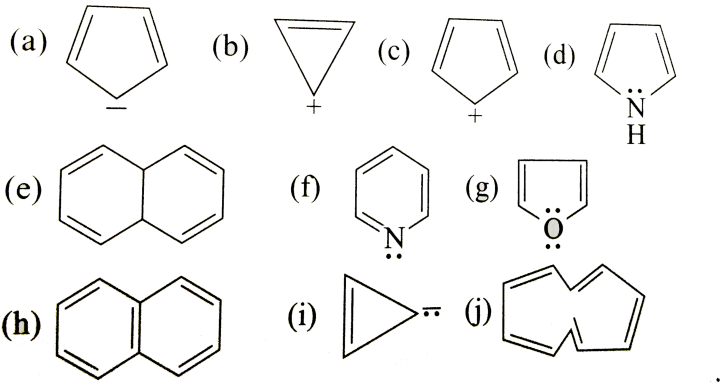
8. Which of the following compounds are aromatic accroding to Huckel's rule ?



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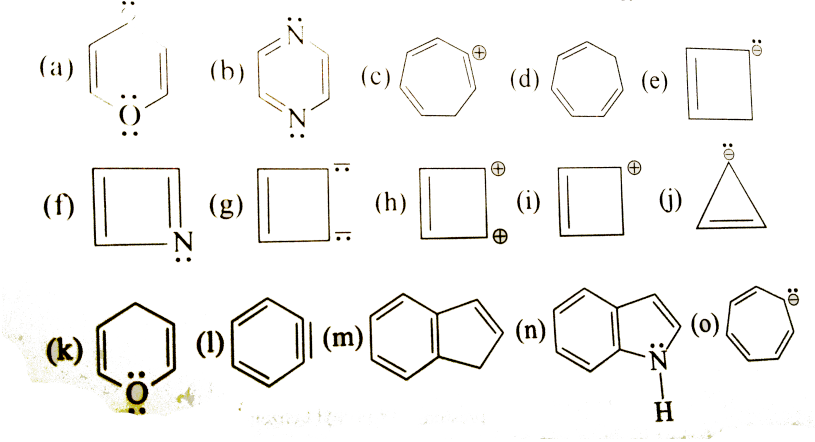
9. Among the given compounds, identify aromatic, anti-aromatic and non-aromatic molecules.



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10. How many isomers are possible when three hydrogen atoms in the benzene ring are replaced by three same substituent groups ?

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11. Match the following :

1. C_6H_6, CH_3Cl, anhyd. $AlCl_3$	(a) Electrophilic substitution
2. Insecticides	(b) Conversion of toluene to benzaldehyde
3. Explosive	(c) C_6H_5COONa + sodalime
4. C_6H_6, conc. HNO_3 and H_2SO_4	(d) $C_6H_6Cl_6$
5. Decarboxylation	(e) $C_6H_5NH_2$, $NaNO_2$ and HCl
6. Wurtz-Fittig reaction	(f) Sym. $C_6H_3(CH_3)_3$
7. Etard's reaction	(g) BHC
8. Diazotisation	(h) Friedel-crafts reaction
9. BHC	(i) $C_6H_5Br + Na + CH_3Br$
10. Mesitylene	(j) TNT

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12. Aromatic compounds are :

A. Open-chain compounds

B. closed-chain compounds

C. both open and closed-chain compunds

D. Closed-chain compounds which are structurally similar to benzene

Answer: d

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13. Coal-tar is a main source of :

A. aromatic compounds

B. alicyclic compunds

C. aliphatic compounds

D. heterocyclic compounds

Answer: a

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14. The general formula of arenes is:

A. C_nH_{2n}

B. C_nH_{2n-4}

C. C_nH_{2n+2}

D. C_nH_{2n-6}

Answer: d

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15. Benzene was discovered by

A. Cavendish

B. Faraday

C. Berzelius

D. Wohler

Answer: b

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16. Mark the fraction of the coal-tar distillation in which benzene and toluene both are presetn:

A. light-oil

B. middle-oil

C. heavy-oil

D. anthracene-oil

Answer: a

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17. Which one of the following statements is wrong ?

A. aromatic compounds are richer in carbon content

B. Aromatic conpounds burn with smoky flame

C. Aromatic conpounds are generally unstable

D. Aromatic conpounds show substitution reactions.

Answer: c

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18. The ring structure of benzene was first proposed by :

A. Wohler

B. Faraday

C. Kekule

D. Baeyer

Answer: c

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19. The carbon-carbon bond order in benzene is

A. 1

B. between 1 and 2

C. 1.5

D. 2

Answer: b

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20. The carbon-carbon bond length in benzene molecule is:

A. 1.54 A

B. 1.39 A

C. 1.33 A

D. 1.20 A

Answer: b

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21. The carbon atoms in benzene are :

A. $sp^2 - \text{hybridized}$

B. sp-hydridized

C. $sp^3 - hybridized$

D. non-hydridized

Answer: a

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22. The benzene molecule is :

A. trigonal

B. terahedral

C. planar

D. pyramidal

Answer: c

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23. The $C-C-C$ bond angle in benzene is

A. 90°

B. 60°

C. 109°

D. 120°

Answer: d

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24. The centric formula of benzene was proposed by

A. Dewar

B. Baeyer and Armstrong

C. Ladenberg

D. Kekule

Answer: b

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25. The number of $\pi - \text{electrons}$ in benzene molecule is :

A. 6

B. 3

C. 5

D. 4

Answer: a

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26. Benzene gives mainly :

A. substituion reaction

B. addition reaction

C. eliumaination reaction

D. all of these

Answer: a

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27. Six carbon atoms of benzene are of:

A. one type

B. two types

C. three types

D. six types

Answer: a

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28. Among the following compounds the one that is most reactive towards electrophilic nitration is

A. toluene

B. benzene

C. nitobenzene

D. benzoic acid

Answer: a

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29. Identify the correct order of reactivity in electrophilic substitution reaction of the following compounds.

(1) Benzene

(2) Toluene

(3) Chlorobenzene,

(4) Nitrobenzene.

A. $4 > 3 > 4 > 2$

B. $4 > 1 > 3 > 2$

C. 4gt1gt2gt3`

D. $4 > 2 > 1 > 3$

Answer: c

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30. The strongest ortho/para and the strongest meta directing groups, respectively, are

A. $-NO_2$ and $-NH_2$

B. $-NH_2$ and $-NO_2$

C. $-NH_2$ and $-CONH_2$

D. $-X$ and $-CONH_2$

Answer: b

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31. Which one of the following undergoes nitration reactions most readily?

A. Benzene

B. Acetopheone

C. Benzaldehyde

D. benzoic acid

Answer: a

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32. Disubstituted derivatives of benzene are ofâ€¦â€¦. Type/types.

A. 1

B. 2

C. 3

D. 6

Answer: c

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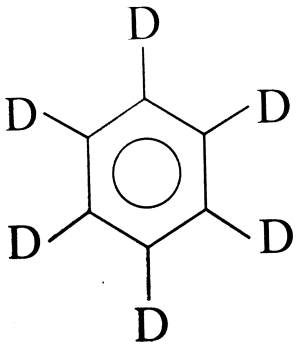
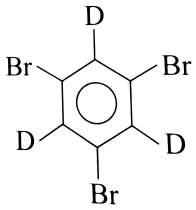
33. The major product obtained form the following reaction of 1 mole of hexadeuteriobenzene is :

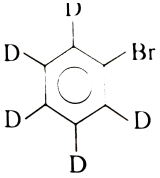


$$\xrightarrow[(ii)\ H_2O]{(i)\ Br_2\ (1\ mole),\ Fe}$$

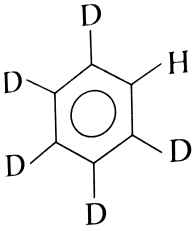
A. (a)

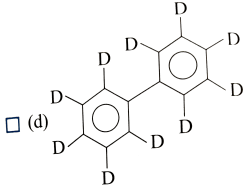


B. (b)



C. (c)



D. 

Answer: b

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34. The function of anhydrous $AlCl_3$ in friedel-Crafts' reaction is to

A. to absorb water

B. to absorb hydrochloric acid

C. to produce an electrophile

D. to produce a nuclephile

Answer: c

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35. Chlorination of benzene in the presence of halogen carrier is an exampole of :

A. aromatic nuleeophilic substictution

B. aromtic electrophilic substituion

C. aromatic anuclephilic addition

D. aromatic electrophilic addition

Answer: b

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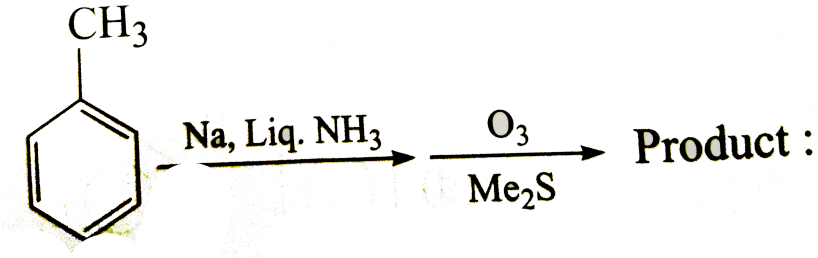
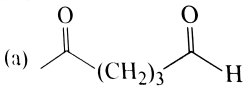
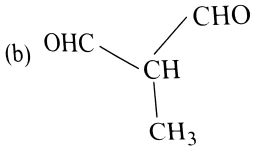
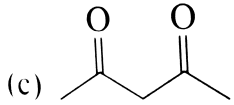
36.

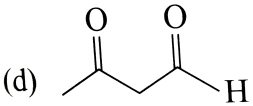


A.



B. 

C. 

D. 

Answer: d

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37. In the sulphonation of benzene, the electrophile involved is:

A. HSO_4^-

B. SO_3

C. SO_2

D. SO_4^{2-}

Answer: b

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38. Conversion of benzene to acetopheone can be brought by :

A. Wurtz reaction

B. Wurtz-Fitting reaction

C. Friedel-Crafts alkylation

D. Friedel-Craft acylation

Answer: d

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39. In the shalogenation of aromatic nucleus, the halogen carrier, is used to generate the species :

A. $CI^{\cdot}$

B. CI^{+}

C. CI^{-}

D. CI

Answer: b

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40. When sodium formate is heated with soda lime, it forms:

A. toluene

B. ethylene

C. benzene

D. aniline

Answer: c

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41. $C_6H_6 + CO + HCl \xrightarrow{\text{Anhy. } AlCl_3} X + HCl$ compound X is

A. C_6H_5CHO

B. C_6H_5COOH

C. $C_6H_5CH_2CI$

D. $C_6H_5CH_3$

Answer: a

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42.

The reaction, $C_6H_5Br + 2Na + C_2H_5Br \rightarrow C_6H_5C_2H_5 + 2NaBrisknou$

A. Friedel-Crafts reaction

B. Wurtz reaction

C. Sandmeyer's reaction

D. Wurtz-Fittin reaction

Answer: d

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43. In Friedel-Crafts reaction for preparation of toluene, the reactants in addition to anhydrous $AICI_3$ are:

A. $C_6H_5CI + CH_4$

B. $C_6H_5CI + CH_3CI$

C. $C_6H_6 + CH_4$

D. $C_6H_6 + CH_3CI$

Answer: d

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44. When phenol is heated with zinc dust the major product formed is

A. biphenyl

B. benzene

C. benzealdehyde

D. phenolphthalein

Answer: d

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45. Benzene reacts with acetyl chloride in the prescence of anhydrous $AlCl_3$ to give

A. acetophenone

B. phenyl acetate

C. chlorobenzene

D. benzoic acid

Answer: a

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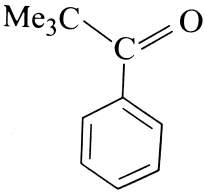
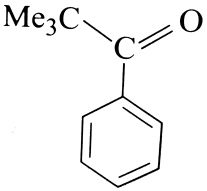
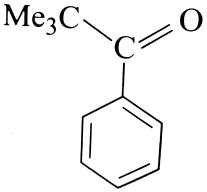
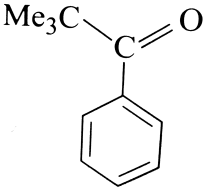
46. Benzene reacts with CH_3COCl in the presence of anhydrous $AlCl_3$ to give

A. 

B. 

C. 

D. 

