CHEMISTRY

RESONANCE ENGLISH

ORGANIC REACTION MECHANISMS - II

Exercise-1 Part-1

1. Explain why are electrophilic substitution reactions the most characteristic reactions of benzene?

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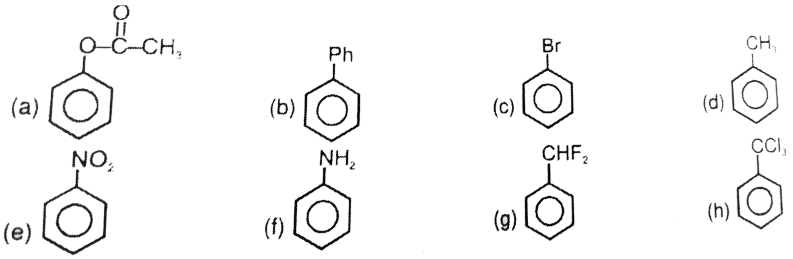
2. Which of the following Benzene rings contain deactivating groups ?



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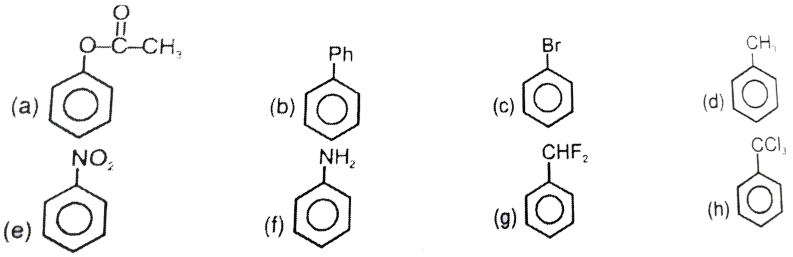
3. Which of the following Benzene rings contain deactivating groups ?



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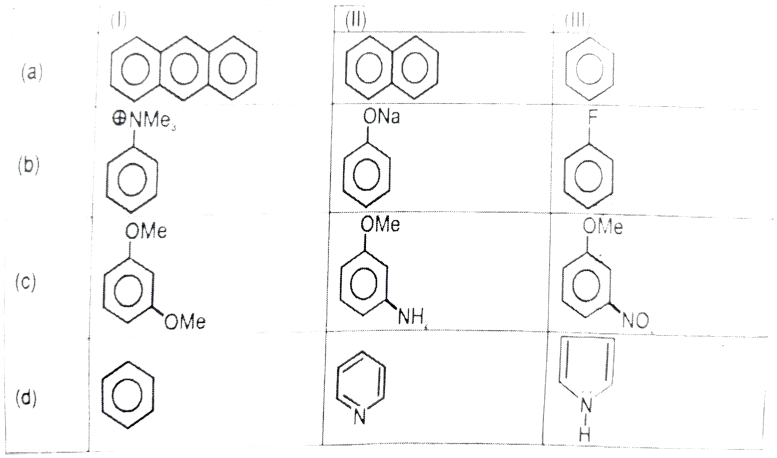
4. Arrange the following in decreasing order of their reactivity with an electrophile.



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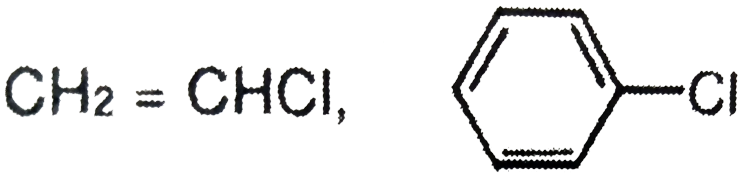
5. Why following organic chlorides will not give a Friedel-Craft alkylation product when heated with benzene and $AlCl_3$?

$CH_2 = CHCl$,



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6. How do you account for the formation of ethane during chlorination of methane ?

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7. Give the major product of monobromination of following compounds.

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

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8. Explain the mechanism of the reaction is given below :

$$2CH_3 - CH_2 - Oh \xrightarrow[413K]{H^+} CH_3CH_2 - O - CH_2 - CH_3 + H_2O$$

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9. The products (A) and (B) are respectively.

(i) $CH_3 - \underset{\underset{Br}{|}}{CH} - \underset{\underset{CH_3}{|}}{CH} - CH_3 \xrightarrow{C_2H_5ONa} (A)$

(ii) $CH_2 = \underset{\underset{CH_3}{|}}{\overset{CH_3}{|}}{C} - CH_2CH_3 \xrightarrow[\text{Peroxide}]{HBr} (B)$

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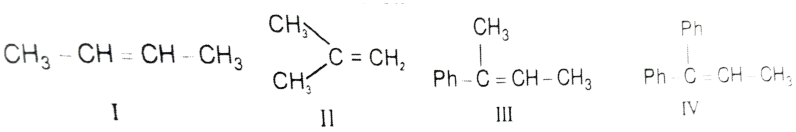
10. What will be order of reactivity of following compounds towards addition of HBr ?



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11. Arrange the following in the order as mentioned :

$(CH_3)_3C - (CH_3)_2CH - CH_3CH_2 - CH_3$ - groups in the order of increasing + I-effect,

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12. Give product of the following reactions.

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13. What will happen when Br_2/CCl_4 react with (a) cis But-2-ene (b) trans But-2-ene.

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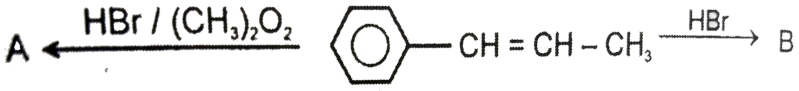
14. In the reaction sequence,



What is the relationship between A & B.

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Exercise-1 Part-2

1. The reagent used for Friedel-Craft's reaction is :

A. Dry ether

B. $AlCl_3$

C. Anhydrous $AlCl_3$

D. P_2O_5

Answer: C

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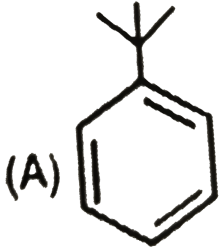
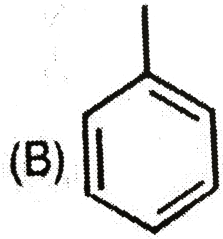
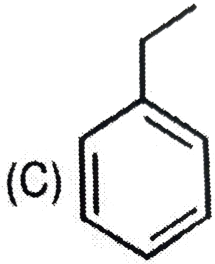
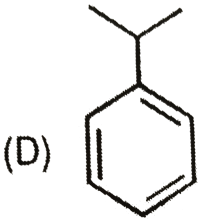
2. Which of the following will undergo sulphonation at fastest rate ?

A. 

B. 

C. 

D. 

Answer: B

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3. Which among the following is deactivating group ?

A. $-Cl$

B. $-OR$

C. $-NH_2$

D. $-NHR$

Answer: A

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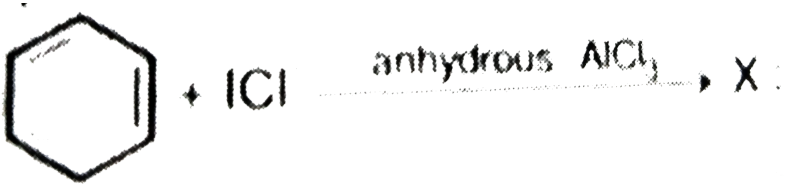
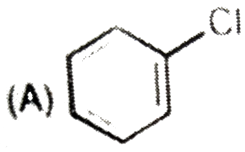
4. The compound X in the reaction is :



A.



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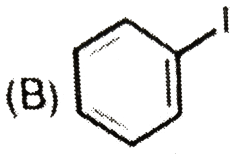

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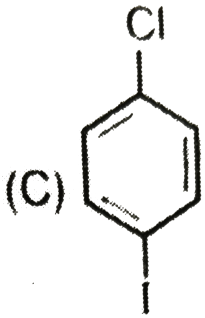
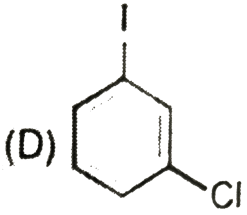


D.



