

IIT-JEE-2012-P2-Model

Time:2:00 PM to 5:00 PM

IMPORTANT INSTRUCTIONS

Max Marks: 198

PHYSICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 1 – 8)	Questions with Single Correct Choice	3	-1	8	24
Sec – II(Q.N : 9 – 14)	Questions with Comprehension Type (3 Comprehensions : 2+2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 15 – 20)	Questions with Multiple Correct Choice	4	0	6	24
Total				20	66

CHEMISTRY:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 21 – 28)	Questions with Single Correct Choice	3	-1	8	24
Sec – II(Q.N : 29 – 34)	Questions with Comprehension Type (3 Comprehensions : 2+2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 35 – 40)	Questions with Multiple Correct Choice	4	0	6	24
Total				20	66

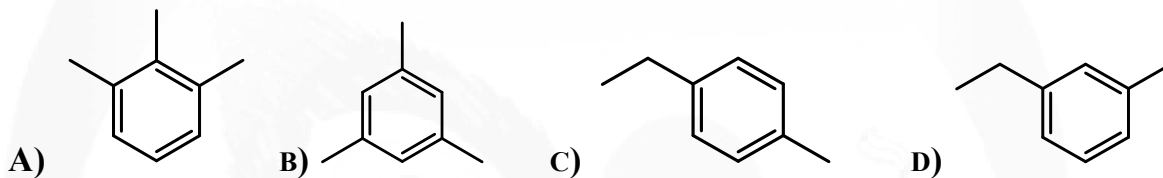
MATHEMATICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : (41 – 48)	Questions with Single Correct Choice	3	-1	8	24
Sec – II(Q.N : (49 – 54)	Questions with Comprehension Type (3 Comprehensions : 2+2+2 = 6Q)	3	-1	6	18
Sec – III(Q.N : 55 – 60)	Questions with Multiple Correct Choice	4	0	6	24
Total				20	66

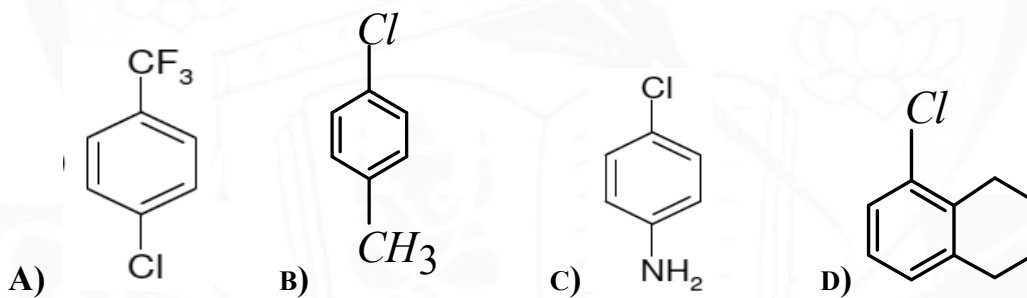
CHEMISTRY:**Max. Marks: 66****SECTION – I
(SINGLE CORRECT CHOICE TYPE)**

This section contains **8 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct

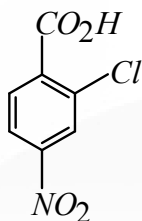
21. What C_9H_{12} hydrocarbon would give a single $C_9H_{11}SO_3H$ product on sulfonation?



22. Which of the following compounds is more reactive than chlorobenzene in reaction with $NaCN(aq)$?

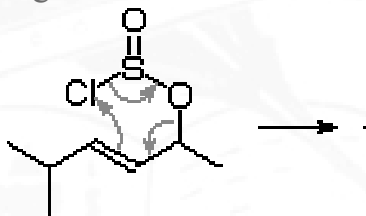


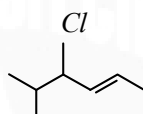
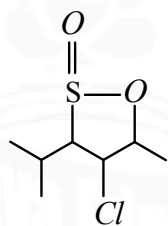
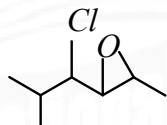
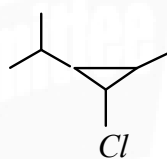
23. Which one of the following is the best synthesis of 2-chloro-4-nitrobenzoic acid?