Answer: d

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47. Nitration of benzene is carried out with :

A. $HNO_3(\text{dil.})$

B. $HNO_3(\text{conc.})$

C. $HNO_3(\text{fuming})$

D. $(HNO_3(\text{conc.}) + H_2SO_4(\text{conc.})$

Answer: d

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48. Benzene reacts with CH_3Cl in the presence of anyhydrous $AlCl_3$ to form

A. chlorobenzene

B. benzene hexachloride

C. hexachlorobenzene

D. none of these

Answer: a

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49. The major products formed in the reaction of toluene with chlorine in the presence of ferric chloride are :

A. benzoyl chloride

B. m-chlorotoluene

C. benzyl chloride

D. o- and p-chlorotoluene

Answer: d

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50. Benzene on treatment with a mixture of conc. HNO_3 and con. H_2SO_4 at 373K gives

A. nitrobenzene

B. m-dinitrobenzene

C. o-dinitrobenzene

D. p-dinitrobenzene

Answer: b

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51. Banzaldehyde can be prepared by oxidation of toluene by

A. $KMnO_4 + H_2SO_4$

B. $K_2Cr_2O_7 + H_2SO_4$

C. CrO_2CI_2 / CCI_4

D. all of these

Answer: c

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52. The order of decreasing reactivity towards an electrphilic reagent for the following,

(i). Benzene

(ii). Toluene.

(iii). Chlorobenzoic acid.

(iv). Phenol. Would.

A. $IV > III > II > I$

B. $IV > I > II > III$

C. $II > I > IV > III$

D. $I > II > IV > III$

Answer: a

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53. Oxidation of toluene of benzaldehyde by the use of chromyl chloride is called

A. Sandmeyer's reaction

B. Pherkin's reaction

C. Fitting reaction

D. Etard's reaction

Answer: d

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54. Gammexne is ,

A. hexachlorobenzene

B. benzene hexachloride

C. p-dichlorobezene

D. chlorobenene

Answer: b

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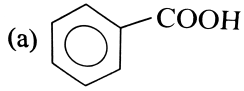
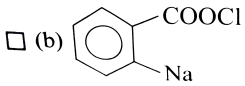
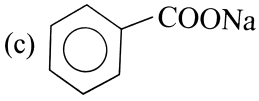
55. Toluene reacts with excess of CI_2 in presence of sunlight to give a product which on hydrolysis followed by reaction with $NaOH$ gives .

A. 

B. 

C. 

D. none of these

Answer: c

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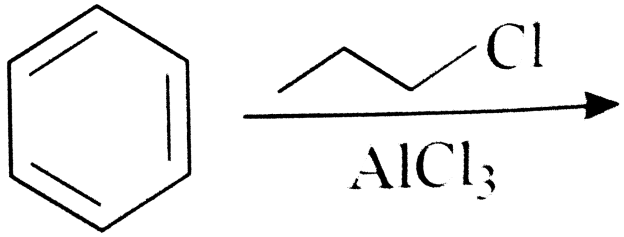
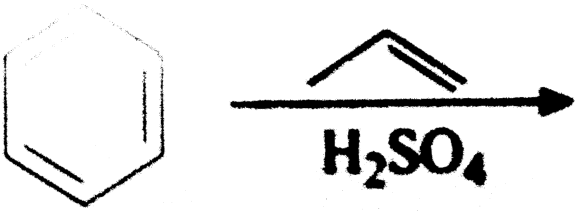
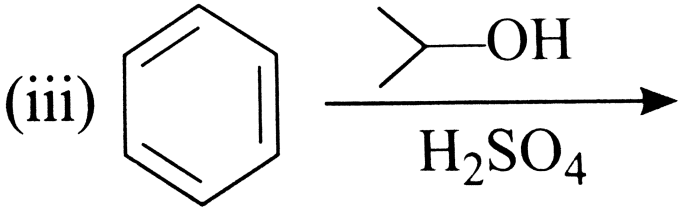
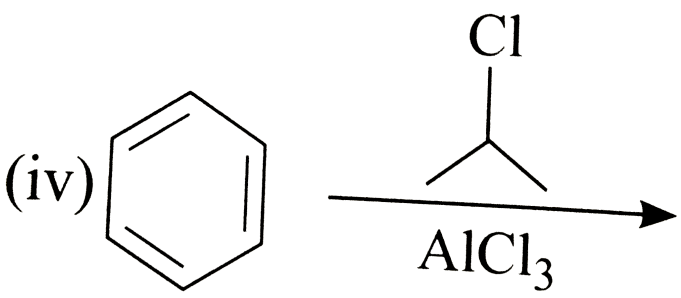
56. Which of the following reactions would give isopropyl benzene as the major product ?

(i) 

(ii) 

(iii) 

(iv) 

A. I and iv only

B. ii and iii only

C. ii iii iv only

D. d all of these

Answer: d

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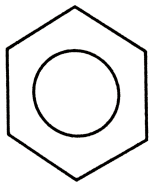
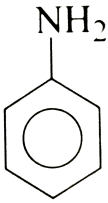
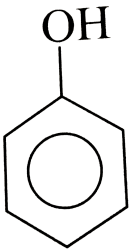
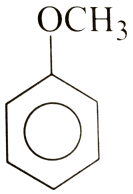
57. Which of the following does not undergo the Friedel-Crafts alkylation reaction?

A. (a) 

B. ☐ (b) 

C. (c) 

D. ☐ (d) 

Answer: b

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58. Benzene diazonium chloride when reacted with hypophosphorus acid, produces :

A. phenol

B. phenyl phoshte

C. benzene

D. phenyl phophite

Answer: c

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59. Which one of the following is not aromatic ?

A. Cyclopentadienyl anion

B. Cycloheptatrienyl cation

C. Cycloocatetraene

D. Thiophene

Answer: c

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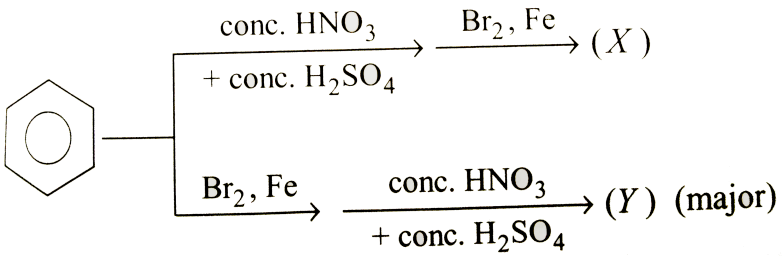
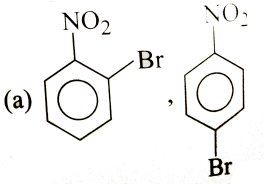
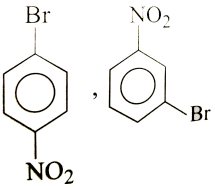
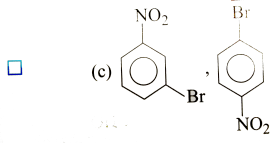


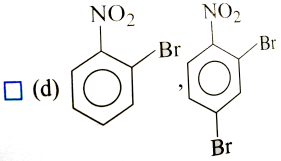
60.

then, the products (X) and (Y) will be :

A. (a) 

B. (b) 

C. 

D. 

Answer: c

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61. Towards electrophilic substitution, the most reactive species will be

A. Aniline

B. Nitrobenzene

C. Benzoic acid

D. Acitanilide

Answer: a

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62. The compound with molecular formula C_8H_{10} which will give only two isomers on electrophilic substitution with $Cl_2/FeCl_3$ or with HNO_3/H_2SO_4 is

A. p-dimethylbenzene

B. m-dimethylbenzene

C. dimethylbezene

D. ethylbenzene

Answer: c

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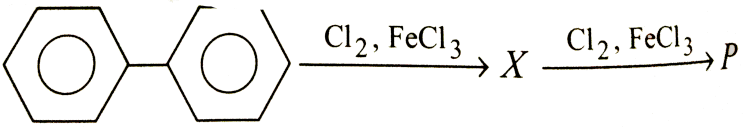
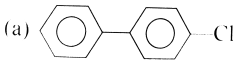
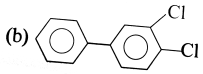
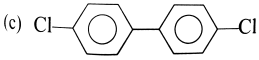
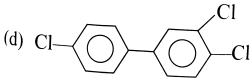
63. The major product 'p' formed in the following reaction is :



A. 

B. 

C. 

D. 

Answer: c

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64. Which of the following compounds will not undergo Friedel — Crafts reaction easily ?

A. nitrobenzene

B. Toluene

C. Cumene

D. Xylene

Answer: a

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65. Meta-directing and deactivating group in the aromatic electrophilic substitution is :

A. $-CH_3$

B. $-OH$

C. $-CI$

D. $-NO_2$

Answer: d

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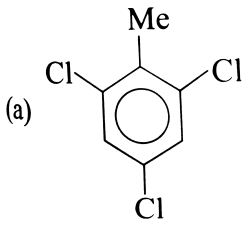
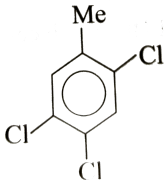
66. By passing excess of CI_2 (g) in boiling toluene, which one of the following compounds is exclusively formed ?

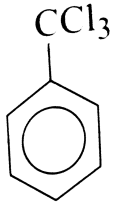
A. (a)



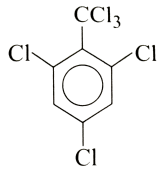
B. ☐ (b)



C. (c)



D. ☐ (d)



Answer: c

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67. According to the huckel rule, planar and completely conjugated monocyclic polyene is aromatic if it possesses

A. $(4n+1)\pi$ electrons

B. $(4n+2)\pi$ electrons

C. $(2n+2)\pi$ electrons

D. $4n\pi$ electrons

Answer: b

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68. How many 120° angles does benzene molecule has ?

A. 9

B. 12

C. 15

D. 18

Answer: d

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69. Friedel-Crafts reaction using MaCI and anhydrous $AICI_3$ will take place most effeciently with :

A. benzene

B. toluene

C. nitobenzene

D. acetophenone

Answer: b

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70. According to Huckl rule, the number of pi electrons in naphthanlene is:

A. 6

B. 10

C. 14

D. 16

Answer: b

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71. The carbon carbon bond length in benzene is

A. same as in C_2H_4

B. in between C_2H_6 and C_2H_2

C. in between C_2H_6 and C_2H_4

D. in between C_2H_4 and C_2H_2

Answer: c

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72. Benzene reacts with n-propyl chloride in the presence of anhydrous $AlCl_3$ to give predominantly

A. n-propylbenzene

B. isopropylbenzene

C. 2-ethyl banzene

D. none of these

Answer: b

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73. The following reagent is used for introducing a formyl group (HCO-) into the benzene ring :

A. $CO + HCI$

B. $HCN + HCI$

C. both (a) and (b)

D. none of these

Answer: c

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74. Benzene on reaction with conc. HNO_3 in presence of conc. H_2SO_4 followed by the treatment of CI_2 in presence of $FeCI_3$ followed by the treatment of CI_2 in presence of $FeCI_3$, it gives :

A. 2-chloro-1-nitrobenzene

B. 3-chloro-1-nitrobenzene

C. 4-chloro-nitrobenzene

D. a maxture of 1-chloro and 4-chloro-1-nitrobenzene

Answer: b

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75. Which does not show substituion in benzene ring ?

A. $CIDO_3H$

B. $\text{Conc.} H_2SO_4 \quad \text{on heating}$

C. Conc. HCl

D. $CH_3CI / AICI_3$

Answer: c

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76. Oxidation of naphthalene by acidic $KMnO_4$ gives :

A. toluene

B. benzoic acid

C. benzaldehyde

D. phthalic acid

Answer: d

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77. Best reagent for nuclear iodination of aromatic compound is :

A. I_2 / CH_3CN

B. I_2 / HNO_3

C. KI / CH_3COCH_3

D. KI / CH_3COOH

Answer: d

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78. Toluene reagent for nuclear iodination of aromatic compound is :

A. benzyl chloride

B. banzoyl chloride

C. p-chlorotoluene

D. p-chlorotoluene

Answer: a

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79. When benzene is heated with air at $500^\circ C$ in the presence of V_2O_5 as catalyst, the major product formed is

A. oxalic acid

B. glyoxal

C. fumaric acid

D. maleic anhydride

Answer: d

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80. Which one of the following compounds will undergo meta substitution (mainly) on monochlorination?