Answer: B

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5. Toluene o/p orienting with respect to an electrophilic substitution reaction due to

A. I effect of the methyl group

B. I as well as +m effect of the methyl group

C. hyperconjugation between the methyl group and the phenyl ring

D. $+m$ effect of the methyl group .

Answer: C

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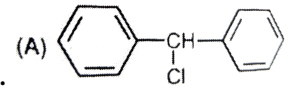
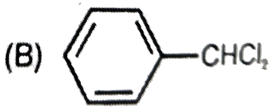
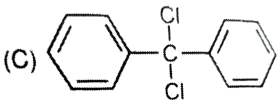
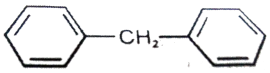
6. Which of the following structures correspond to the product expected, when excess of C_6H_6 reacts with CH_2Cl_2 in presence of anhydrous $AlCl_3$.

A. 

B. 

C. 

D. 

Answer: D

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7. Benzene undergoes substituion reaction more easily than addition because

A. In alkylation, a poisonous gas is evolved

B. In alkylation, large amount of heat is evolved

C. In alkylation, polyalkylated proudct is formed

D. Alkylation is very costly.

Answer: C

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8. Which one is o, p-directiong group for electrophliic substitution reaction ?

A. $+m$ of Ph

B. $+I$ of Cl

C. $+m$ of Cl

D. $+I$ of Ph

Answer: C

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9. In the free-radical chlorination of methane, the chain-intiation step involves the formation of:

A. Chlorine radical

B. Hydrogen chloride

C. Methyl radical

D. Chloromethyl radical

Answer: A

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10. The maximum ease of abstraction of a hydrogen atom by a chlorine atom is given by :

A. $(CH_3)_3C - CH_3$

B. $(CH_3)_2CH_2$

C. $C_6H_5CH_3$

D. $CH_2 = CHCH_3$

Answer: C

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11. Methane reacts with excess of chlorine is diffused sunlight to give the final product as

A. Chloroform

B. Methyl chloride

C. Methylene chloride

D. Carbon tetrachloride

Answer: D

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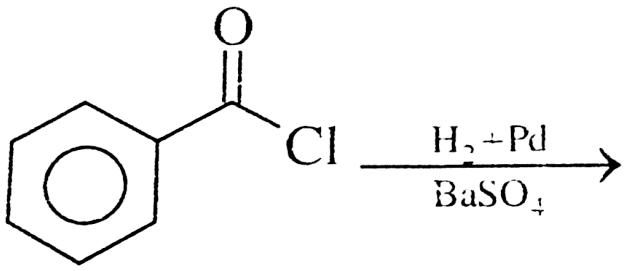
12.



The above reaction is known as

A. Electrophilic substitution reaction

B. Free radical substitution reaction

C. Nucleophilic substitution reaction

D. Electrophilic addition reaction

Answer: B

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13. In which of the following pairs the bromination of first member is easier than the second member ?

A. Isobutane, n-Butane

B. n-Butane, Isobutane

C. Methane, Ethane

D. None of these

Answer: A

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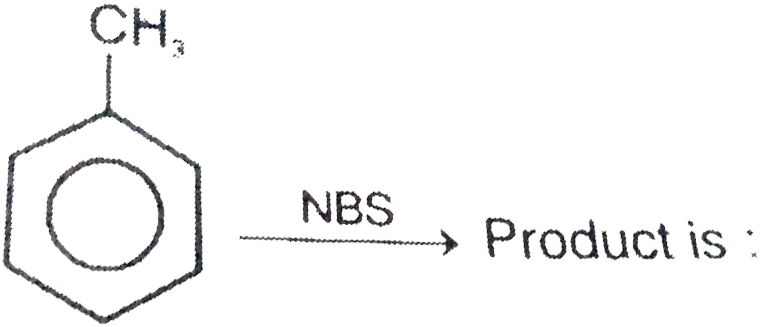
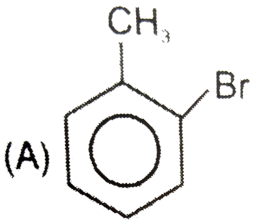
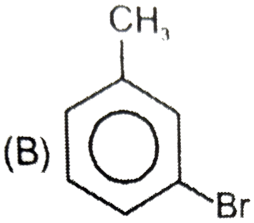
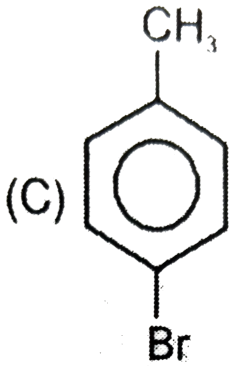
14. 

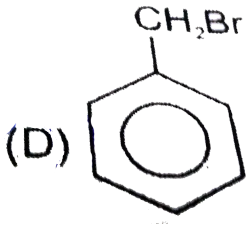
A. 

B. 

C.



D.



Answer: D

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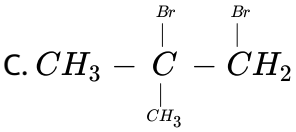
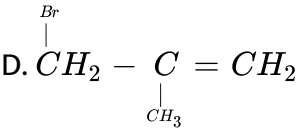
15. $CH_3 - \underset{CH_3}{\overset{|}{C}} = CH_2 + HBr \xrightarrow{R_2O_2}$ Product is :

A. $CH_3 - \underset{CH_3}{\overset{|}{C}}H - \overset{Br}{\overset{|}{C}}H_2$

B. $CH_3 - \overset{Br}{\overset{|}{\underset{CH_3}{\overset{|}{C}}}} - CH_3$

C. 

D. 

Answer: A

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16. One of the following which does not observe the anti-Markovnikoff's addition of HBr is

A. Propene

B. 1-Butene

C. But-2-ene

D. Isobutene

Answer: C

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17. What are hybridisation states of each carbon atom in the following compounds?

$CH_2 = C = O, CH_3CH = CH_2(CH_3)_2CO, CH_2 = CHCN, C_6H_6$

A. III gt I gt II gt IV

B. III gt IV gt II gt I

C. II gt IV gt III gt I

D. I gt II gt III gt IV

Answer: B

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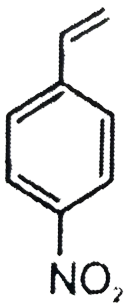
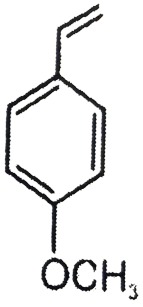
18. Arrange in decreasing order of reactivity with HCl :



I

II



III

A. II gt III gt I

B. III gt II gt I

C. III gt I gt II

D. none of the above

Answer: B

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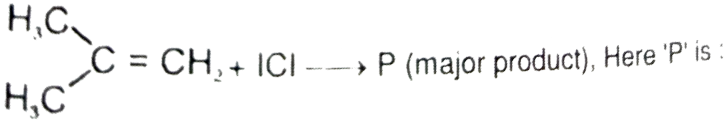
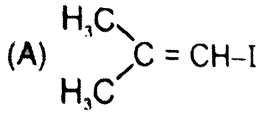
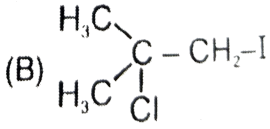
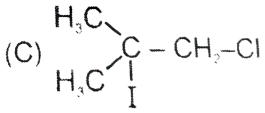
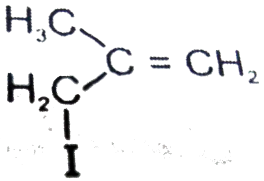
19. 

A. 

B. 

C. 

D. 

Answer: B

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20. In the given reaction

$CH_3 - CH = CH - CH_2 - OH \xrightarrow{PCC}$ Product

Product is :

A. $CCl_3\underset{\underset{OH}{|}}{C}HCH_2Cl$

B. $CCl_3\underset{\underset{Cl}{|}}{C}HCH_2OH$

C. $CCl_3\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}}HCH_2$

D. $CCl_3\underset{\underset{OH}{|}}{\overset{\overset{OH}{|}}{C}}HCH_2$

Answer: B

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21. In which fo the following reaction the product formed by anti markonikoff rule is observed:

A. $CF_3CH = CH_2 \xrightarrow{HCl}$

B. $ClCH = CH_2 \xrightarrow{HCl}$

C. $CH_3OCH = CH_2 \xrightarrow{HCl}$

D. None

Answer: A

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22. Which will form 2,2-Dibromopropane with HBr ?