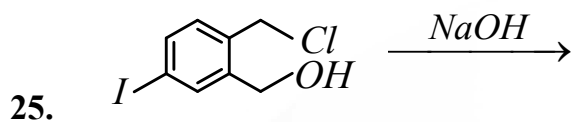


- A) 1) Treat chlorobenzene with HNO_3, H_2SO_4 B) 1) Treat toluene with HNO_3, H_2SO_4
2) $CH_3Cl, AlCl_3$ 2) $K_2Cr_2O_7, H_2O, H_2SO_4$, heat
3) $K_2Cr_2O_7, H_2O, H_2SO_4$, heat 3) $Cl_2, FeCl_3$, heat
C) 1) Treat toluene with HNO_3, H_2SO_4 D) 1) Treat nitrobenzene with $Cl_2, FeCl_3$, heat
2) $Cl_2, FeCl_3$, heat 2) $CH_3Cl, AlCl_3$
3) $K_2Cr_2O_7, H_2O, H_2SO_4$, heat 3) $K_2Cr_2O_7, H_2O, H_2SO_4$, heat

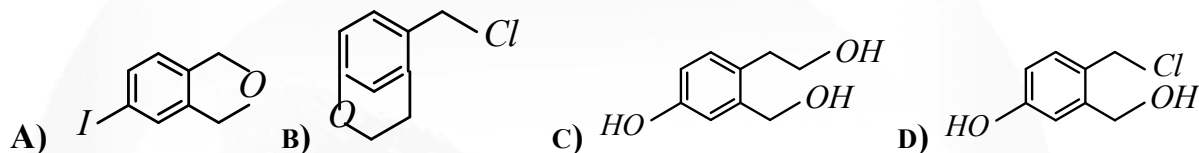
24. Which of the following is the most likely product from the reaction illustrated by the curved arrows in the formula given below?



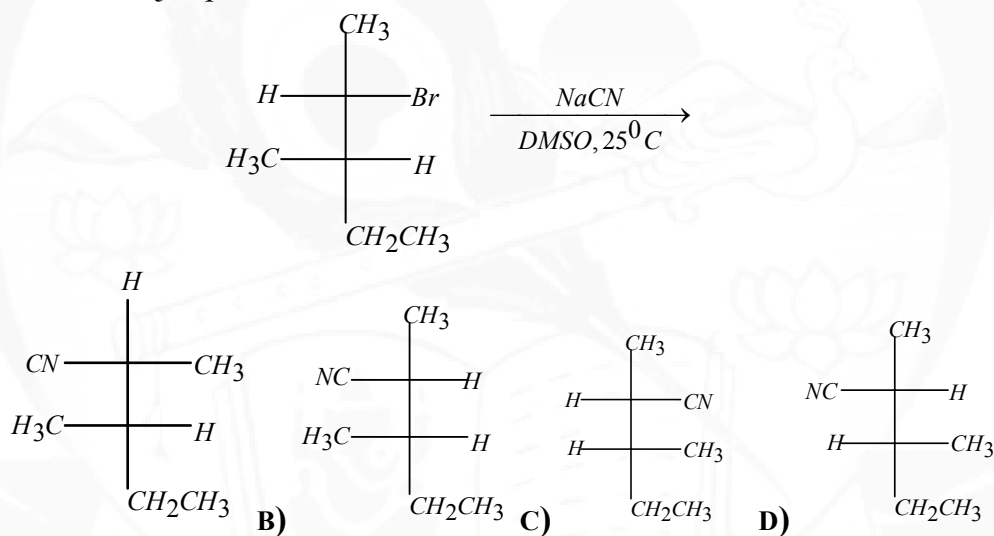
- A)  + SO_2 B) 
C)  + SO_2 D)  + SO_2



the possible product of the above reaction is



26. What is the major product of the reaction shown?



27. In the S_N2 reaction of iodide ion with $(CH_3)_2CHCH_2CH_2X$ what is the order of decreasing reactivity for the following X substituent's?