A. chlorobenzene

B. Phenol

C. Ethylbenzoate

D. Ethoxyethane

Answer: c

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81. The compound prepared by a substitution by a substitution reaction of benzene is :

A. acetophenone

B. glyoxal

C. Cycloocatetraene

D. hexabromocyclohexane

Answer: a

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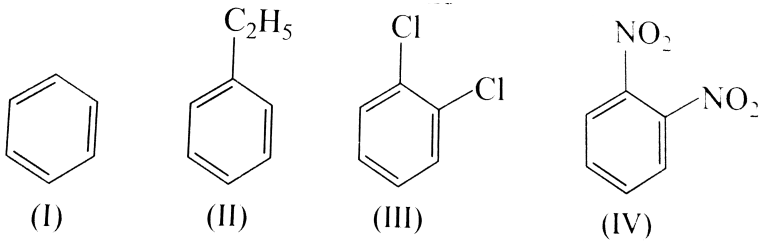
82. Identify the correct order of reactivity in electrophilic substitution reactions of the following compounds:



(I) (II) (III) (IV)

A. $i > II > III > IV$

B. $IV > III > II > I$

C. $II > I > III > IV$

D. $II > III > I > IV$

Answer: c

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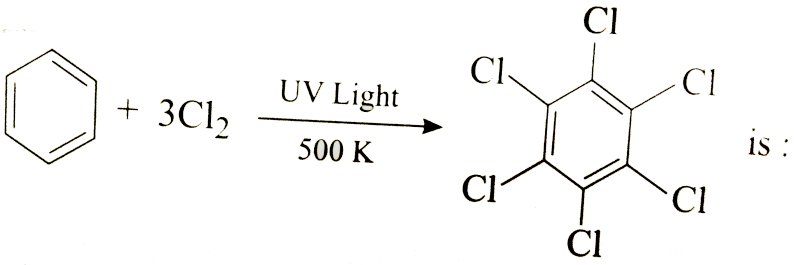
83. The chemical reaction,



is :

A. an addition reaction

B. an elimination reaction

C. a substitution reaction

D. rearrengement reaction

Answer: c

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84. Which of the following is not aromatic ?

A. Cyclopropernyl cation

B. Tropylium cation

C. Cyclopentadienyl cation

D. Cyclopentadienyl anion

Answer: d

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85. Toluene by Etard's reaction gives :

A. ortho-cresol

B. benzoic acid

C. benzyl alcohol

D. benzoic acid

Answer: d

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86. The compound formed as a result of oxidation of ethyl benzene by $KMnO_4$ is

A. benzylalcohol

B. enzophenone

C. acetophenone

D. benzoic acid

Answer: d

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87. Presence of a nitro group in a benzene ring:

A. deactivates the ring towards electrophilic substitution

B. activates the ring towards electrophilic substitution

C. renders the ring basic

D. deactivates the ring towards nuclephilic substitution

Answer: a

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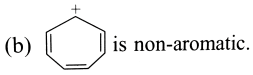
88. Pick out the wrong statement.

A. Toluene shows resonance.

B. 

is non-aromatic.

C. The hybrid state of carbon in carbonyl group is sp^2.

D. Dipole moment of vinyl chloride is less than that of methyl chloride.

Answer: b

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89. In an electrophilic substitution reactitution reaction of nitrobenzene, the presence of nitro group.....

A. decreses electron density at meta-position

B. increases electron density of at meta-position

C. increases electron density at ortho- and para-posotions

D. Decreases electron density at ortho-and para-positions

Answer: d

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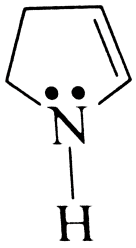
90. Which one of the following is an aromatic compound ?

A. (a)



B. (b)

C. (c)

D. (d)

Answer: b

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91. 1, 4-Dimethyl benzene on heating with anhydrous $AICI_3$ and HCI produces :

A. 1,2-dimethylbenzene

B. 1, 3-dimethylbenzene

C. 1,2, 3-trimethylbenzene

D. ethylbenzene

Answer: a

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92. $X \xrightarrow{CI_2} \text{Benzotrichloride} \xrightarrow{\text{Hydrolysis}} Y,$

X and Y respectively are :

A. benzene and benzoic acid

B. benzene and benzaldehyde

C. toluene and benzoic acid

D. toluene and benzaldehyde

Answer: c

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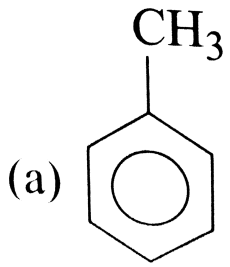
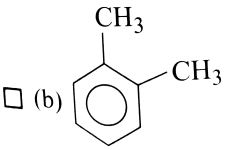
93. Which one of the following compounds give only one isomer upon nitration ?

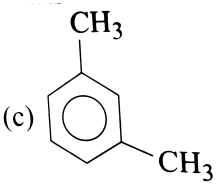
A.

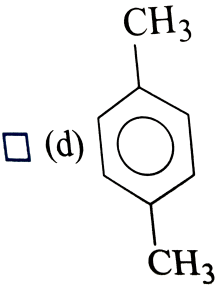


B.



C.





D.

Answer: d

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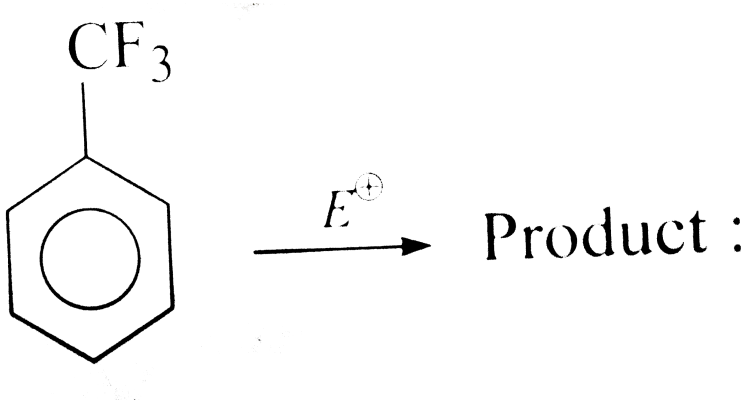
94. Consider the following reaction :



(a) CF_3will activate the benzene ring

(b) CF_3 will deactivate the benzene ring

(c) CF_3 is m-directing

(d) CF_3 is o/p directing

Select the correct options :

A. (i) and (iv)

B. (ii) and (iii)

C. (i) and (iii)

D. (ii) and (iv)

Answer: b

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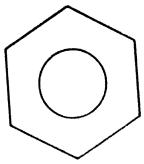
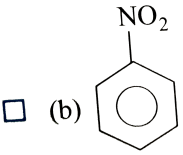
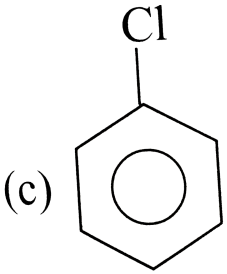
95. Among the following copounds that can be most readily sulphonated is :

A. (a) 

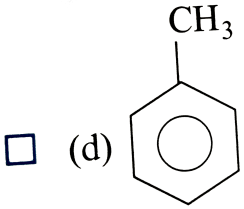
B.



C.



D.



Answer: d

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96. Arrange the following groups in order of decresing 0- and p- directing strength :

$\ddot{N}H_2, \ -CI, -\ddot{O}H, \ -R$

A. $-CI > -\ddot{\underset{\cdot\cdot}{O}}H > -R > -\ddot{N}H_2$

B. $-\ddot{N}H_2 > -R > -CI > -\ddot{\underset{\cdot\cdot}{N}}H_2$

C. $-\ddot{N}H_2 > -\ddot{\underset{\cdot\cdot}{O}}H > -CI > -R$

D. $-\ddot{N}H_2 > -\ddot{\underset{\cdot\cdot}{O}}H > -R > -CI$

Answer: d

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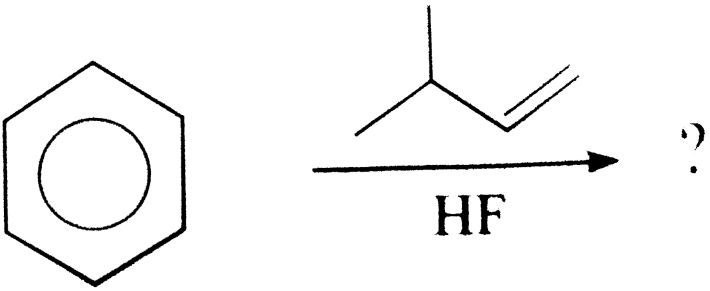
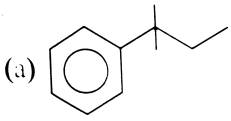
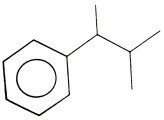
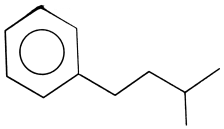
97. Give the major product of the following reactions :

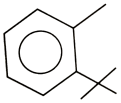


A.



B. (b) 

C. (c) 

D. (d) 

Answer: a

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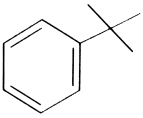
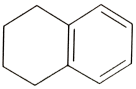
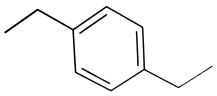
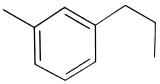
98. Which of the following compounds forms ortho-benzenedicarboxylic acid when oxidized by hot aqueous potassium permanganate ?

A. (a) 

B. (b) 

C. (c) 

D. ☐ (d) 

Answer: b

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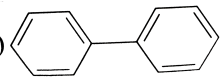
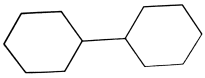
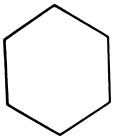
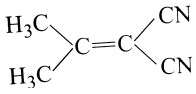
99. In which of the following moleucles, all atoms are coplanar?

A. (a) 

B. (b) 

C. (c) 

D. ☐ (d) 

Answer: a

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100. Whch one of the following is a benzenoid benzenoid aromatic compounds ?

A. Furan

B. Thiophene

C. Pyridine

D. Aniline

Answer: d

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101. The electrophile involved in the nitration of benzene is

A. NO^+

B. NO_2^+

C. NO

D. NO_3^-

Answer: b

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102. Cycloheptatrienyl cation is :

A. Non-benzenoid and non-aromatic

B. non-benzenoid and aromatic

C. benzenoid and non-aromatic

D. non-benzenoid and anti aromatic

Answer: b

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103. Toluene reacts with halogen in presence of iron (III) chloride giving ortho and para-halo compounds. The reaction is :

A. free redical addition reaction

B. electrophilic elimination reaction

C. nucleophilic substitution reaction

D. electrophilic substitution reaction

Answer: d

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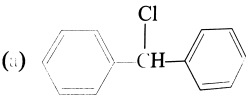
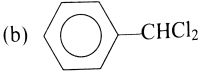
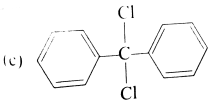
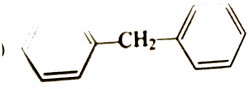
104. Which of the following structures correspond to the product expected, when excess of C_6H_6 reacts with CH_2Cl_2 in presence of anhydrous $AlCl_3$?

A. (a) 

B. 

C. 

D. 

Answer: d

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105. Which of the following froups groups deactivates the benzene ring towards electrophilic substitution ?

A. $-NHR$

B. $-OH$

C. $-COOR$

D. $-OR$

Answer: c

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106. Benzene reacts with CCI_4 in presence of anhydrous $AICI_3$ to give :

A. tetraphenylmethane

B. chlorobenzene

C. tetrachlorobenzene

D. triphenyl methyl chloride

Answer: a

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107. Which xylene is most readily nitrated ?

A. ortho Xylene

B. para Xylene

C. meta Xylene

D. all at the same rate

Answer: c

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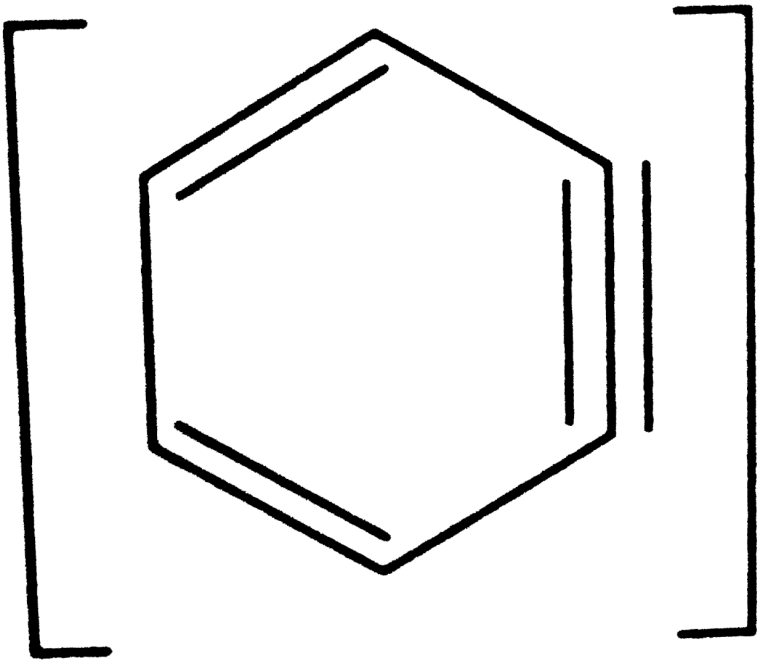
108. In benzyne [



] intermediate,

the triple bond consists of :

A. one sp-sp sigme bond and two p-p pi-bonds

B. one $sp^2 - sp^2$ sigma bond and two p-p pi-bonds

C. two sp-sp sigma bonds and one p-p pi-bond

D. one $sp^2 - sp^2$ sigma bond, one $sp^2 - sp^2$ pi-bond and one p-p pi-bond

Answer: d

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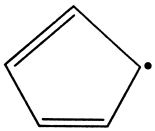
109. Which of the following species is aromatic ?