A. $CH_2 = CH - CH_3$

B. $CH_3 - C \equiv CH$

C. $CH_3 - \underset{\underset{Br}{|}}{C} = CH_2$

D. Both B & C

Answer: D

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23. $Ph - CH_2 - CH = CH_2 \xrightarrow{\text{dil } H_2SO_4} A$, is

A. $Ph - CH_2 - CH_2 - CH_2 - OH$

B. $Ph - CH_2 - \underset{\underset{OH}{|}}{CH} - CH_3$

C. $Ph - \underset{\underset{OH}{|}}{CH} - CH_2 - CH_3$

D. $Ph - CH_2 - OH$

Answer: C

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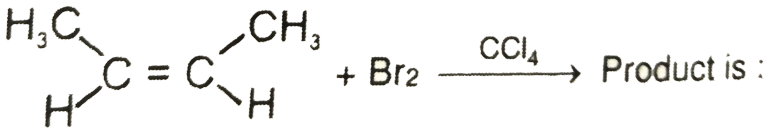
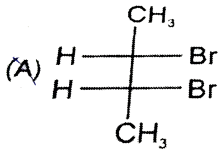
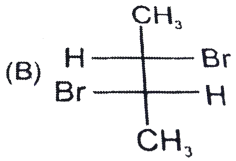


24.

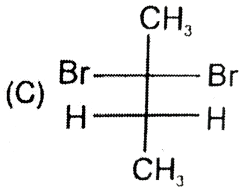
A.



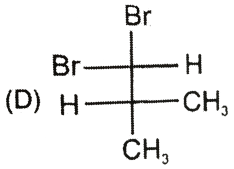
B.



C.



D.



Answer: B

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25. What is the product when one mole of Pent-1-yne treated with two moles of HCl ?

A. 1,2-Dichloropentane

B. 2,3-Dichloropentane

C. 1,1-Dichloropentane

D. 2,2-Dichloropentane

Answer: D

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26. The products obtained via oxymercuration $(HgSO_4 + H_2SO_4)$ of 1-butyne would be :

A. $CH_3 - CH_2 - \overset{O}{\overset{||}{C}} - CH_3$

B. $CH_3 - CH_2 - CH_2 - CHO$

C. $CH_3 - CH_2 - CHO + HCHO$

D. $CH_3 - CH_2 - COOH + HCOOH$

Answer: A

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Exercise-1 Part-3

1. Match List I (Reaction) with List II (Type of reaction) and select the correct answer using the code given below the lists :

	List I		List II
(P)	$CH_3-CH_2-CH_2-CH_3 + Br_2 \xrightarrow{h\nu}$	(1)	Electrophilic addition
(Q)	$CH_3-CH=CH-CH_3 + Br_2 \xrightarrow{CCl_4}$	(2)	Nucleophilic addition
(R)	 $+ Br_2 \xrightarrow{Fe}$	(3)	Free radical subsitution
(S)	$CH_3-CH_2-CH_2-CHO + LiAlH_4 \xrightarrow{H_2O}$	(4)	Electrophilic subsitution

A. $\begin{matrix} P & Q & R & S \\ 2 & 1 & 3 & 4 \end{matrix}$

B. $\begin{matrix} P & Q & R & S \\ 3 & 2 & 1 & 4 \end{matrix}$

C. $\begin{matrix} P & Q & R & S \\ 4 & 2 & 1 & 3 \end{matrix}$

D. $\begin{matrix} P & Q & R & S \\ 3 & 1 & 4 & 2 \end{matrix}$

Answer: D

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2. Match the column-I with column-II :

	Column-I Group		Column-II Nature
(A)	$-Cl$	(p)	Activating
(B)	$-CH_3$	(q)	deactivating
(C)	$-OH$	(r)	o,p-directing
(D)	$-NO_2$	(s)	m-directing

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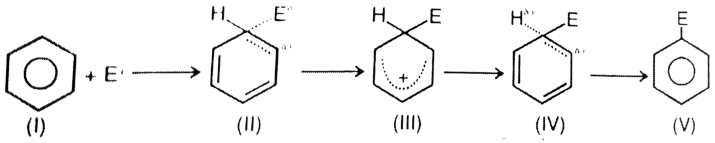
Exercise-2 Part-1

1. Which of the following species is expected to have maximum enthalpy in an electrophilic aromatic substitution reaction ?



A. Species (II)

B. Species (III)

C. Species (IV)

D. Species (V)

Answer: A

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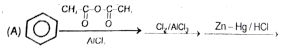
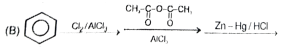
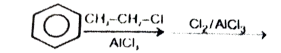
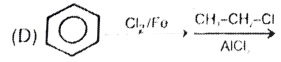
2. Which step is used to produce 1-Chloro-3-ethylbenzene

A. 

B. 

C. 

D. 

Answer: A

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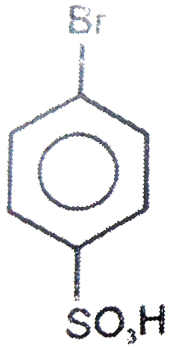
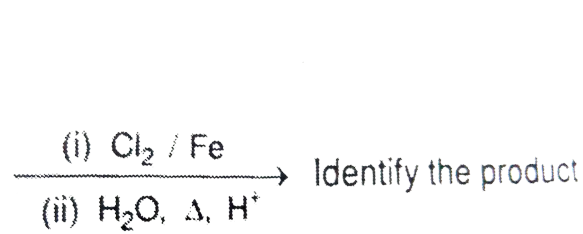
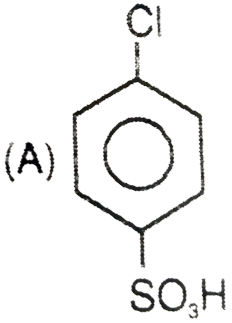
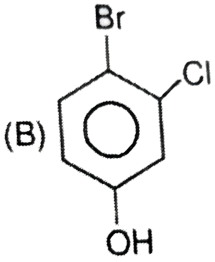
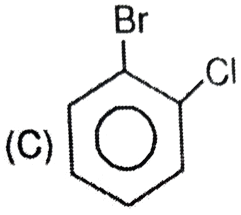
3. 

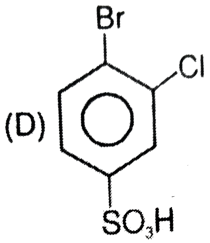


Identify the product

A. 

B. 

C. 



D.

Answer: C

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4. Which statement is correct about photochemical bromination of Butane ?

$$CH_3 - CH_2 - CH_2 - CH_3 \xrightarrow{Br_2, h\upsilon}$$

A. 1-Bromobutane and 2-Bromobutanes are formed in equal amounts.

B. 2-Bromobutane is formed with faster rate than 2-chlorobutane in the other experiment of chlorination.

C. The major product is an equimolar mixture of two compounds.

D. Major product is formed by more stable carbocation.

Answer: C

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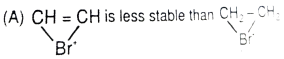
5. Identify the incorrect statement / statement :

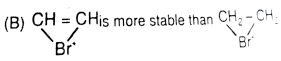
(i) Alkynes are more reactive than alkenes towards electrophilic addiction reaction

(ii) Alkynes are less reactive than alkenes towards electrophilic addiction reaction

(iii) Alkanes decolourise Br_2 water

(iv) Addition of HBr to alkenes in presence of peroxide proceeds via Markownikoff's rule

A. 

B. 

C. Both are equally stable

D. Original statement is incorrect.

Answer: A

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6. The correct order of reactivity towards electrophilic substitution is

A. $CH_2 = CH - Cl > CH_2 = CH - OCH_3$

B. $CH_2 = CHCl < CH_2 = CCl_2$

C. $CH_2 = CH_2 > CH_3 - CH = CH_2$

D. $CH_2 = CH - OCH_3 > CH_2 = CH - CH_2 - OH$

Answer: D

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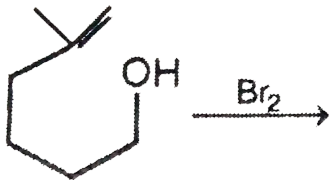
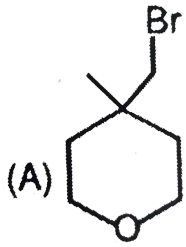
7.

