



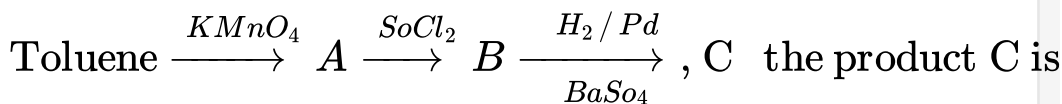
CHEMISTRY

BOOKS - IIT-JEE PREVIOUS YEAR (CHEMISTRY)

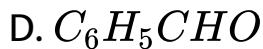
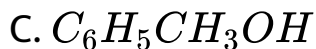
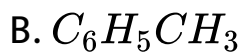
BENZENE AND ALKYL BENZENE

Jee Main And Advanced

1. In the following squence of reactions



A. C_6H_5COOH



Answer: d

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2. Match the four starting materials given in Column I with the corresponding reaction schemes provided in Column II and select the correct answer using the code given below the lists



- A. $A \ B \ C \ D$
 $p \ q \ r \ s$
- B. $A \ B \ C \ D$
 $r \ p \ s \ q$
- C. $A \ B \ C \ D$
 $r \ s \ q \ p$
- D. $A \ B \ C \ D$
 $s \ p \ r \ q$

Answer: c



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3. For which of the following molecule significant

$\mu \neq 0$?



A. only I

B. only II

C. only III

D. III and IV

Answer: d

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4. The compounds P,Q, and s



were separately subjected to nitration using $\text{HNO}_3 / \text{H}_2\text{SO}_4$ mixture. The major product formed in each case respectively, is

A. 

B. 

C. 

D. 

Answer: c

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5. In the reaction,  the product are,

A. 

B. 

C. 

D. 

Answer: d

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6. In the following reaction,



the product X is

A. 

B. 

C. 

D. 

Answer: b

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7. 

P and Q are respectively

A. 

B. 

C. 

D. 

Answer: c

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8. 

product on monobromination of this compound is

A. 

B. 

C. 

D. 

Answer: b

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

(1) Benzene

(2) Toluene

(3) Chlorobenzene,

(4) Nitrobenzene.

A. $1 > 2 > 3 > 4 >$

B. $4 > 3 > 2 > 1 >$

C. $2 > 1 > 3 > 4 >$

D. $2 > 3 > 1 > 4 >$

Answer: c



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10. A solution of (+)2-chloro-2-phenylethane in toluene racemises slowly in the presence of small amount of $SbCl_5$ due to the formation of-

- A. carbanion
- B. carbene
- C. free-radical
- D. carbocation

Answer: d



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11. Benzyl chloride ($C_6H_5CH_2Cl$) can be prepared from toluene by chlorination with

A. SO_2Cl_2

B. $SOCl_2$

C. Cl_2

D. $NaOCl$

Answer: a



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

- A. o-cresol
- B. p-cresol
- C. 2,4-dihydroxy toluene
- D. benzoic acid

Answer: d

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13. The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives predominantly

- A. benzoyl chloride
- B. m-chlorotoluene
- C. benzyl chloride
- D. o- and p-chlorotoluene

Answer: d



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

A. toluene

B. benzene

C. benzoic acid

D. nitrobenzene

Answer: a



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15. Among the following, the compound that can be most readily sulphonated is:

A. benzene

B. nitrobenzene

C. toluene

D. chlorobenzene

Answer: c



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

A. 

B. 

C. 

D. 

Answer: b,c,d

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17. The major product U in the following reaction is



A. 

B. 

C. 

D. 

Answer: b



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18. Which of the following molecules, in pure form, is /are stable at room temperature?

A. 

B. 

C. 

D. 

Answer: b,c,d



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19. An aromatic molecule will

A. have $4n\pi$ – electrons

B. have $(4n + 2)\pi$ – electrons

C. be planar

D. be cyclic

Answer: b,c,d



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20. Toluene, when treated with $\frac{Br_2}{Fe}$, gives p-bromotoluene as the major product because the $-CH_3$ group of toluene is

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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21. A new carbon-carbon bond formation is possible in:

A. Cannizzaro's reaction

B. Friedel-Craft's alkylation

C. Clemmensen reduction

D. Reimer-Tiemann reaction

Answer: b,d

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22. Statement I: In strongly acidic solutions, aniline becomes more reactive towards electrophilic reagents

Statement II: The amino group being completely protonated in strongly acidic solution, the lone pair of electrons on nitrogen is no longer available for resonance.

- A. (a) Statement I is correct, Statement II is correct,
Statement II is a correct explanation of
Statement I.
- B. (b) Statement I is correct, Statement II is correct,
Statement II is not the correct explanation of
Statement I.
- C. Statement I is correct, Statement II is incorrect.
- D. Statement I is incorrect, Statement II is correct.

Answer: d



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23. An electron donating substituent in benzene orients the incoming electrophilic group to the meta-position.

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24. In benzene, carbon uses all the three p-orbitals for hybridisation.

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25. 7-bromo-1,3,5-cycloheptatriene exists as ionic species in aqueous solution while 5-bromo-1,3-

cyclopentadiene doesn't ionise even in presence of $Ag^+ (aq)$, Explain.

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26. What would be the major product in the following reaction?



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27. Give reasons for the following:

(i) tert-butylbenzene does not give benzoic acid on treatment with acidic $KMnO_4$.

(ii) Normally, benzene gives electrophilic substitution reaction rather than electrophilic addition reaction although it has double bond.



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28. show the steps to carry out the following transformations.