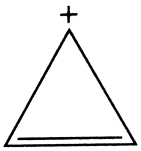
(a)

A.

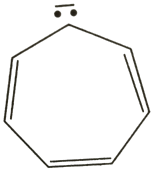
(b)



B.

(c) 

C.

(d) 

D.

Answer: c

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110. Chlorination of toluene in the presence of light and heat followed by treatment with aqueous $NaOH$ gives

A. ortho-cresol

B. para-cresol

C. 2, 4-dihydroxytoluene

D. benzoic acid

Answer: d

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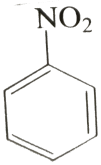
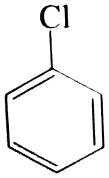
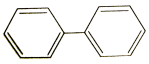
111. Which of the following is most reactive towards electrophilic substituion reaction ?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: a

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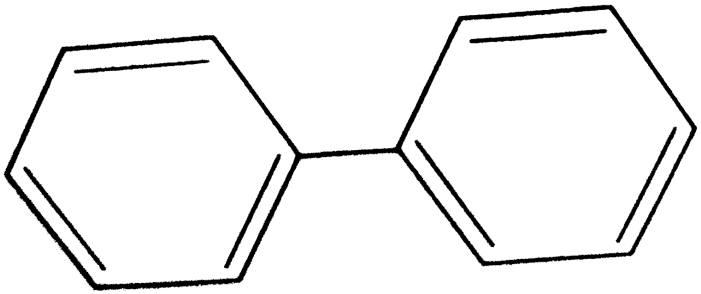
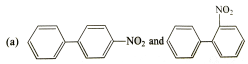
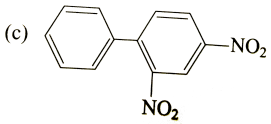
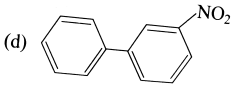


112. When is treated with nitrating mixture $(HNO_3 + H_2SO_4)$, we get :

A. 

B.

C. 

D. 

Answer: a

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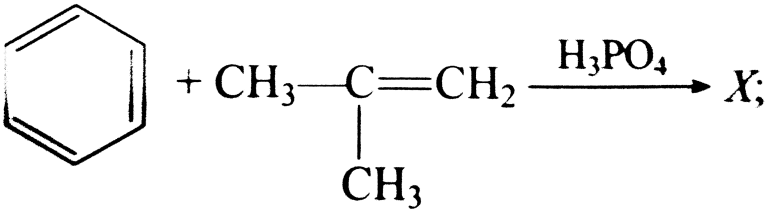
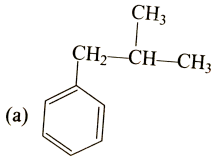
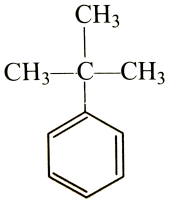
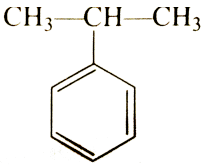


113.

The compound 'X' is :

A. 

B. 

C. 

D. none of these

Answer: b

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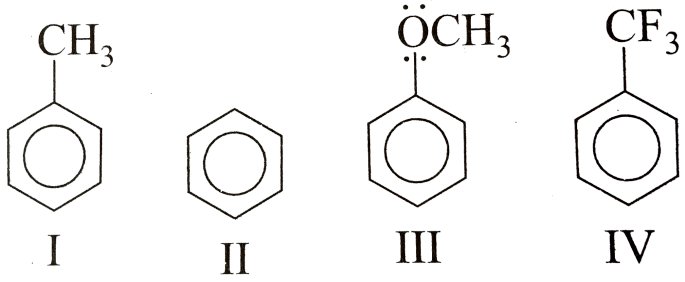

114.

Among the compounds the order of decreasing reactivity towards electrophilic substitution is

A. $III > I > II > IV$

B. $IV > I > II > III$

C. $I > II > III > IV$

D. $II > I > III > IV$

Answer: a

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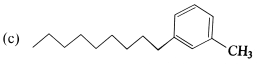
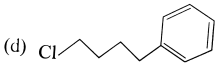
115. Which of the following molecules is most suitable to disperse benzen in water?

A. 

B. 

C. 

D. 

Answer: c

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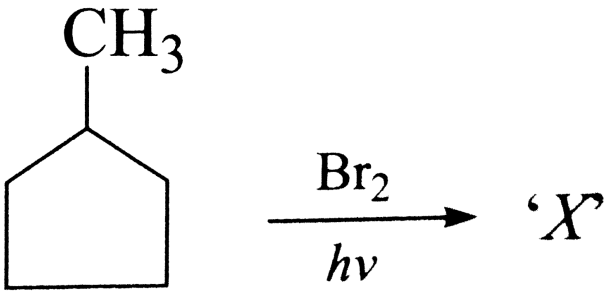
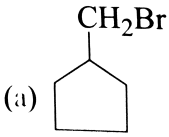
116. In the following reaction,

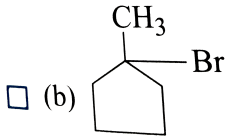


The major product "X' is :

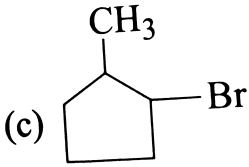
A.



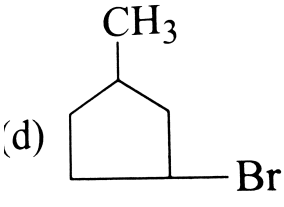
B.



C.



D.



Answer: b

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117. Amino grup is ortho, para-directing for aromatic electrophilic substitution, On nitration of aniline, a good amount of m-nitroaniline is obtained. This is due to :

A. in nitration mixture, ortho-, para-activity of $-NH_2$ group is completely lost

B. $-NH_2$ bencomes NH_3^+, which is m-directing

C. $-NH_2$ bencomes $-NH^+SO\_(4)^-$, which is m-directing

D. $-NH_2$ bencomes $-NH^-SO_4^-$, which is m-directing

Answer: b

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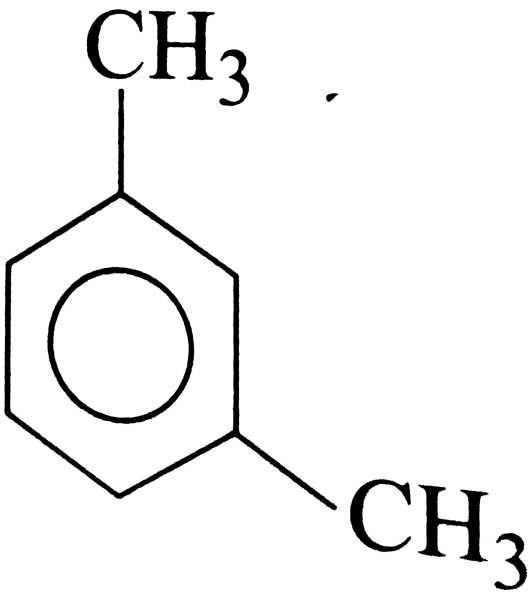
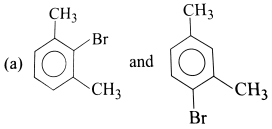
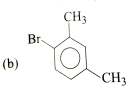
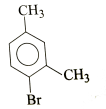
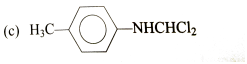
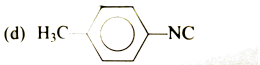
118. What products are formed when m-xylene is treated with Br_2 in the presence of $FeBr_3$?



A. (a)  and

B. (b)  and 

C. 

D. 

Answer: b

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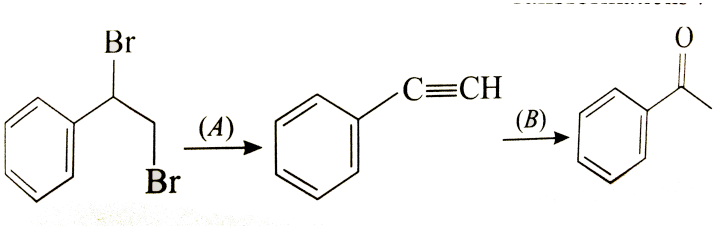
119. Indentify the reagents in the following transformations :



A. alc. KOH and $H_2O, HgSO_4, H_2SO_4$

B. alc. KOH and $KMmO_4 / H^+$

C. $NaNH_2$ and $H_2O, HgSO_4, H_2SO_4$

D. $NaNH_2$ and $KMnO_4 / H^+$

Answer: c

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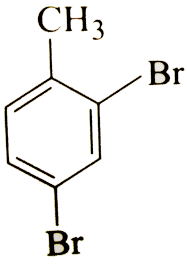
120. 

$$\xrightarrow[\text{(ii) } H_2O/H^+]{\text{(i) } KMnO_4/OH^-} (A) \xrightarrow[\Delta]{CaO+4NaOH} (B)$$

What will be the end peoduct (B) ?

A. 1,2-Dibromobenzene

B. 1,3-Dibromobenzene

C. 1,4-Dibromobenzene

D. 1,2-Dibromobenzaldehyde

Answer: b

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121. The correct sequence of reactions to be performed to convert benzene into m-bromoaniline is :

A. nitration, reduction, bromination

B. bromination, nitration, reduction

C. nitration, bromination, reduction

D. reduction, nitration, bromination

Answer: c

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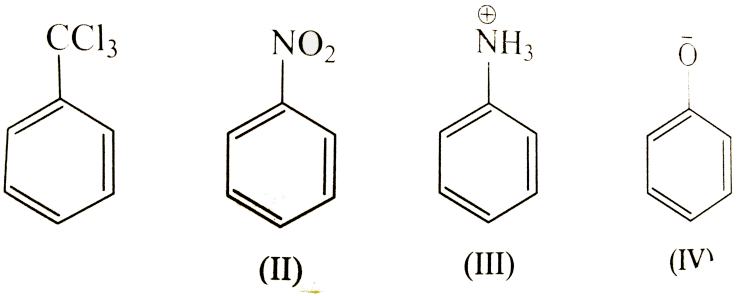
122. In which of the following cases, the nitration will take place at meta-position ?



A. II and IV

B. I, II and III

C. II and III

D. I only

Answer: b

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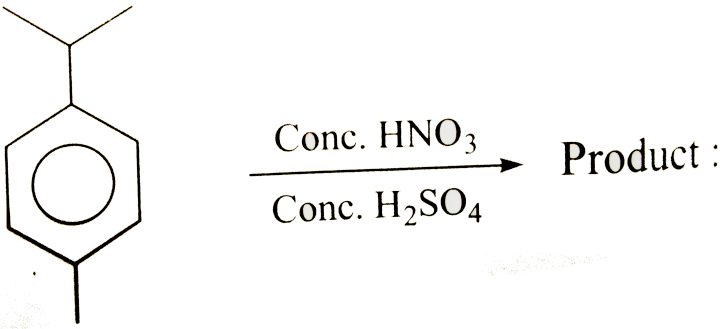
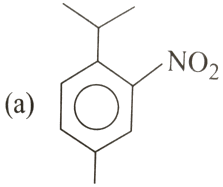
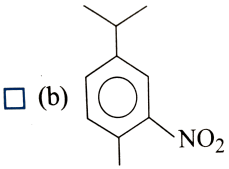
123. The major product formed in the reaction is :



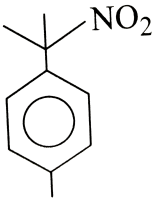
A.



B.



C. (c) 

D. ☐ (d) 

Answer: b

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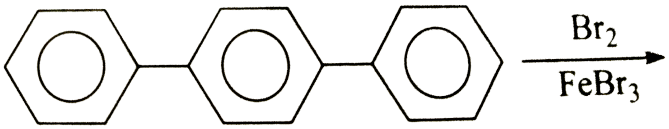
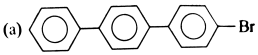
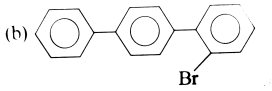
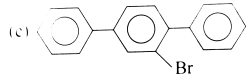
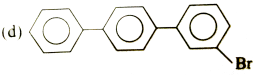
124. 

A. (a) 

B. 

C. 

D. 

Answer: c

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125. Nitrating agent for aromatic compound may be :

A. N_2O_5

B. NO_2ClO_4

C. $NO_2CF_3SO_3$

D. all of these

Answer: d

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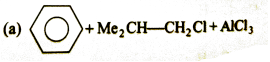
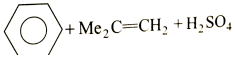
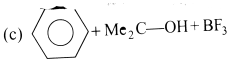
126. In which of the following reactions, tertaryt butyl benzene is formed ?

A. 

B. 

C. 