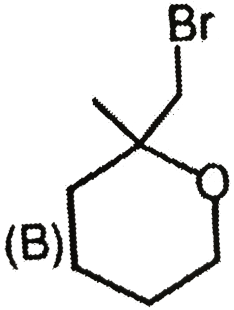


P (Major Product) 'P' is

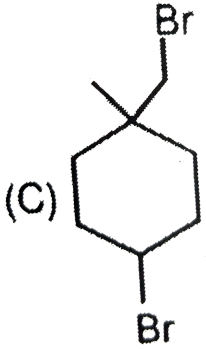
A.



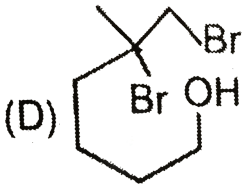
B.



C.



D.



Answer: B

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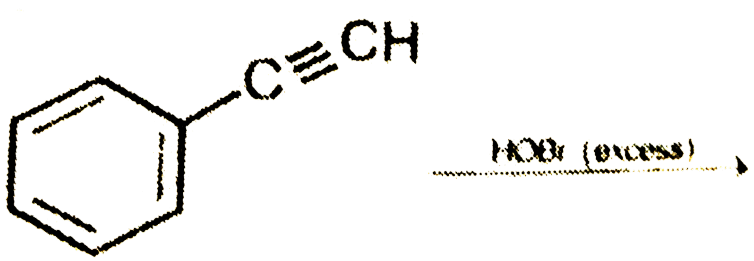
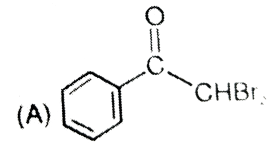
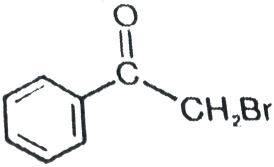
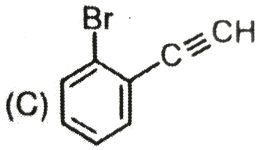
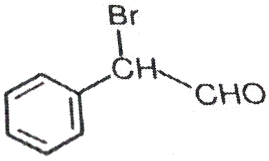
8. 

A. 

B. 

C. 

D. 

Answer: A

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9. The reaction of one equivalent of HBr with $CH_2 = CH - CH_2 - C \equiv CH$ gives :

A. $CH_2 = CH - CH_2 - C \equiv CBr$

B. $CH_2 = CH - CH_2 - \underset{\underset{Br}{|}}{C} = CH_2$

C. $CH_3 - \underset{\underset{Br}{|}}{CH} - CH_2 - C \equiv CH$

D. $CH_2 = CH - CH_2 - CH = CHBr$

Answer: C

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10. The reaction of one equivalent of HBr with

$CH_2 = CH - C \equiv CH$ gives

A. $CH_2 = CH - C \equiv CBr$

B. $CH_2 = CH - \underset{\underset{Br}{|}}{C} = CH_2$

C. $CH_3 - \underset{\underset{Br}{|}}{CH} - C \equiv CH$

D. $CH_2 = CH - CH = CHBr$

Answer: B

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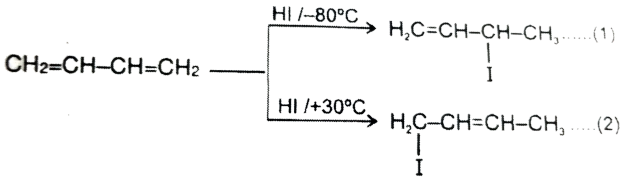
11. At given temperature , these reaction tell about control of reaction which is :



At given temperature, these reaction tell about control of reaction which is :

	(1)	(2)
(A)	Kinetic	Thermodynamic
(B)	Thermodynamic	Kinetic
(C)	Kinetic	Kinetic
(D)	Thermodynamic	Thermodynamic

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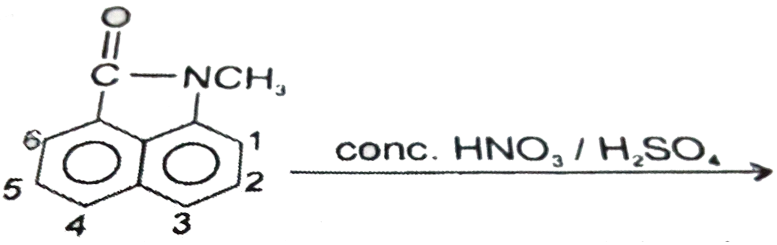
Exercise-2 Part-2

1. 

At which position nitration mainly takes place ?

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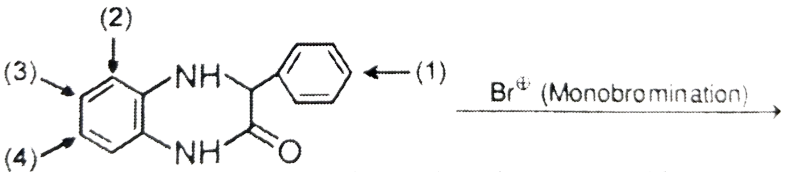
2. 

The substitution will mainly take place at position :

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3. When ortho dibromobenzene is subjected to mononitration X number of product are formed and when meta dibromobenzene is subjected to

mononitration, Y number of products are formed. Report answer as XY.

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4. The number of possibel enantiomeric pairs that can be produced during monochlorination of 2-methyl butane is :

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5. For the given reaction how many products are optically active (all isomers) :

$$CH_3 - \underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}} - CH_2 - \overset{CH_3}{\underset{|}{\overset{|}{C}}}H - CH_3 \xrightarrow{Br_2/h\upsilon}$$

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6. Total number of isomeric products(excluding stereoisomers) formed on monochlorination of 2-methylbutane are

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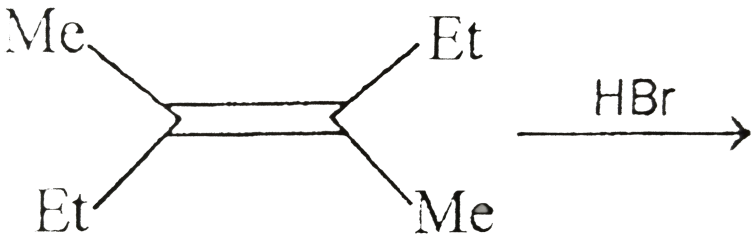

7.

How many products will be formed in above reaction?

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8. When trans-2-butene reacts with Br_2 / CCl_4, X number of products are formed. Whereas when trans-2-butene reacts with HBr Y number of products are formed . Report your answer as Y X .