I) $X = -OH$ II) $X = CH_3CO_2-$ iii) $X = CF_3SO_3-$ IV) $X = CCl_3CO_2-$

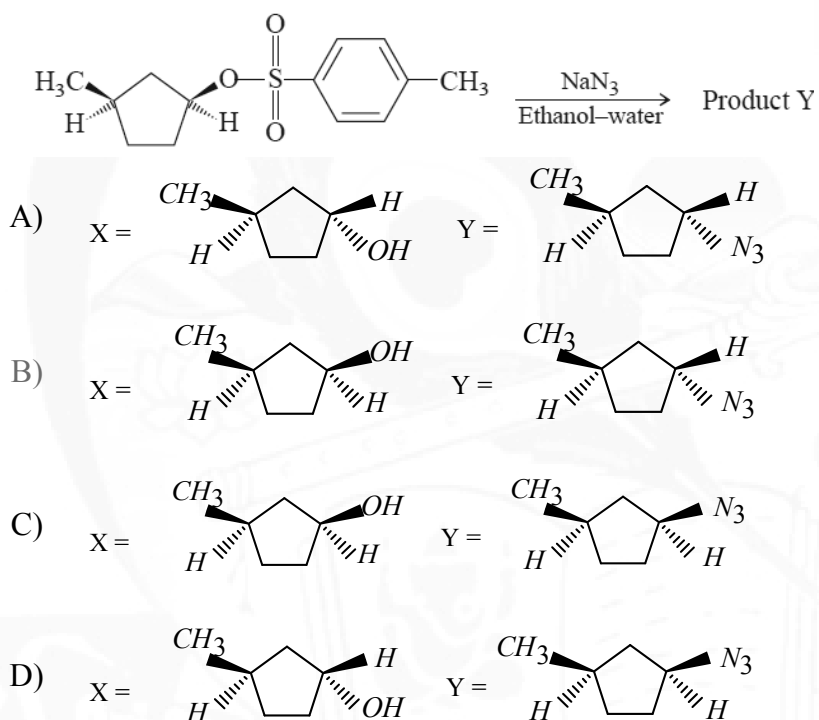
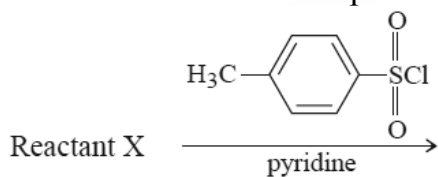
A) I > II > III > IV

B) IV > III > II > I

C) III > II > IV > I

D) III > IV > II > I

28. What are reactant X and product Y in the following sequence of reactions?



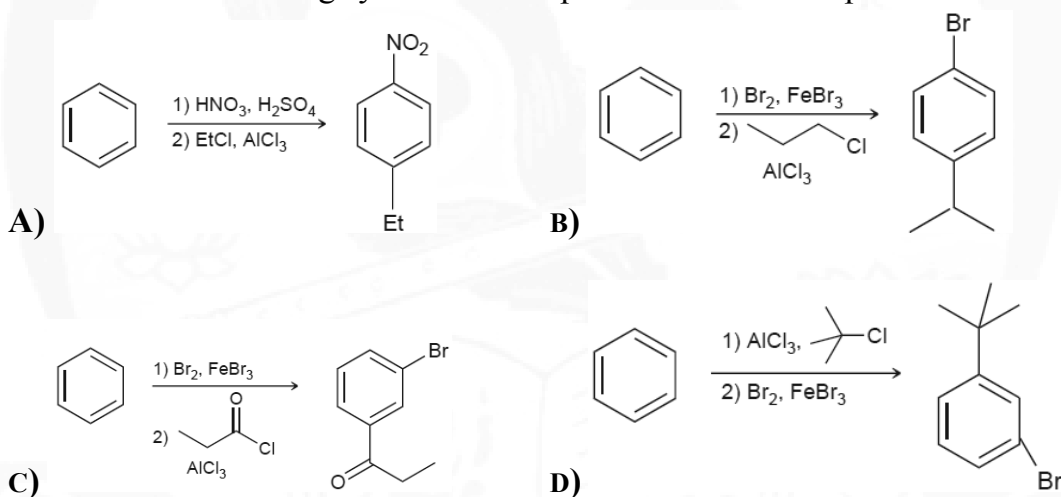
SECTION - II
(COMPREHENSION TYPE)

This section contains **6 multiple choice questions** relating to three paragraphs with two questions on each paragraph. Each question has 4 choices A), B), C) and D) for its answer, out of which **ONLY ONE is correct**.