D. all of these

Answer: d

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127. The order of reactivity of the following compounds towards electrophilic substitution will be :

(I) $C_6H_5CH_3$

(II) $C_6H_5CH_2CH_3$

(III) $\left(C_6H_5CH(CH_3)_3\right.$

(IV) $\left(C_6H_5C(CH_3)_3\right.$

A. $I > II > III > IV$

B. $IV > III > II > I$

C. $II > I > III > IV$

D. $III > II > I > IV$

Answer: a

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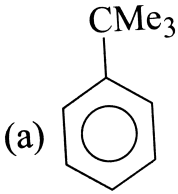
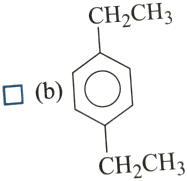
128. $A(C_{10}H_{14}) + CI_2, \Delta \rightarrow C_{10}H_{13}CI$ (Two isomers) Possible structure of (A) is :

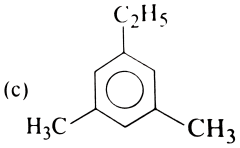


A.

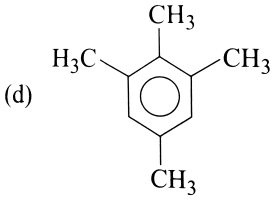


B.

C.



D.



Answer: b

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129. What function does HNO_3 serve in the reaction of benzene with I_2 to produce iodobenzene ?

A. The HNO_3 convert the I^- to I_2

B. HNO_3 serve as a catalyst

C. HNO_3 convert I_2 to HI

D. HNO_3 conver I_2 to I^+

Answer: d

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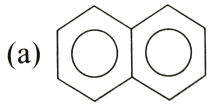
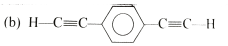
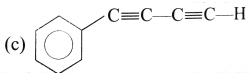
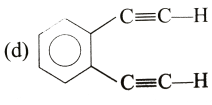
130. Compound (A) $(C_{10}H_6)$ liberates 2 mole of CH_4 when treated with MeMgBr. On heating with $KMnO_4$ solution, (A) produces benzene dicarboxylic acid which on mono-nitration produces only one peoduct and no other isomers. (A) can be.

A. 

B. 

C. 

D. 

Answer: b

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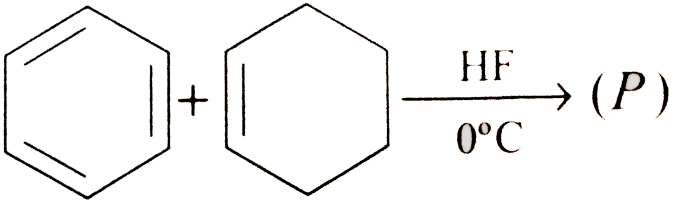
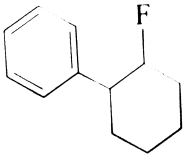
131. In the given reaction,

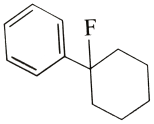


The product (P) is :

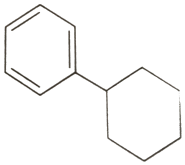
A. (a)



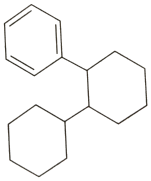
B. (b)



C. (c)



D. (d)



Answer: c

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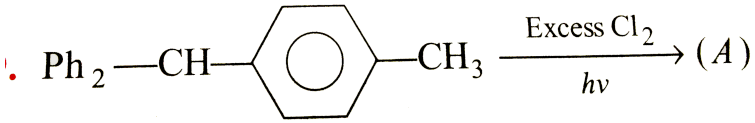
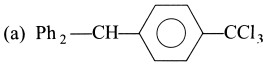
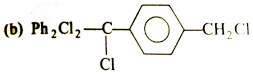
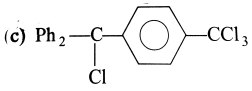
132. Complete the following reaction



A. 

B. 

C. 

D. none of these

Answer: c

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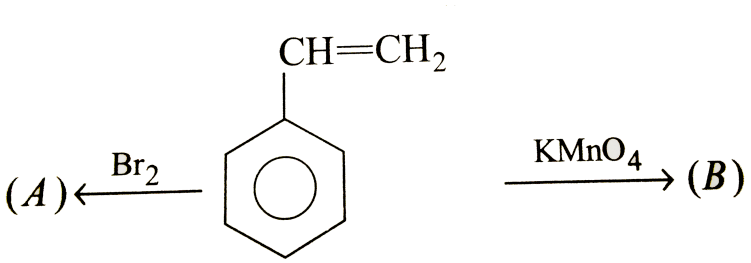
133.



Compund (A) and (B) respectively are :

A. o-bromosyrene, benzoic acid

B. p-bromostyrene, benzaldeyde

C. m-bromostyrene, benzaldehyde

D. Styrenedibromide, benzoic acid

Answer: d

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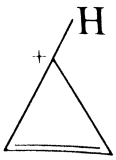
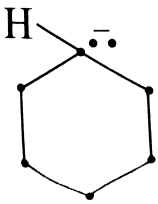
134. Which of the following is/are aromatic ?

(a)



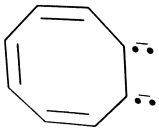
A.

(b)



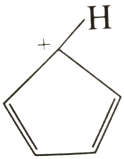
B.

(c)



C.

(d)



D.

Answer: (a, c)

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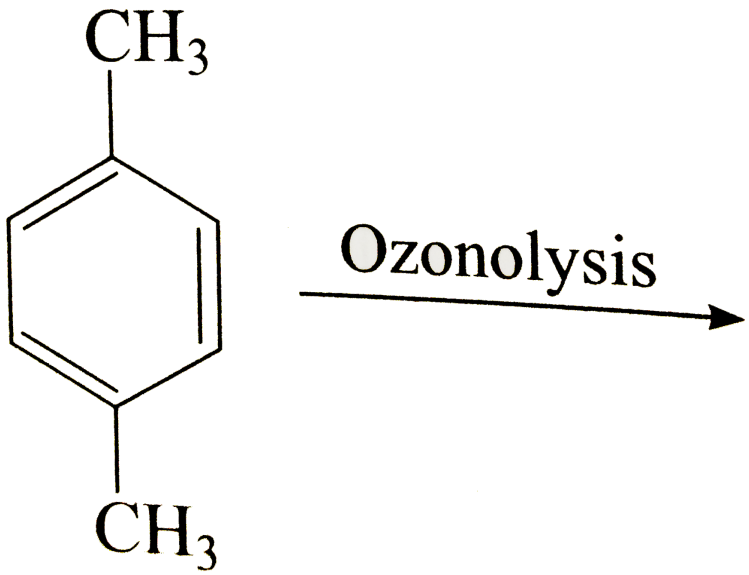

135.

The products formed are :

A. $CH_3 - \overset{\overset{O}{||}}{C} - CHO$

B. $CHO - CHO$

C. $CH_3 - \overset{\overset{O}{||}}{C} - \overset{\overset{O}{||}}{C} - CH_3$

D. HCOOH

Answer: (a, b)

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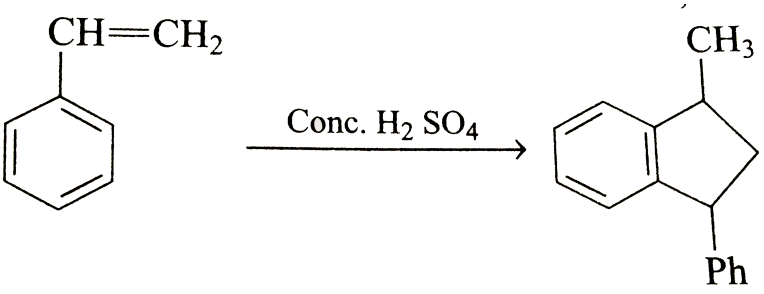
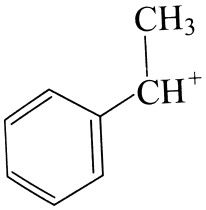
136. Styrene undergo following reactions in acidic medium



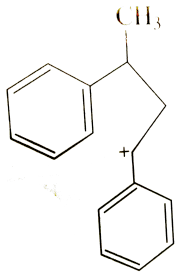
The various intermadite formed are :

(a)



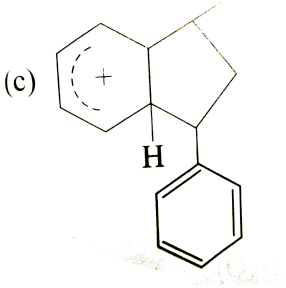
A.

(b)

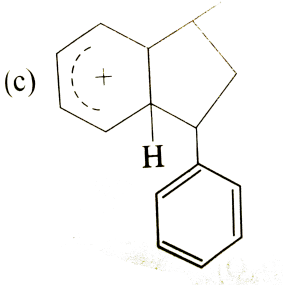


B.

C.



D.



Answer: (a, b, c)

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137. Toluene, when treated with Br_2 / Fe gives p-bromotoluene as the major product, because the CH_3 group:

A. is para-directing

B. is meta-directing

C. activates the ring by hyperconjugation

D. deactivates the ring

Answer: (a, c)

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138. An aromatic molecule will

A. have $4n\pi$ electrons

B. have $(4n+2)\pi$ electrons

C. be planar

D. be cyclec

Answer: (b, c, d)

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139. Which of the following are less arective than benzene ?

A. Toluene

B. Chlorobenzene

C. Nitrobenzene

D. benzoic acid

Answer: (b, c, d)

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140. The type of substituion reactions of benzenoid hyderocarbons are :

A. elemination

B. electrophilic

C. nuclephilic

D. free radical

Answer: (b, c, d)

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141. Benzene is obtained form benzene diazonium chloride by the :

A. reduction with alkaline stannous chloride

B. reduction with alkaline stannous chloride

C. action of hypoposphorus acid

D. acition of ethyl alcohol

Answer: (a, c, d)

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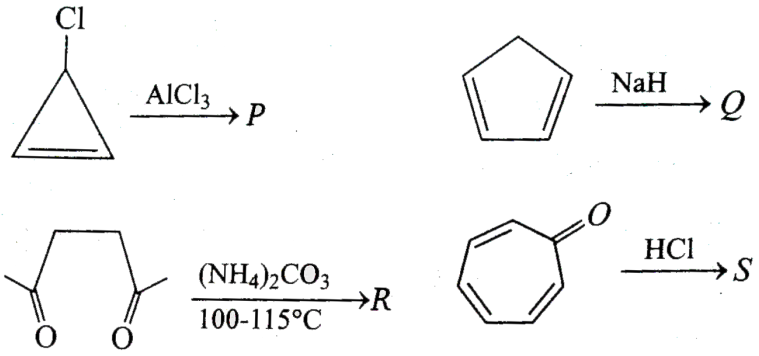
142. Among P, Q, R and S, the aromatic compounds(s) is/are



A. P

B. Q

C. R

D. S

Answer: (a, b, c, d)

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143. Which of the following does not undergo the Friedel-Crafts alkylation reaction?

A. Aniline

B. Phenol

C. Nitrobenzene

D. all of these

Answer: (a, c)

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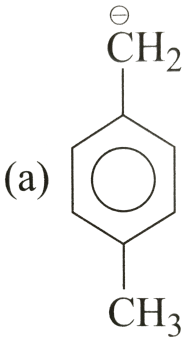
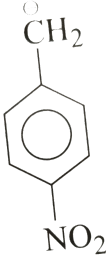
144. Which of the following anions are more stable than benzyl anion ?

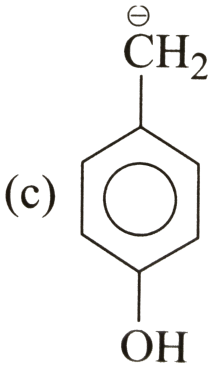
A. (a)

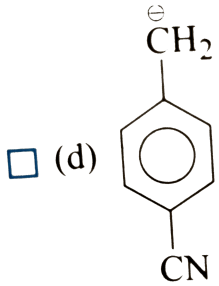


B. (b)



C. (c)





D.

Answer: (b, d)

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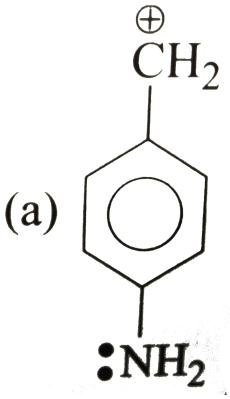
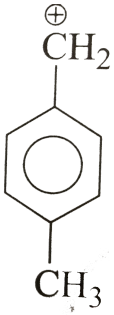
145. Which of the following cations are more stable than benzyl cation ?



A.

B. (b) 

C. (c) 

D.

Answer: (a, c, d)

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146. Choose the correct statements :

A. halogens are deactivating but ortho, para-directing

B. directing nature of any group is decided by stability of sigma compounds

C. all activating groups are ortho, para directing

D. all deactivating groups are meta directing

Answer: (a, b, c)

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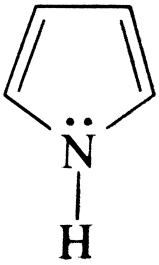
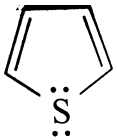
147. Which of the following compounds gives faster electrophilic aromatic substitution than benzene ?