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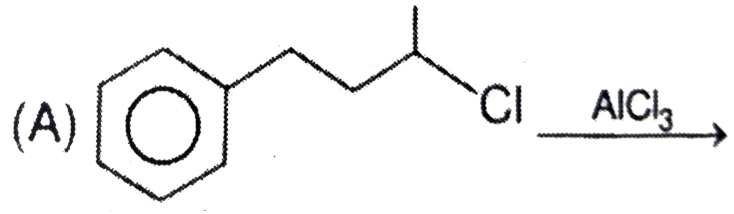
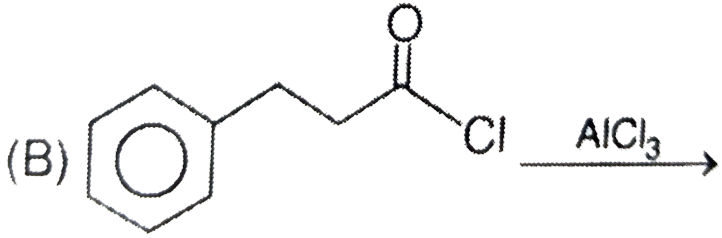
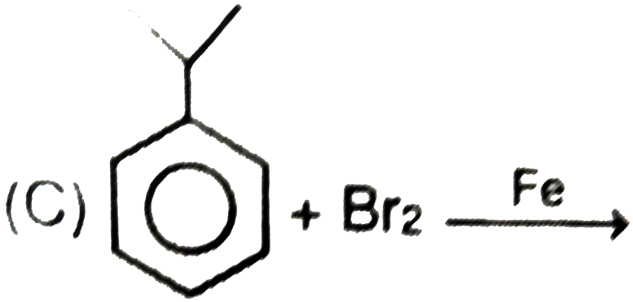
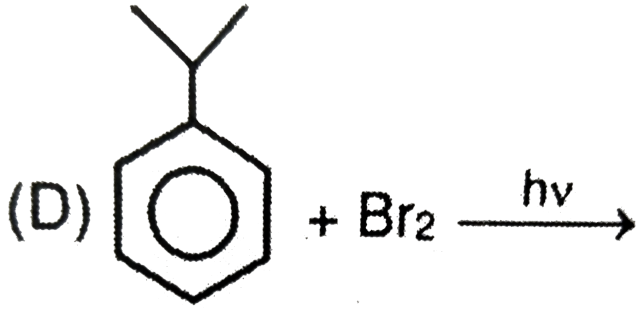
Exercise-2 Part-3

1. Electrophilic aromatic substitution can be seen in which of the following cases ?

A. 

B. 

C. 

D. 

Answer: A::B::C

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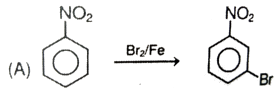
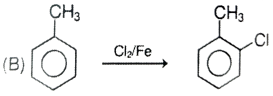
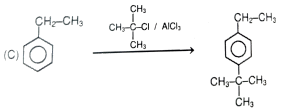
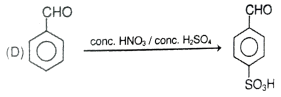
2. In which of the following reactions correct major product has be mentioned?

A. 

B. 

C. 

D. 

Answer: A::B::C

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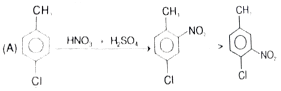
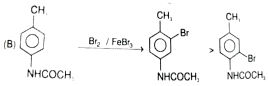
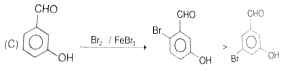
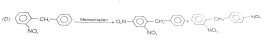
3. Which is the correct relationship mentioned in bracket :

A. 

B. 

C. 

D. 

Answer: A::C

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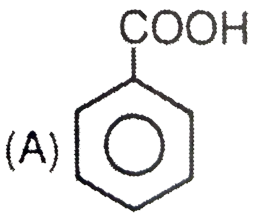
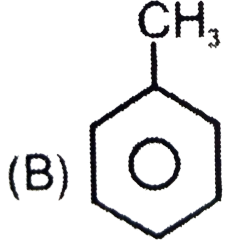
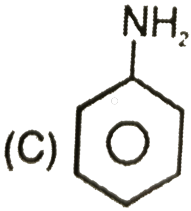
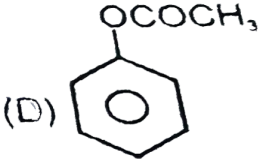
4. Paedogenesis is observed in

A. 

B. 

C. 

D. 

Answer: B::D

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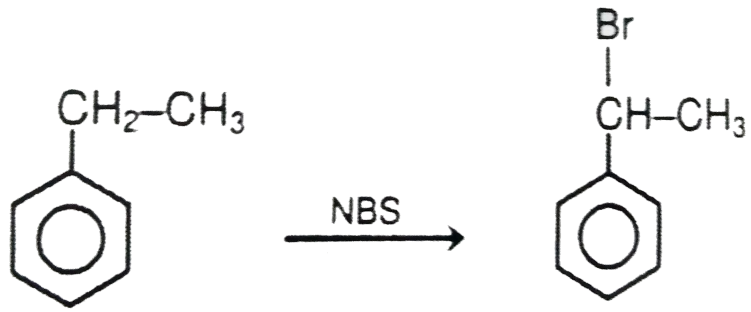
5. 

Which of the following statements are correct for above reaction .

A. Reaction intermediate is carbocation

B. Products is mixture of two enantiomers.

C. Reaction intermediate is stabilized by +I, hyperconjugation & resonance.

D. Br_2 at high temperture also give same product in the place of NBS.

Answer: B::C::D

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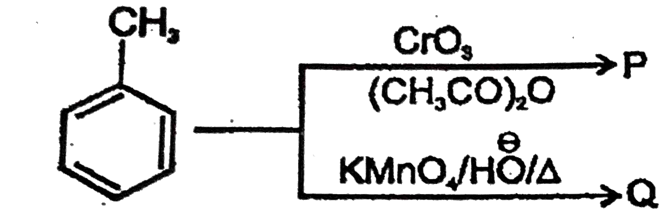
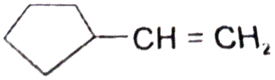
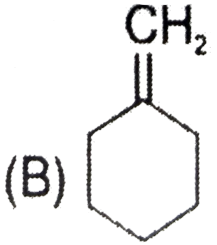
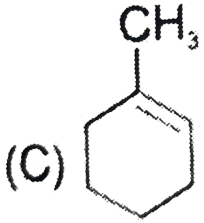
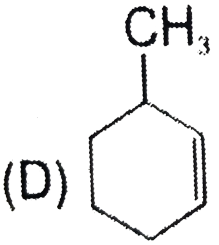
6. 

The products P & Q are respectively

A. 

B. 

C. 

D. 

Answer: A::B::C::D

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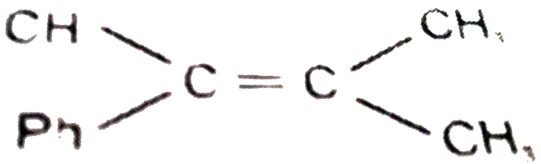
7. Which of the following compounds will give same major product on acid catalysed hydration ?

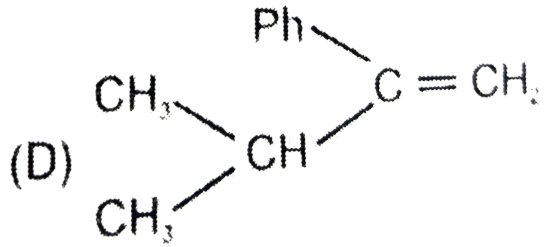
A. $Ph - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH = CH_2$

B. $Ph - \overset{\overset{CH_3}{|}}{CH} - \underset{\underset{CH_3}{|}}{C} = CH_2$

C.



D.



Answer: A::B::C::D

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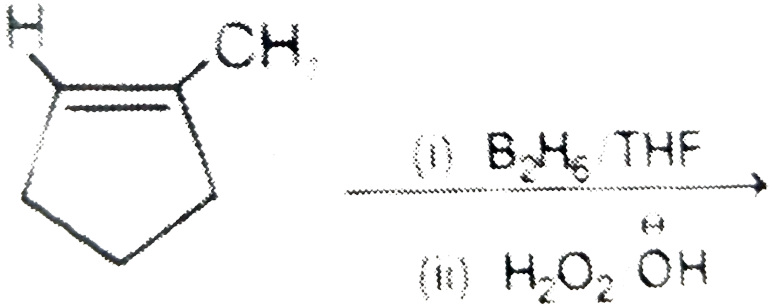
8.



True statement about above reaction :

A. Reagent involve stereospecific syn addition of H and OH species .

B. Product obtained is trans isomer.

C. Boron atom acts as electrophile

D. Two stereoisomers are obtained as product.

Answer: A::B::C::D

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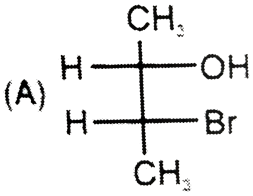
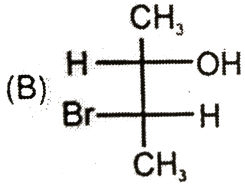
9. $CH_3 - CH = CH_2 + HOBr \rightarrow P$, The major product P is

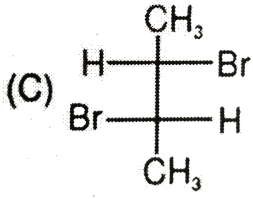
A.