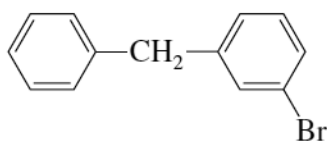
Passage-I :

For cases involving electrophilic aromatic substitution of aromatic rings with two or more substituent's already on the ring, the more activating group will dominate the orientation preference of the incoming group. This is because activating groups will activate the ring for more substitution according to their orientation preference, while deactivating groups only serve to deactivate the ring toward further substitution. In practice, this means that ortho-para directing groups will dominate meta directing groups when they are both on a ring

29. Which of the following syntheses will produce the desired product.



30. Which sequence of steps describes the best synthesis of the compound shown?



- A) $\xrightarrow[\text{AlCl}_3]{\text{C}_6\text{H}_5\text{CH}_2\text{Cl}}$ $\xrightarrow[\text{FeBr}_3]{\text{Br}_2}$
- B) $\xrightarrow[\text{FeBr}_3]{\text{Br}_2}$ $\xrightarrow[\text{AlCl}_3]{\text{C}_6\text{H}_5\text{CH}_2\text{Cl}}$
- C) $\xrightarrow[\text{AlCl}_3]{\text{C}_6\text{H}_5\text{COCl}}$ $\xrightarrow[\text{FeBr}_3]{\text{Br}_2}$ $\xrightarrow[\text{HCl}]{\text{Zn(Hg)}}$
- D) $\xrightarrow[\text{FeBr}_3]{\text{Br}_2}$ $\xrightarrow[\text{AlCl}_3]{\text{C}_6\text{H}_5\text{COCl}}$ $\xrightarrow[\text{HCl}]{\text{Zn(Hg)}}$

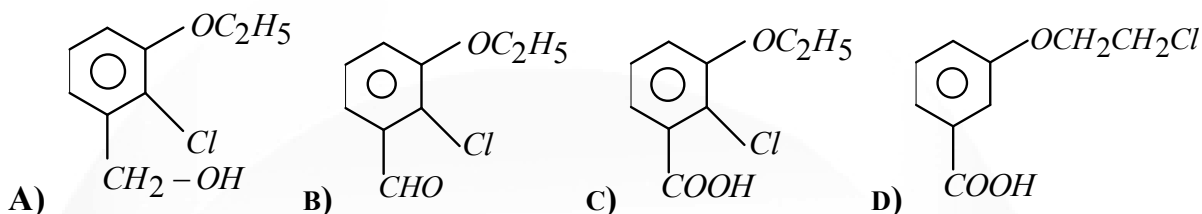
Passage-II :

Two stereo isomeric forms of A ($\text{C}_{11}\text{H}_{13}\text{OCl}$) readily decolourise $\text{Br}_2/\text{H}_2\text{O}$ and gives same compound (B) on catalytic hydrogenation. Both isomeric forms on vigorous oxidation gives (C) which on treatment with soda lime gives 2-chloroethoxy benzene.

31. The structural formula of (A) is

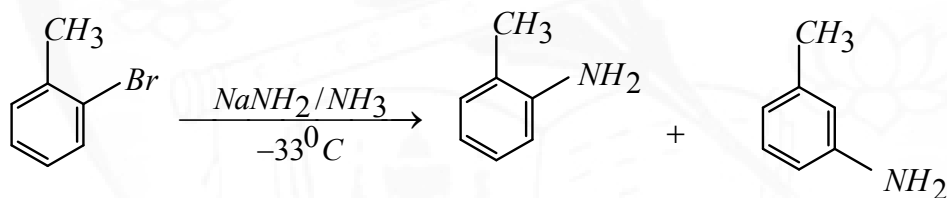
- A)
- B)
- C)
- D)

32. The compound 'C' is



Passage-III

Very strong bases such as sodium or potassium amide react readily with aryl halides, even those without electron-withdrawing substituents, to give products of nucleophilic substitution by the base. Substitution does not occur exclusively at the carbon with the halide, as shown for the following reaction of *o*-bromotoluene with sodium amide.