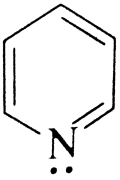
A. (a)



B. (b)



C. (c)



□ (d)

D.

Answer: (a, b, d)

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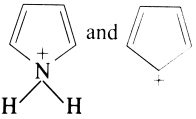
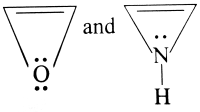
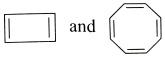
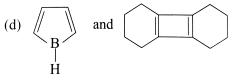
148. Which of the following are pairs of antiaromatic species ?

A. (a)  and

B. (b)  and

C. (c)  and

D. (d)  and

Answer: (b, d)

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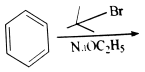
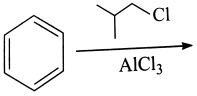
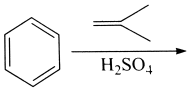
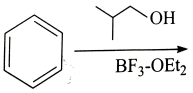
149. Among the following reactions (s), which gives (give) tert-butyl benzene as the major product?

A. ☐ (a) 

B. ☐ (b) 

C. (c) 

D. ☐ (d) 

Answer: (b, c, d)

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150. Compound p and R upon ozonolysis produce Q and S, respectively . The molecular fromular of Q and S id C_8H_8O. Q undergoes Cannizzaro reaction but not halofrom reaction , whereas S undergoes halofrom reaction but not Cannizzaro

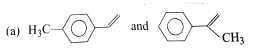
reaction .

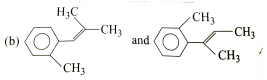
$$(i) P \xrightarrow[(ii)\ Zn/H_2O]{(i)\ O_3/CH_2Cl_2} Q \quad (C_8H_8O)$$

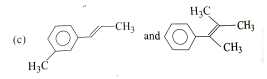
$$\text{(ii)}\ R \xrightarrow[(ii)\ Zn/H_2O]{(i)\ O_3/CH_2Cl_2} S \quad (C_8H_8O)$$

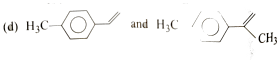
The option (s) with suitable combination of P and R,

respectively , is(are)

A. 

B. 

C. 

D. 

Answer: (a, c)

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151. (A) Friedel-Crafts reaction between benzene and acetic angydride in presence of anhydrous $AICI_3$ yields acetophenone and not polysubstitution product.

(R) Acetophenone formed poisons the catalyst, preventing further reaction.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: c

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152. (A) Benene does not decolorise alkaline $KMnO_4$.

(R) Benzene is stabilized by resonance and $\pi =$ electron are delocalized.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: a

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153. (A) Clorine is ortho and para directing but deactivating group.

(R) Inductive effect of chlorine atom overcoms the resonance effect.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: a

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154. (A) Nitrobenzene undergoes Friedel-Craft reaction.

(R) Friedel-Crafts reaction is an electrophilic substitution reaction.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: d

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155. (A) Benzene on heating conc. H_2SO_4 gives benzene sulphonic acid which heated with supherheated stem under pressure gives benzene.

(R) suplhonation is a reversible precess.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: a

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156. (A) Rate of nitration of benzene and hexadeuterobenzene are different.

(R) C-H bond is stronger than C-D bond.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: e

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157. (A) 1,3,5-Trimethybenzene (mesitylene) can be brominated under very mild condition even in the absence of Lewis acid.

(R) The ring is activated by three methyl groups.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: a

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158. (A) Benzene reacts with CI_2 in presence of sunlight to form benzen hexachloride (BHC).

(R) BHC or Gammexane of 666 is used as an insecticide.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: b

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159. Assertion: Styrence on reaction with HBr gives 1-bromo-1-phenylethane .

Reason: Benzyl radical is more stable than alkyl redical .

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: c

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160. (A) Toluene undergoes nitration much more readily than benzene.

(R) It is due to electron relesing nature of $-CH_3$ group which increases

electron relectron density on benzene and electrophilic substitution reaction like nitrotion becomes faster.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: a

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161. Assertion : Friedel – Crafts reaction is used to introduce an alkyl or acyl group in benzene nucleus

Reason : Benzene is a solvent for the Friedel – Crafts alkylation of bromobenzene.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: c

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162. (A) Cyclopentadienyl anion is aromatic.

(R) Aromatic molecules have high degree of themodynamic stability.

A. If both (A) and (R) are correct and (R) is corrct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the corrct explanation of (A).

C. If (A) is incorrect but (R) is incorrect.

D. If (A) is incorrect but (R) is incorrect.

Answer: b

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163. Match the following :

Column I	Column II
(a) Aromatic	(p) Planar
(b) Antiaromatic	(q) $(4n+2)\pi$delocalize electros
(c) Cyelooctatetraene	(r) $(4n)\pi$ localized electrons
(d) Huckel rule	(s) Non-lanar

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164. Match the following :

Column I (Group)	Column II (Directive influence)
$(a) - NO_2$	(p) meta directing
$(b) - CI$	(q)o-and p-directing
$(c) - CH_3$	(r) Activating
$(d) - NH_2$	(s) Deactivating

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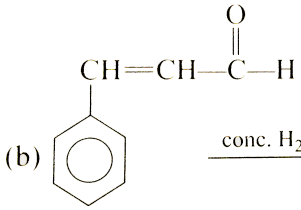
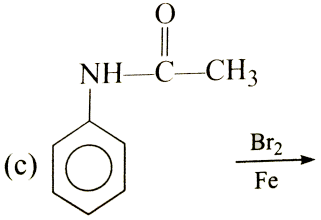
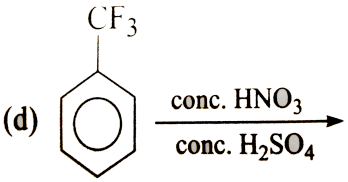
165. Match the following :

Column I

(a) 

(b) 

(c) 

(d) 

Column II

(p) *o*- and *p*-substitution

(q) *meta*-substitution

(r) Substitution at faster rate than benzene

(s) Substitution at slower rate than benzene

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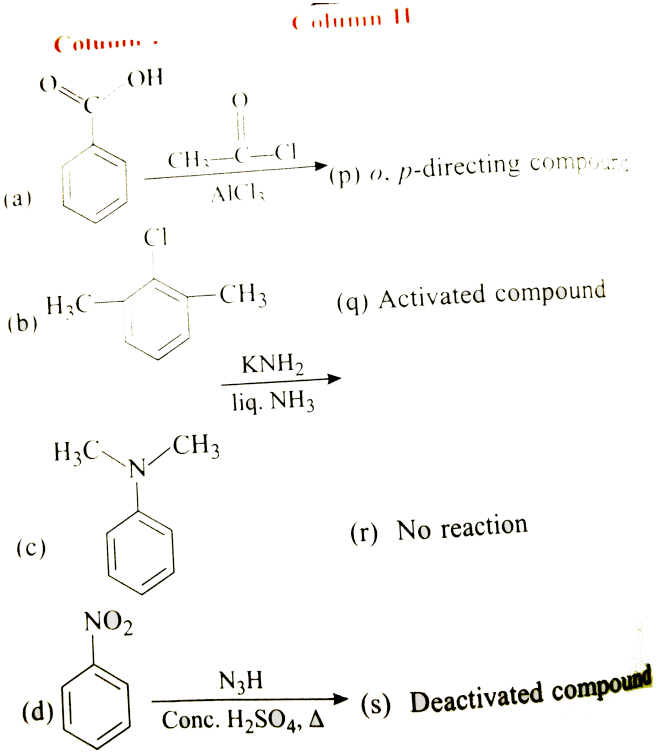
166. Match the following :



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167. Match the following :

Clumn I	Column II
(a) Oxidation of naphthalene	(p) Benzaldehyde
(b) Acylation of benzene	(q) Acetophenone
(c) Oxidation of toluene	(r) Benzoic acid
(d) Ozonolysis of styrene	(s) Phthalic acid
	(t) Formaldehyde

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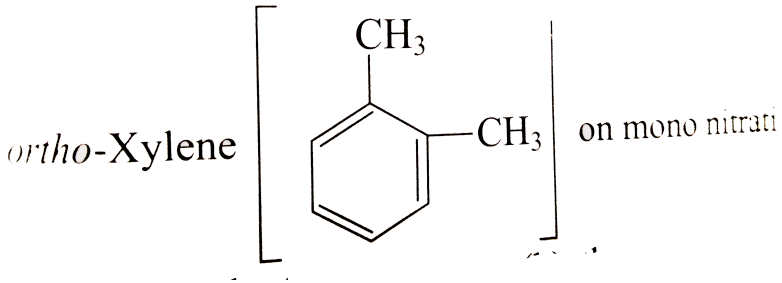
168. In the electrophilic substituion of benzene ring, the second substituent is directed by the group already present. Electron releasing groups (+I and +M) are ortho-para-directing and activating, whreas the electron withdrawing groups (-I and -M) are meta-directing and deactivating.

Halogens are placed under the category of +T (Tautomeric) groups because they have -Ibdyctuve abd +Mesomeric effect. These groups are deactivating but ortho-para-directing.

In the introduction of third group to the benzene ring, the product of minimum steric gindrance is formed.

Answer the follwing questions :

Ortho-Xylene 

on mono nitration gives

A. two products

B. three products

C. one products

D. four products

Answer: a

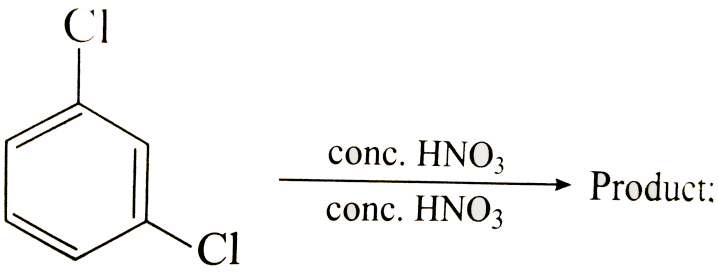
169. In the electrophilic substituion of benzene ring, the second substituent is directed by the group already present. Electron releasing groups (+I and +M) are ortho-para-directing and activating, whreas the electron withdrawing groups (-I and -M) are meta-directing and deactivating.

Halogens are placed under the category of +T (Tautomeric) groups because they have -Ibdyctuve abd +Mesomeric effect. These groups are deactivating but ortho-para-directing.

In the introduction of third group to the benzene ring, the product of

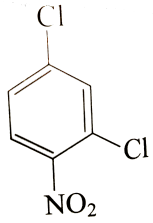
minimum steric gindrance is formed.

In the reaction

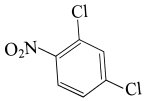


Which of the following products is not formed at all ?

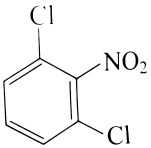
A. (a)



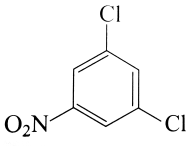
B. (b)



C. (c)



D. (d)



Answer: d

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170. In the electrophilic substituion of benzene ring, the second substituent is directed by the group already present. Electron releasing groups (+I and +M) are ortho-para-directing and activating, whreas the electron withdrawing groups (-I and -M) are meta-directing and deactivating.

Halogens are placed under the category of +T (Tautomeric) groups because they have -Ibdyctuve abd +Mesomeric effect. These groups are deactivating but ortho-para-directing.

In the introduction of third group to the benzene ring, the product of minimum steric gindrance is formed.

Which of the following is not an ortho, para-directing group ?

A. $-F$

B. $-NC$

C. $-OCH_3$

D. $-CCI_3$

Answer: d

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171. In the electrophilic substituion of benzene ring, the second substituent is directed by the group already present. Electron releasing groups (+I and +M) are ortho-para-directing and activating, whreas the electron withdrawing groups (-I and -M) are meta-directing and deactivating.

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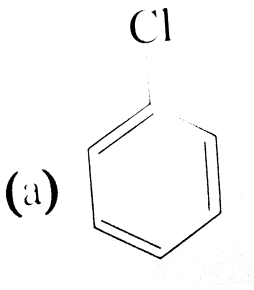
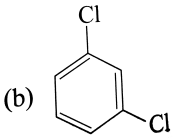
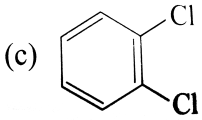
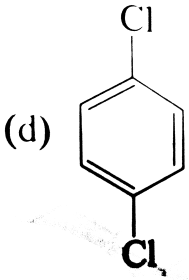
In the introduction of third group to the benzene ring, the product of minimum steric gindrance is formed.

Which of the following substituted benzene derivatives would furmish three isomers when one more substituent is introduced ?