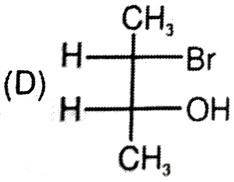
B.



C.



D.



Answer: A::D

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10. Identify the incorrect statement

A. Alkynes are more reactive than alkenes towards electrophilic addition reaction

B. Alkynes are less reactive than alkenes towards electrophilic addition reaction

C. Alkynes decolourise Br_2 water

D. Addition of HBr to alkynes in presence of peroxide proceeds via Markownikoff's addition.

Answer: A::D

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Exercise-2 Part-4

1. Three acyclic alkenes (x,y,z) on catalytic hyrogenation give same alkane. On reaction with HCl (x,y,z) form same major tertiary halide

product.Reductive ozonolysis of mixture of (x,y,z) gives a mixture of two moles of $CH_2 = O$ one moles of $CH_3CH = O$ one mole of acetone, one mole of butanone and one mole of 2-methyl propanal, x,y and z do not have any stereoisomers.

(x,y,z) $\xrightarrow{H_3O^*}$ addition product . The correct statement is

A. All three alkenes will give 3 different major hydration products

B. Three alkenes will give same hydration major product

C. Two alkenes form same product but one alkene forms different major product.

D. Addition of HCl and H_3O^* both are following different regioselectivity.

Answer: B

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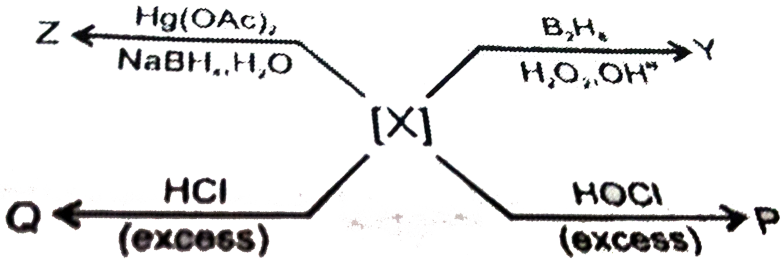
2. A Hydrocarbon X (M.F.C_4H_6) produces an aldehyde Y through Hydroboration Oxidation and a ketone Z through Oxymercuration Demercuration. Y and Z are functional isomers. X gives P when treated with excess of HOCl and Q when treated with excess of HCl.



The correct statement is :

A. $CH_3 - C \equiv C - CH_3$

B. $CH_3 - CH_2C \equiv CH$

C. $CH_2 = CH - CH = CH_2$

D. $CH_2 = CH - CH \equiv CH$

Answer: B

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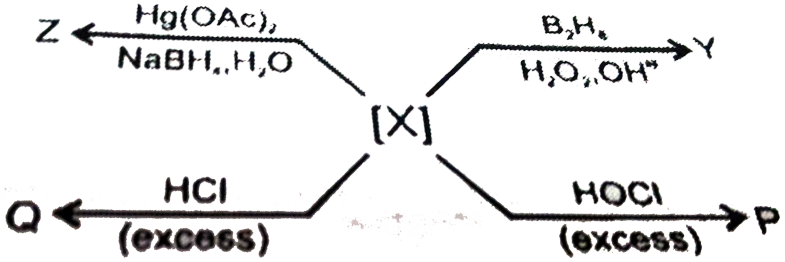
3. A Hydrocarbon X (M.F.C_4H_6) produces an aldehyde Y through Hydroboration Oxidation and a ketone Z through Oxymercuration Demercuration. Y and Z are functional isomers. X gives P when treated with excess of HOCl and Q when treated with excess of HCl.



The correct statement is :

A. P and Q are positional isomers

B. Q is 1,2-Dichlorobutane

C. P is 1,1-Dichlorobutan-2-one

D. P and Q are identical

Answer: C

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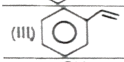
Column 1	Column 2	Column 3
(I) $Ph-C\equiv CH$	(i) Hg^{++}/H_3O^{+}	(P) Electrophilic substitution
(II) 	(ii) $Cl_2/h\nu$	(Q) Electrophilic addition
(III) 	(iii) $CH_3-\overset{\overset{O}{\|}}{C}-H/H^{+}$	(R) Carbocation intermediate
(IV) 	(iv) H^{+}/H_2O	(S) Radical intermediate

4.

Ketone is formed by the reaction

A. (I)(i)(Q)

B. (IV)(iii)(R)

C. (III)(iv)(Q)

D. (II)(iii)(P)

Answer: A

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Observe the three columns in which column-1 represents reactants, column-2 represents reagent while column-3 represents reaction conditions.

Column 1	Column 2	Column 3
(I) $Ph-C\equiv CH$	(i) Hg^{++}/H_3O^+	(P) Electrophilic substitution
(II) 	(ii) Cl_2/hv	(Q) Electrophilic addition
(III) 	(iii) $CH_3-\overset{O}{\overset{\|}{C}}-H/H^+$	(R) Carbocation intermediate
(IV) 	(iv) H^+/H_2O	(S) Radical intermediate

5.

Which of the following is non-correct for substitution reaction.

A. (II)(iii)(R)

B. (IV)(ii)(S)

C. (III)(iv)(R)

D. (IV)(iii)(P)

Answer: A

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Exercise-3 Part-1

1. In the presence of peroxide, hydrogen chloride and hydrogen iodide do not give anti − Markovnikov's addition to alkenes because :

A. both are highly ionic

B. one is oxidising and the other is reducing

C. one of the steps is endothermic in both the cases

D. all the steps are exothermic in both the cases.

Answer: C

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2. The reaction of propene with HOCl proceeds via the addition of :

A. H^+ in the first step

B. Cl^+ in the first step

C. OH^- in the first step

D. Cl^+ and OH^- in the single step

Answer: B

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3. Assertion : Addition of bromine to trans-but-2-ene yields meso-2,3-dibromobutane.

Reason : Bromine addition to an alkene is a nucleophilic addition

(a) If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

(b) If both Assertion and Reason are CORRECT but Reason is not the CORRECT explanation of the Assertion.

(c) I Assertion is CORRECT but Reason is INCORRECT.

(d)I Assertion is CORRECT but Reason is INCORRECT.

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. Both Assertion and Reason are true and Reason is not correct explanation of Assertion.

C. Assertion is true but Reason is false

D. Assertion is false but Reason is true.

Answer: B

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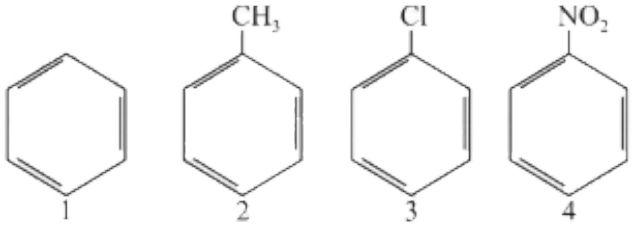
4. Identify the correct order of reactivity in electrophilic substitution reactions of the following compounds :



A. 1 gt 2 gt 3 gt 4

B. 4 gt 3 gt 2 gt 1

C. 2 gt 1 gt 3 gt 4

D. 2 gt 3 gt 1 gt 4

Answer: C

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5. Consider the following reaction

$$CH_3 - \underset{\underset{D}{CH}}{-} \underset{|}{CH} - CH_3 + Br^+ \rightarrow X + HBr$$
$$CH_3$$

Identify the structure of the (X)

A. $H_3C - \underset{|}{\underset{D}{CH}} - \underset{|}{\underset{CH_3}{CH}} - \dot{C}H_2$

B. $H_3C - \underset{|}{\underset{D}{CH}} - \underset{|}{\underset{CH_3}{\dot{C}}} - CH_3$

C. $H_3C - \underset{|}{\underset{D}{\dot{C}}} - \underset{|}{\underset{CH_3}{CH}} - CH_3$

D. $H_3C - \dot{C}H - \underset{|}{\underset{CH_3}{CH}} - CH_3$

Answer: B

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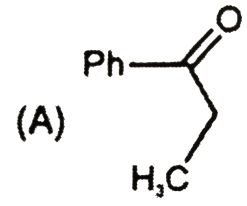
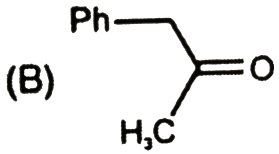
6. $Ph - C \equiv C - CH_3 \xrightarrow{Hg^{2+} / H_2SO_4 (aq)} A$

The major product (A) formed is -

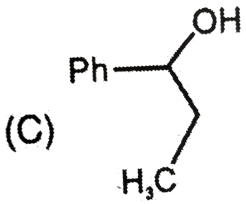
A.