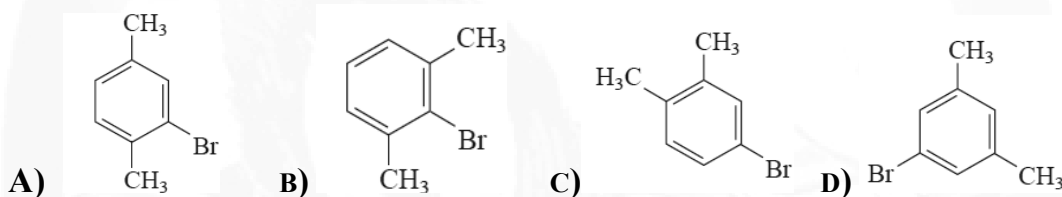
On the basis of labeled experiment, an alternative mechanism was proposed for the substitution reaction of aryl halide with strong base, the elimination addition mechanism.

In the first step, base removes proton from the carbon on the ring adjacent to the one with halogen. The product is an unstable intermediate known as Benzene.

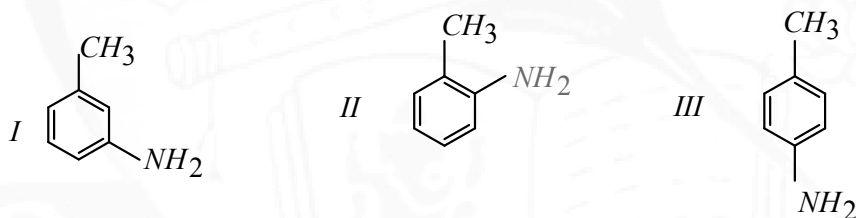
In second step, base now act as nucleophile, adding to one of the carbons of triple bond. This addition step gives an aryl anion.

In the final step, the aryl anion abstract proton from solvent to give product.

33. Which one of the following isomers of bromodimethylbenzene *cannot* undergo nucleophilic aromatic substitution by treatment with sodium amide in liquid ammonia?

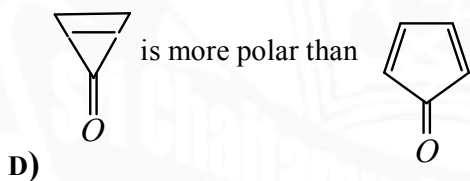


34. Which of the following methyl anilines can be formed by the reaction of P-bromotoluene with $\text{NaNH}_2 / \text{NH}_3$ at -33°C .

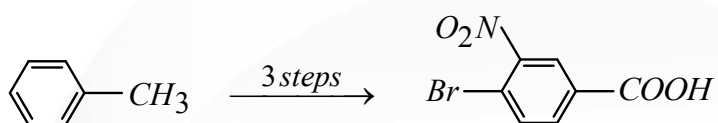


- A) I and II B) II and III C) I and III D) I, II and III

This section contains **6 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONE OR MORE is/ are correct**



37. The transformation shown below can be accomplished in three steps each step is performed by isolating Major product of previous step.



- A) step I - Bromination and isolation of P-bromotoluene
B) step II - oxidation of the methyl group to a carboxylic acid
C) step III - Nitration
D) step III has good regioselectivity since *O/P*-directing bromine substituent is located in a complementary location to *m*-directing COOH
38. Which of the following does convert a 1° -hydroxyl group into a good leaving group for a $\text{S}_\text{N}2$ reaction?
- A) SOCl_2 B) $\text{CH}_3\text{SO}_2\text{Cl}$ C) PBr_3 D) NaI