A. 

B. 

C. 

D. 

Answer: a,b

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In the introduction of third group to the benzene ring, the product of minimum steric gindrance is formed.

A deactivating group in electrophilic substitution reaction :

A. deactivates only rotho- and para-positions

B. deactivates only meta-position

C. deactivates meta-position more than ortho-and para-positions.

D. deactivatesn ortho- and para-positions more than meta-position

Answer: d

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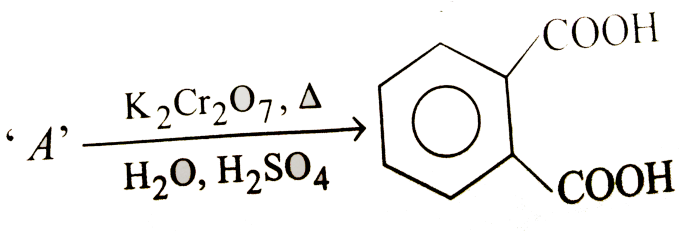
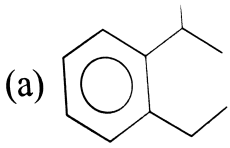
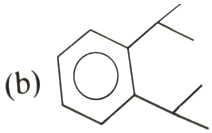
173. Aromatic hydrocarbon can show electrophilic substitution reaction, oxidation and acidic nature. If alkyl group attached to benzene ring has $\alpha - H$ atom, it is oxidiesd into-COOH group. The electrophilic sustittion in aromatic compounds takes The at the position where most stable σ complex is formed :

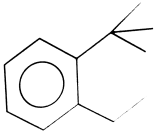
Answer the following questions :

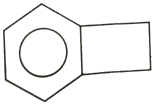


out of the given compounds 'A' is/are:

A. 

B. 

C. (c) 

D. (d) 

Answer: (a, b, d)

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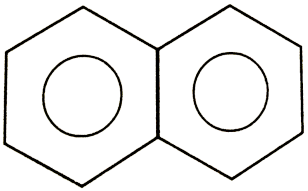
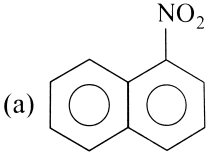
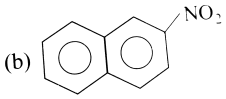
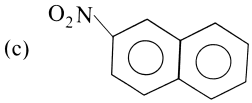
174. Aromatic hydrocarbon can show electrophilic substitution reaction, oxidation and acidic nature. If alkyl group attached to benzene ring has $\alpha - H$ atom, it is oxidiesd into-COOH group. The electrophilic sustittion in aromatic compounds takes The at the position where most stable σ complex is formed :

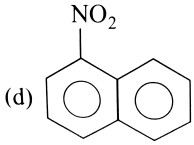
-  $\xrightarrow[\text{Conc. } H_2SO_4, \Delta]{\text{Conc. } HNO_3}$ Product

The producut formed is/are :

A. 

B. 

C. 

D. 

Answer: (a, d)

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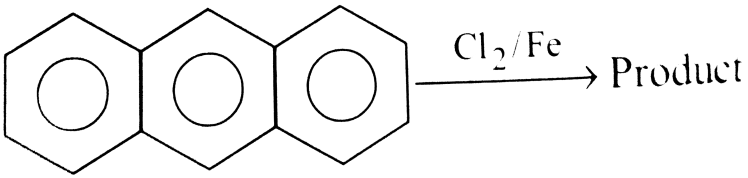
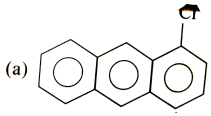
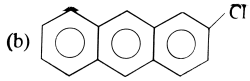
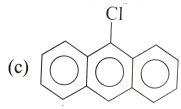
175. Aromatic hydrocarbon can show electrophilic substitution reaction, oxidation and acidic nature. If alkyl group attached to benzene ring has $\alpha - H$ atom, it is oxidiesd into-COOH group. The electrophilic sustittion in aromatic compounds takes The at the position where most stable σ complex is formed :

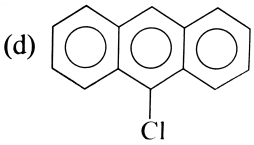


The product formed si/are :

A. 

B. 

C. 

D. 

Answer: (c, d)

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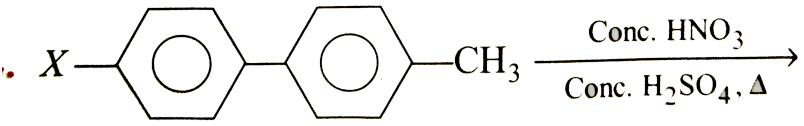
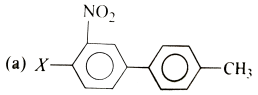
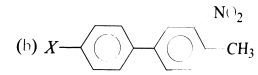
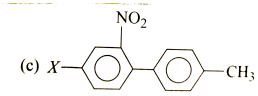
$\alpha - H$ atom, it is oxidiesd into-COOH group. The electrophilic sustittion in aromatic compounds takes The at the position where most stable σ complex is formed :

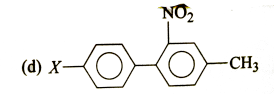


the product formed is/are:

A. 

B. 

C. 

D. 

Answer: b

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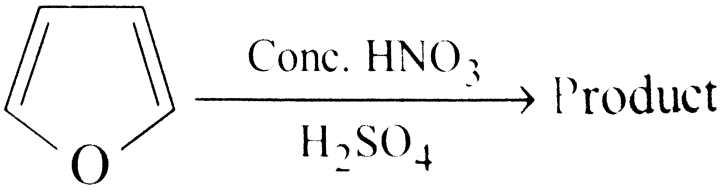
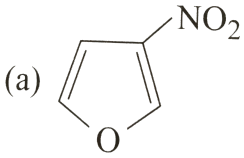
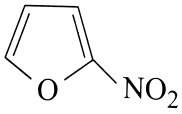


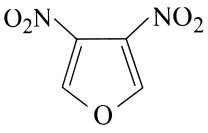
the product formed is/are:

(a) 

A.

(b) 

B.

(c) 

C.

D. Both (a) and (b)

Answer: b

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178. For any compound to be aromatic, compound should follow a given set of rule known as Huckel's rule

According to Huckel's rule of aromaticy :

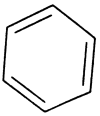
(a) compound should be cyclic

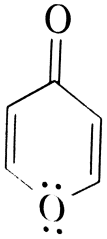
(b) compounds shoulds be planar and conjugated .

(c) compound should have $(4n+2)\pi e^-$

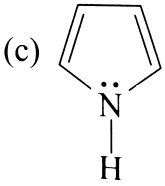
where `n=0, 1, 2, 3.... integer number .

Which of the following is not an aromatic compound ?

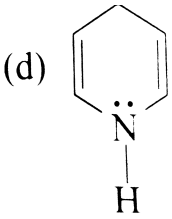
A. (a) 

B. (b) 

C.



D.



Answer: d

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179. For any compound to be aromatic, compound should follow a given set of rule known as Huckel's rule

According to Huckel's rule of aromaticy :

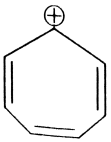
(a) compound should be cyclic

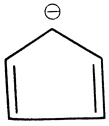
(b) compounds shoulds be planar and conjugated .

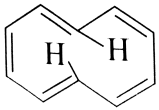
(c) compound should have $(4n+2)\pi e^-$

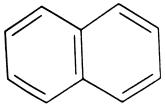
where `n=0, 1, 2, 3.... integer number .

Among the following which is a non-planer compound ?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: c

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180. For any compound to be aromatic, compound should follow a given set of rule known as Huckel's rule

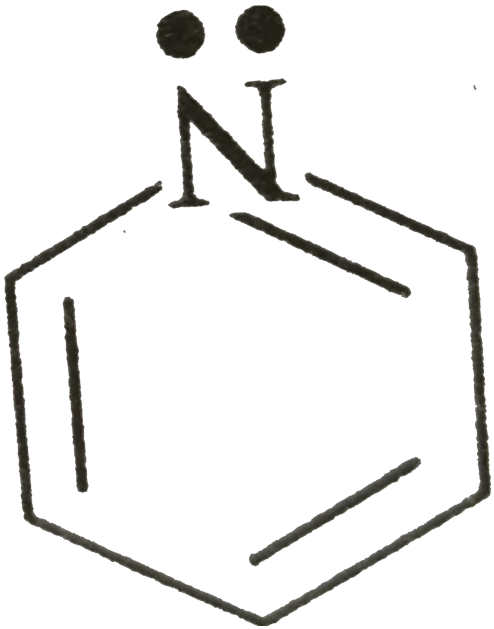
According to Huckel's rule of aromaticy :

(a) compound should be cyclic

(b) compounds shoulds be planar and conjugated .

(c) compound should have $(4n+2)\pi e^-$

where $n = 0, 1, 2, 3....$ $\int e \geq r\nu mber. Ident$ if $y\nu mberof\,\partial ocalised$ pi`-electron in pyridine : ltBRgt



A.

B.

C.

D.

Answer: b

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181. For any compound to be aromatic, compound should follow a given set of rule known as Huckel's rule

According to Huckel's rule of aromaticy :

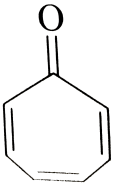
(a) compound should be cyclic

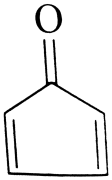
(b) compounds shoulds be planar and conjugated .

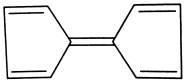
(c) compound should have $(4n + 2)\pi e^-$

where `n=0, 1, 2, 3.... "integer number" .

"Identify the compound which have maximum dipole moment" :

A. (a) 

B. (b) 

C. (c) 

D. none of these

Answer: a

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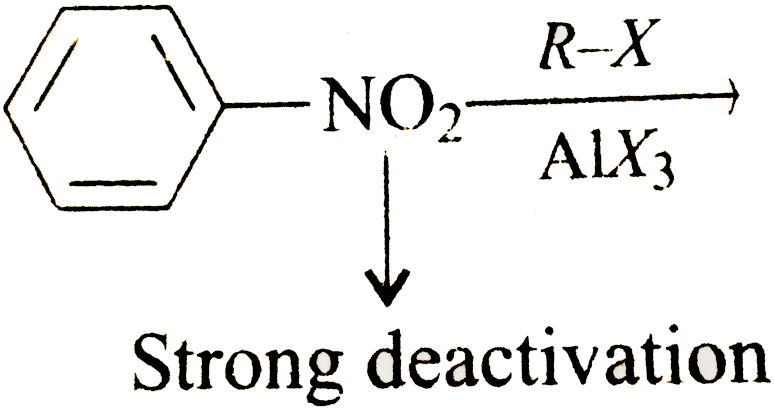
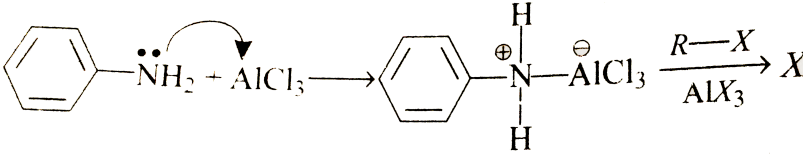
182. A benzene ring deactived by strong and moderate electrons withdrawing group that is, any meta directing group, is not electron rich enough to undergoes Friedel-Carfts reactions.

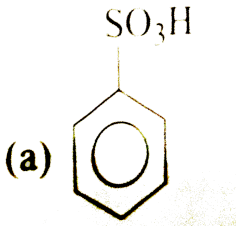


Friedel- Crafts reaction also do not occur with NH_2 group as it react with $AlCl_3$ and produce deactivating group .

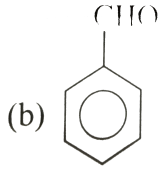


Which of the following compounds undergo Friedel-Crafts alkylation reaction ?

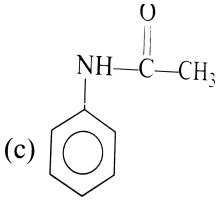
A.



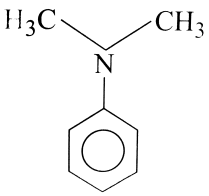
B.



C.



D.