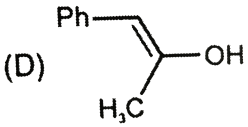
B.



C.



D.



Answer: A

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7. How many chiral compounds are possible on monochlorination of 2-methyl butane?

A. 2

B. 4

C. 6

D. 8

Answer: B

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8. The product of acid catalyzed hydration of 2-phenylpropene is :

A. 2-Phenylpropan-2-ol

B. 2-Phenylpropan-1-ol

C. 3-Phenylpropan-2-ol

D. 1-Phenylpropan-1-ol

Answer: A

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9. $(CH_3)_2CH - CH_2CH_3 \xrightarrow{Cl_2/h\upsilon} [N] \xrightarrow[\text{distillation}]{\text{Fractional}} [P]$

The number of possible isomers [N] and number of fractions [P] are :

A. (6,6)

B. (6,4)

C. (4,4)

D. (3,3)

Answer: B

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10. 2-propanol will be product of which one of the following reactions?

Multiple can be true.

I. $CH_2 = CH - CH_3 + H_2O \xrightarrow{H^+}$

II. $CH_3 - CHO \xrightarrow[(ii)\, H_3O^+]{(i)\, CH_3Mgl}$

III. $CH_2O \xrightarrow[(ii)\, H_2O^+]{(i)\, C_2H_5Mgl}$

IV. $CH_2 = CH - CH_3 \xrightarrow{\text{Neutral} KMnO_4}$

A. $\underset{Cl}{\underset{|}{CH_2}} - \underset{NO}{\underset{|}{CH}} - CH_3$

B. $\underset{NO}{\underset{|}{CH_2}} - \underset{Cl}{\underset{|}{CH}} - CH_3$

C. $ON - CH_2 - CH_2 - CH_2 - Cl$

D. $ON - \underset{Cl}{\underset{|}{CH}} - CH_2 - CH_3$

Answer: B

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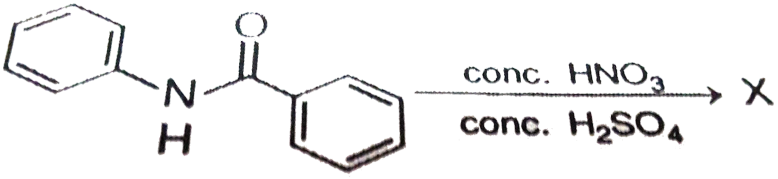
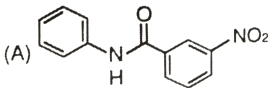
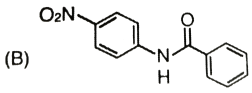
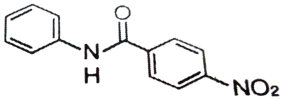
11. In the following reaction,

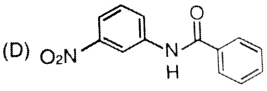


the structure of the major product 'X' is :

A. 

B. 

C. 

D. 

Answer: B

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12. Statement 1: In bromobenzene upon reaction with Br_2/Fe gives , 4 dibromobenzene as the major product.

Statement 2: In bromobenzene the inductive effect of the bromo effect of the bromo group is more dominant than the mesomeric effect is directing the incoming electrophile.

A. Statement-1 is True, Statement-2 is True , Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is True, Statement-2 is True , Statement-2 is NOT a correct explanation of Statement-1.

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: C

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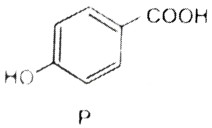
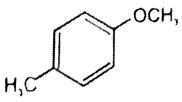
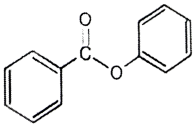
13. The compounds P,Q and S were separately to nitration using HNO_3 / H_2SO_4 mixture.The major product formed in each case respectively is :



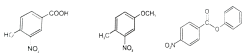
P

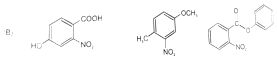


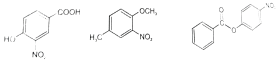
Q

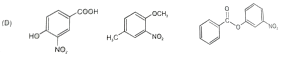


S

A. 

B. 

C. 

D. 

Answer: C

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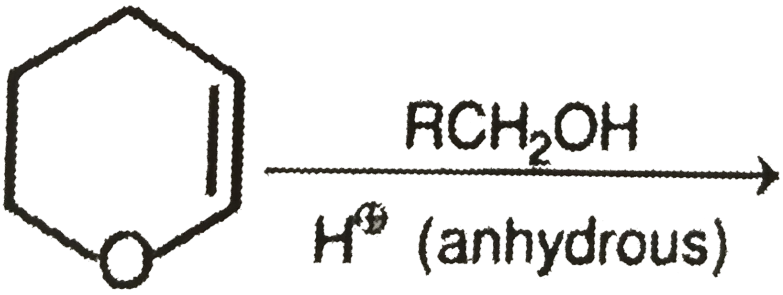
14. The major product of the following reaction is



A. a hemiacetal

B. an acetal

C. an ether

D. an ester

Answer: B

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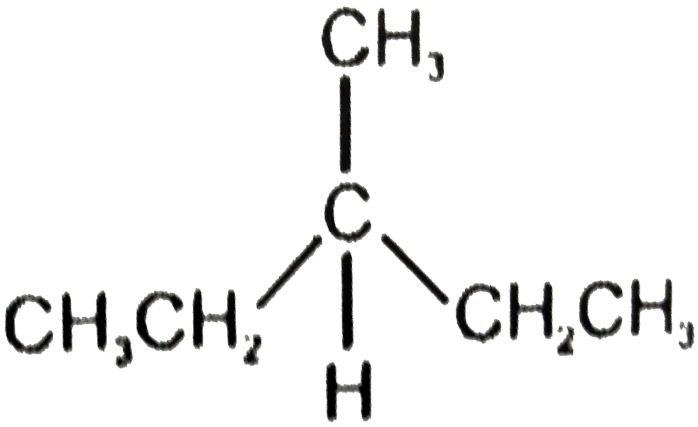
15. The maximum number of isomers (including stereoisomers) that are possible on monochlorination of the following compound is :



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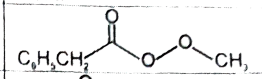
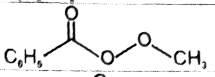
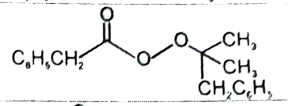
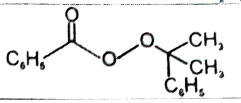
16. Different possible thermal decomposition pathways for peroxyesters are shown below. Match each pathway from List-I with an appropriate structure from List II and select the correct answer using the code given below the lists.

	List-I		List-II
P.	Pathway P	1.	
Q.	Pathway Q	2.	
R.	Pathway R	3.	
S.	Pathway S	4.	