(i) Ethylbenzene \rightarrow benzene

(ii) Ethylbenzene \neq \rightarrow 2-phenyl \propto nicotinic acid



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29. The following reaction gives two products. Write the structures of these products.



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30. Give reasons for the following in one or two sentences "Nitrobenzene does not undergo Friedel-Craft's alkylation."

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31. Complete the following, giving the structure of the principle organic products.



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32. Toluene reacts with bromine in the presence of the light to give benzyl bromide, while in presence of $FeBr_3$ it gives p-bromotoluene. Give explanation for the above observation.

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33. Predict the structure of the intermediates/products in the following reaction sequences



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34. Predict the major product in the following reactions



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35. Give reason for the following :

'In acylium ion, the structure $R - C \equiv O^{\oplus}$ is more stable than $R - \overset{\oplus}{C} = O$.

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36. Identify the major product in the following reactions:

(i) 

(ii) $C_6H_5COOH + CH_3MgI \rightarrow ? + ?$

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37. write the structures of the major organic product expected from the following reaction



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38. Give reasons in two or three sentences only for the following: Phenyl group is known to exert negative inductive effect, but each phenyl ring in biphenyl ($C_6H_5 - C_6H_5$) is more reactive than benzene towards electrophilic substitution.

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39. Arrange the following in increasing order of reactivity towards sulphonation with fuming sulphuric acid.

Benzene, toluene, methoxy benzene, chlorobenzene.

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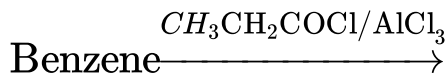
40. Answer the following with suitable equation wherever necessary

(i) How can you prepare benzene from lime?

(ii) How will you convert toluene to m-nitrobenzoic acid?

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41. Write down the main product of the following reaction



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42. How many sigma and pi bonds are present in a benzene molecule?

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43. Write down the reaction involved in the preparation of following using the reagents indicated

against in parenthesis.

"Ethyl benzene from benzene."

[C_2H_5OH , PCl , anhyd. $AlCl_3$]



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44. Show with balanced equation what happens when the 'p-xylene is reacted with concentrated sulphuric acid and the resultant product is fused with KOH'.



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45. Give reason for the following in one or two sentences:

'Although benzene is highly unsaturated, normally it does not undergo addition reaction'.

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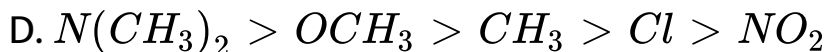
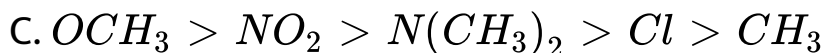
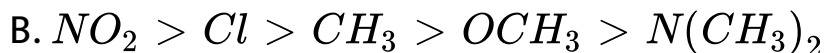
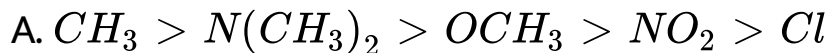
46. Among the following, the number of aromatic compound(s) is



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47. which of the following sequence correctly represents the order of activation, by ring

substituents, of an aromatic ring to electrophilic attack?



Answer: d



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48. Which one of the following cyclic olefins would you predict to be aromatic?

A. 

B. 

C. 

D. 

Answer: d



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49. Which of the following carbanion is most stable?

A. 

B. 

C. 

D. 

Answer: c

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50. Rank the following compounds in decreasing order of reactivity in electrophilic aromatic substitution reaction



A. $IV > I > III > II$

B. $II > I > IV > II$


C. $I > II > IV > II$

D. $II > II > I > IV$

Answer: c

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51. Give the major product the following reaction

 major product

A. 

B. 

C. 

D. 

Answer: c

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52. Select from the following molecules or ions which is/are aromatic?

A. 

B. 

C. 

D. 

Answer: a,c,d

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53. What is/are true regarding nitration and sulphonation of benzene?

A. Nitration of C_6H_6 occurs at slightly faster rate than that of C_6D_6

B. Sulphonation of C_6H_6 occurs at slightly faster than that of C_6D_6

C. Addition of concentrated sulphuric acid catalyses the nitration of benzene with concentrated nitric acid.

D. Nitration of benzene is easier than sulphonation

Answer: b,c,d



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54. Following two question have assertion followed by the reason. Answer them according to the following options

Assertion Friedel Craft alkylation of benzene with n-propyl chloride, fail to produce propyl benzene.

Reason Carbocation rearrangement produces rearranged isopropyl benzene as major product.

A. Both assertion and reason are correct and reason is the correct explanation of the

assertation.

B. Both assertion and reason are correct but reason is not the correct explanation of assertion.

C. Assertion is correct but reason is incorrect.

D. Assertion is incorrect but reason is incorrect.

Answer: a

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55. Following two question have assertion followed by the reason. Answer them according to the following

options

Assertion 5-Chloro-1, 3-cyclopentadiene is very resistant to S_N1 reaction.

Reason It produces a resonance stabilised carbocation.

- A. Both assertion and reason are correct and reason is the correct explanation of the assertion.
- B. Both assertion and reason are correct but reason is not the correct explanation of assertion.
- C. Assertion is correct but reason is incorrect.
- D. Assertion is incorrect but reason is incorrect.

Answer: b

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56. If benzene is treated with 4-chloro-1-butene in presence of $AlCl_3$, how many different mono-substitution products would be formed?

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Others

1. In which of the following reaction, reactants and products are correctly matched?

A. 

B. 

C. 

D. 

Answer: a,b,c



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2. Consider the compound on left column and match with reactions from right column by which they can be prepared:



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3. Consider the following compounds



How many of the above compounds are less reactive than benzene in aromatic electrophilic substitution reaction?

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