Answer: c

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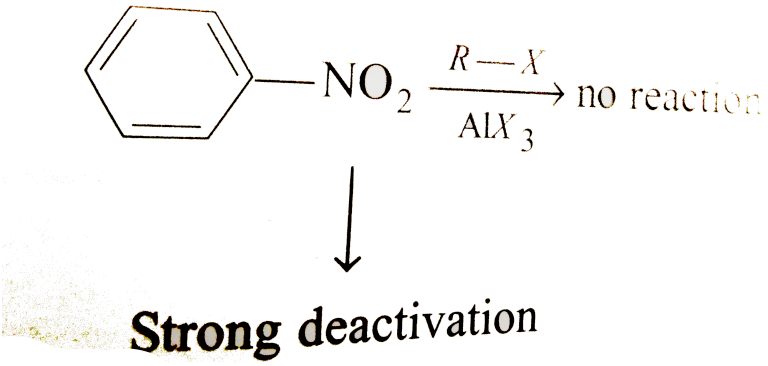
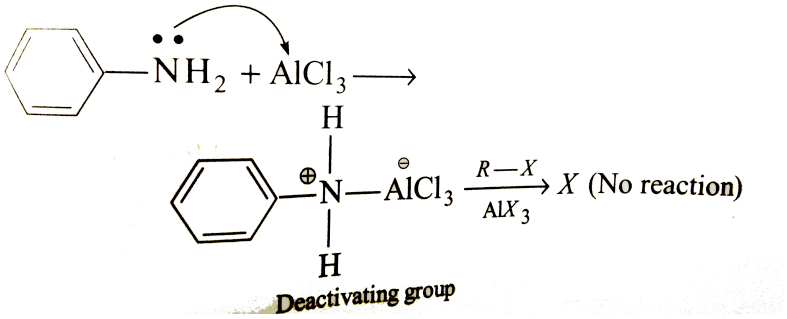
183. A benzene ring deactivated by strong and moderate electron withdrawing group that is, any meta directing group, is not electron rich enough to undergo Friedel-Crafts ranctions.



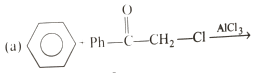
Friedel-Crafts reaction also do not occur with HN_2 group as it react with $AICI_3$ and produce deactivating group.

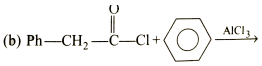


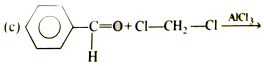
Answer the following question :

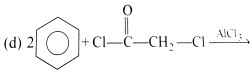
Which of the following cannot be starting for this compound

$$Ph - \underset{\underset{O}{||}}{C} - CH_2 - Ph?$$

A. 

B. 

C. 

D. 

Answer: c

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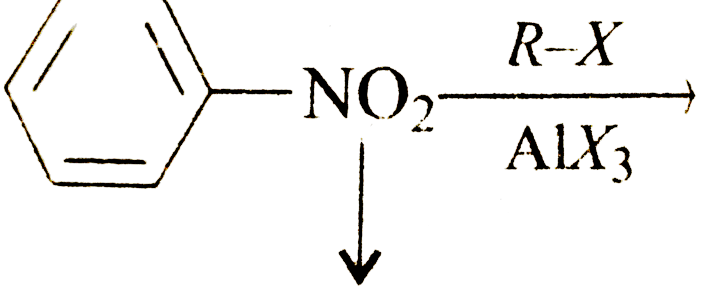
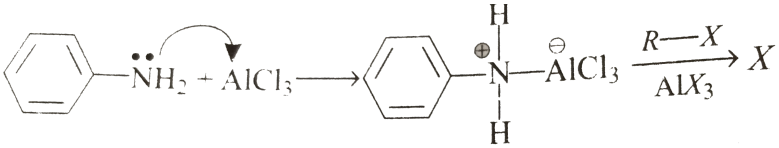
184. A benzene ring deactived by strong and moderate electrons withdrawing group that is, any meta directing group, is not electron rich enough to undergoes Friedel-Carfts reactions.



Strong deactivation

Friedel- Crafts reaction also do not occur with NH_2 group as it react with

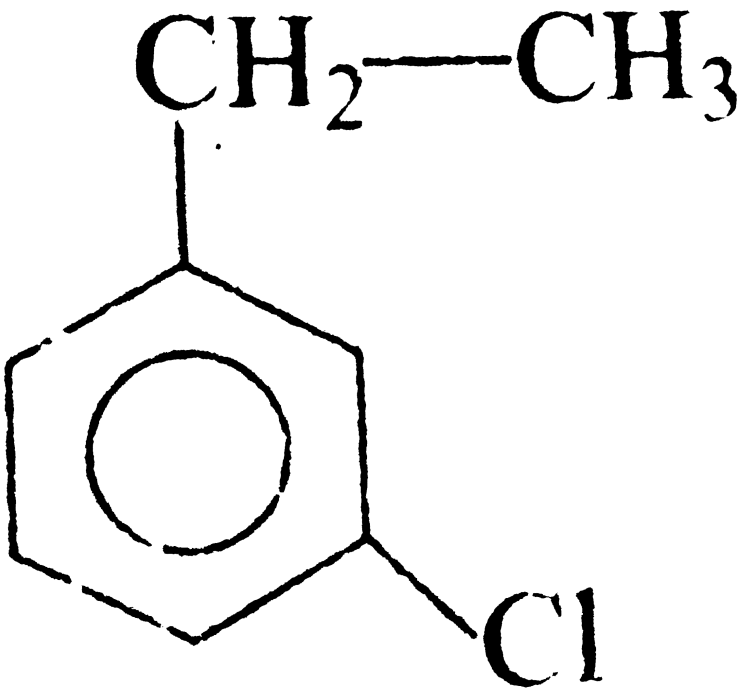
$AlCl_3$ and produce deactivating group .

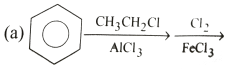


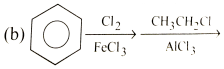
Deactivating group

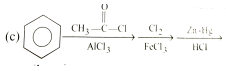
Which of the following sequence of reaction is correct for the synthesis

of product



A. 

B. 

C. 

D. All are incorrect

Answer: c

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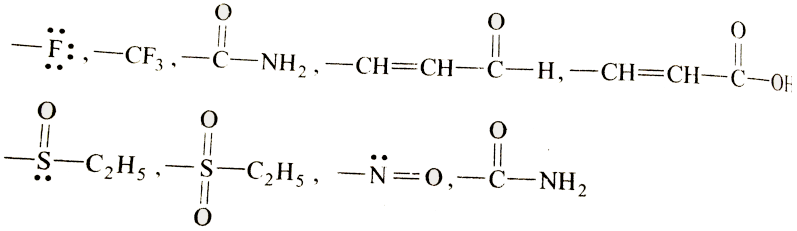
185. Identify number of substituents those are dectivating but ortho and para direacting



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186. Excess chlorine is passed through boiling toluene how many chloroderivatives would you get?

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187. How many different carboxylic acids are obtained when all the isomeric arenes having the molecular formula C_8H_{10} are oxidised with alk. $KMnO_4$ followed by acidification ?

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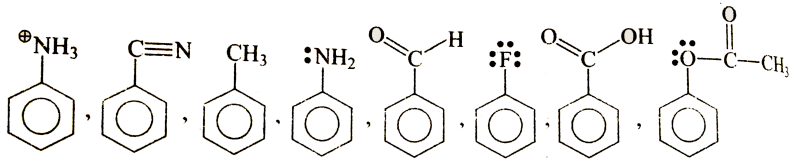
188. Examine the structural formula shown below and find out how many compounds can not give Friedel Carfts reaction .



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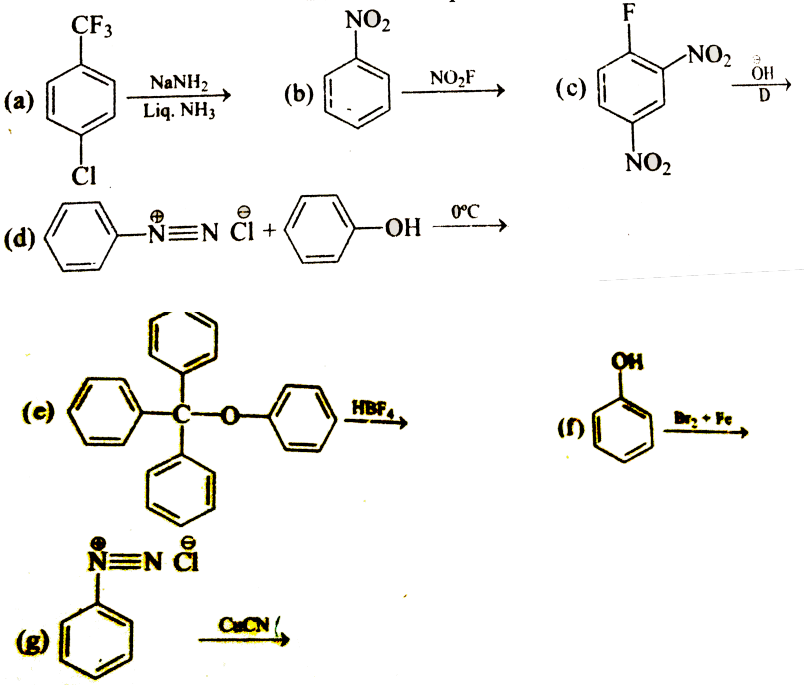
189. Find out number of reaction that are electrophilic aromatic substitution in nature .



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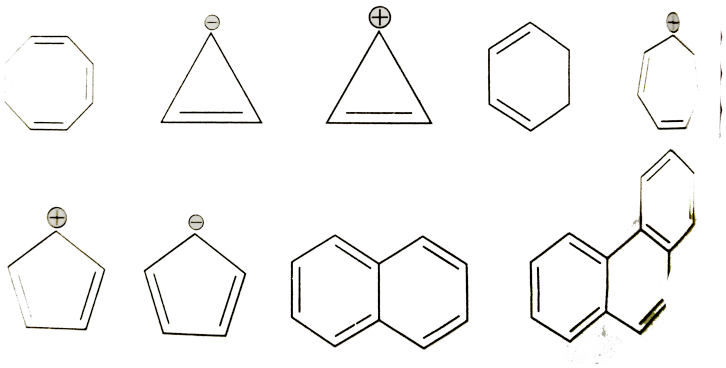
190. Among the following the number of aromatic compound(s) is:



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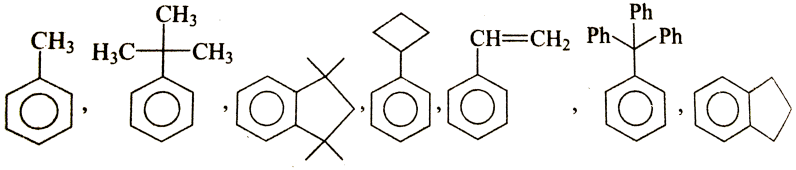
191. Eaxmine the structural formula shown below and find out how many compounds will show oxidation reaction with acidic $KMnO_4$



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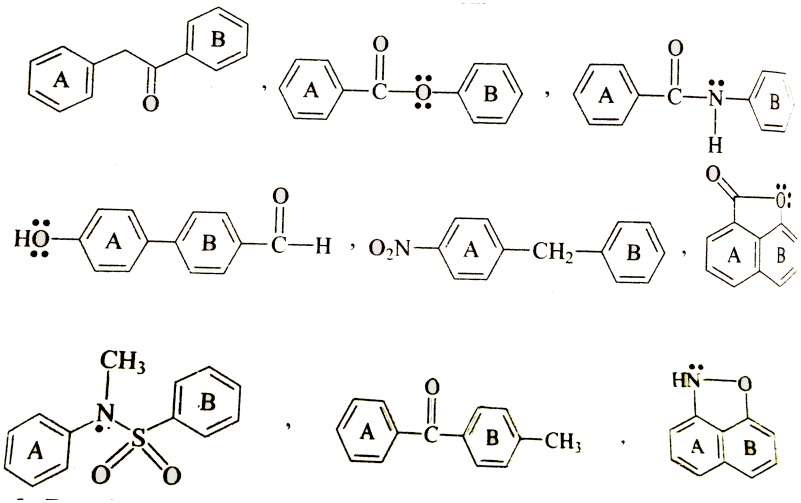
192. Each of the compounds shows below has two aromatic ring. Labled as A and Identify number of compounds in which ring B is more active than ring A for electrophilic aromatic substitution reaction .



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193. When meta-disubstituted benzene $A(C_6H_4X_2)$ is further substituted into $B(C_6H_3X_3)$, the number of isomers of B formed is :

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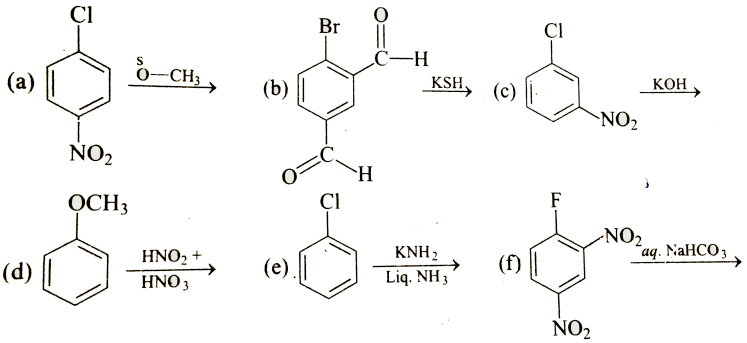
194. Identify number of reaction that can gives nucleophilic aromatic substitution products



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