A. $\begin{matrix} P & Q & R & S \\ 1 & 3 & 4 & 2 \end{matrix}$

B. $\begin{matrix} P & Q & R & S \\ 2 & 4 & 3 & 1 \end{matrix}$

C. $\begin{matrix} P & Q & R & S \\ 4 & 1 & 2 & 3 \end{matrix}$

D. $\begin{matrix} P & Q & R & S \\ 3 & 2 & 1 & 4 \end{matrix}$

Answer: A

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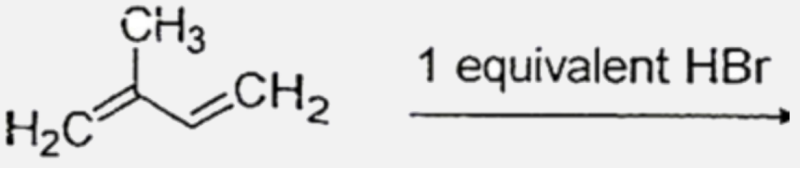
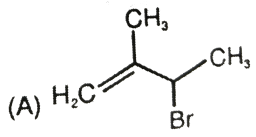
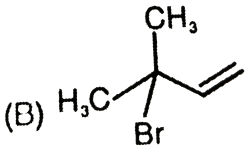
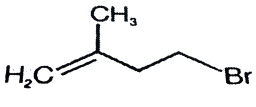
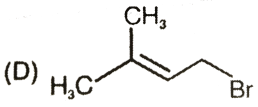
17. In the following reaction, the major product is



A. 

B. 

C. 

D. 

Answer: D

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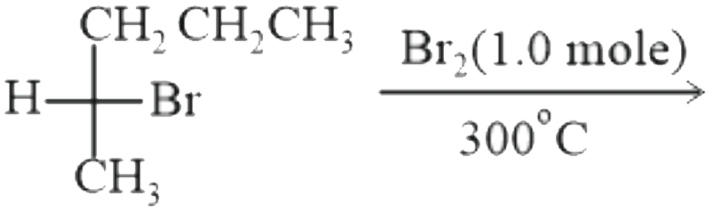
18. For the following compound during monobromination reaction, the number of possible chiral products are



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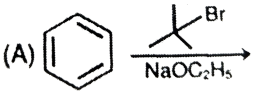
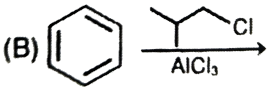
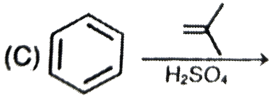
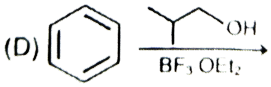
19. Among the following reaction(s), which gives(give) tert-butyl benzene as the major product ?

A. 

B. 

C. 

D. (D) 

Answer: B::C::D

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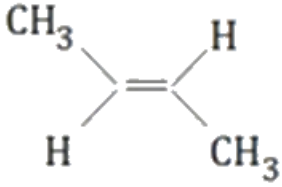
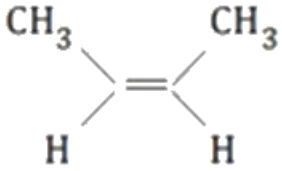
20. The correct statement for the following addition reaction is

(1)  $\xrightarrow{Br_2/CHCl_3}$ M and N

(2)  $\xrightarrow{Br_2/CHCl_3}$ O and P

A. (M and O) and (N and P) are two pairs of enantiomers

B. Bromination proceeds through trans-addition in both the reactions

C. O and P are identical molecules

D. (M and O) and (N and P) are two pairs of diastereomers

Answer: B::D

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Exercise-3 Part-2

1. What is the product when acetylene reacts with HOCl

A. CH_3COCl

B. $ClCH_2CHO$

C. Cl_2CHCHO

D. $ClCH_2COOH$

Answer: C

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2. Reaction of one molecule of HBr with one molecule of 1,3-butadiene at $40^{\circ} C$ gives predominatly:

A. 3-bromobutene under kinetically controlled conditions

B. 1-bromo-2-butene under thermodynamically controlled conditions

C. 3-bromobutene under thermodynamically controlled conditions.

D. 1-bromo-2-butene under kinetically controlled conditions

Answer: B

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3. Acid catalyzed hydration of alkenes except ethene leads to the formation of

A. Mixture of secondary and tertiary alcohols

B. Mixture of primary and secondary alcohols

C. secondary or tertiary alcohol

D. Primary alcohol

Answer: C

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4. 2-methylbutane on reacting with bromine in the presence of sunlight gives mainly

A. 1-Bromo-3-methylbutane

B. 1-Bromo-2-methylbutane

C. 2-Bromo-3-methylbutane

D. 2-Bromo-2-methylbutane

Answer: D

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5. HBr reacts with $\overset{CH_2}{\underset{||}{C}}H - OCH_3$ at room temperature to give

A. CH_3CHO and CH_3Br

B. $BrCH_2CHO$ and CH_3Br

C. $BrCH_2 - CH_2 - OCH_3$

D. $H_3C - CHBr - OCH_3$

Answer: D

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6. The reaction of toluene with chlorine in presence of ferric chloride gives predominantly :

A. o- and p- chlorotoluene

B. m-chlorotoluene

C. benzoylchloride

D. benzyl chloride

Answer: A

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7. Which of the following reactions will yield 2, 2-dibromopropane ?

A. $CH_3 - C \equiv CH + 2HBr \rightarrow$

B. $CH_3CH = CHBr + HBr \rightarrow$

C. $CH \equiv CH + 2HBr \rightarrow$

D. $CH_3 - CH = CH_2 + HBr \rightarrow$

Answer: A

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8. Presence of a nitro group in a benzene ring

A. activates the ring towards electrophilic substitution.

B. renders the ring basic

C. deactivates the ring towards nucleophilic substitution

D. deactivates the ring towards electrophilic substitution

Answer: D

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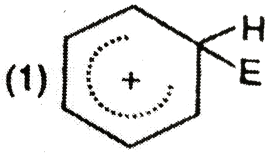
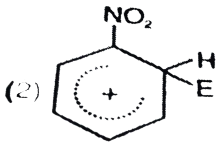
9. The electrophile, E^+ attacks the benzene ring to generate the intermediate σ-complex. Which σ-complex is of lowest energy?

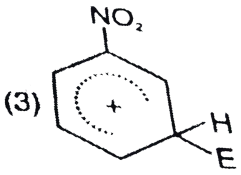
A.



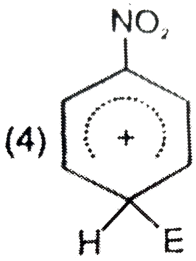
B.



C.



D.



Answer: A

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10. How many chiral compounds are possible on monochlorination of 2-methyl butane?

A. 8

B. 2

C. 4

D. 6

Answer: C

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11. Which branched chain isomer of the hydrocarbon with molecular mass $72u$ gives only one isomer of mono substituted alkyl halide ?

A. Tertiary butyl chloride

B. Neopentane

C. isohexane

D. Neohexane

Answer: B

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12. The reaction of propene with $HOCl(Cl_2 + H_2O)$ proceeds through the intermediate

A. $CH_3 - CH^+ - CH_2 - Cl$

B. $CH_3 - CH(OH) - CH_2^+$

C. $CH_3 - CHCl - CH_2^+$

D. $CH_3 - CH^+ - CH_2 - OH$

Answer: A

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13. 3-methyl-pent-2-ene on reaction with HBr in the presence of peroxide forms an addition product. The number of possible stereoisomers for the product is

A. Zero

B. Two

C. Four

D. Six

Answer: C

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14. In the hydroboration-oxidation reaction of Propene with diborane, H_2O_2 and $NaOH$, the organic compound formed is

A. CH_3CH_2OH

B. $CH_3CHOHCH_3$

C. $CH_3CH_2CH_2OH$

D. $(CH_3)_3COH$

Answer: C

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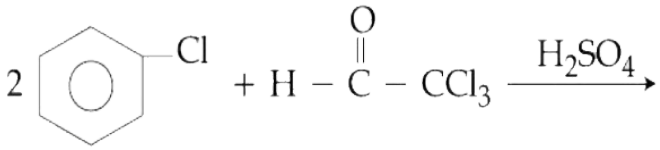
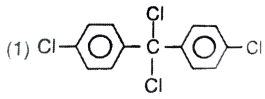
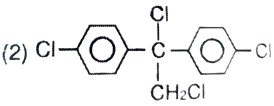
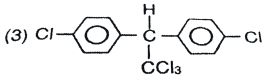
15. Chlorobenzene reacts with trichloro acetaldehyde in the presence of H_2SO_4

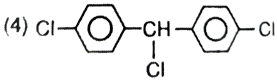


The major product formed is :

A. 

B. 

C. 

D. 

Answer: C

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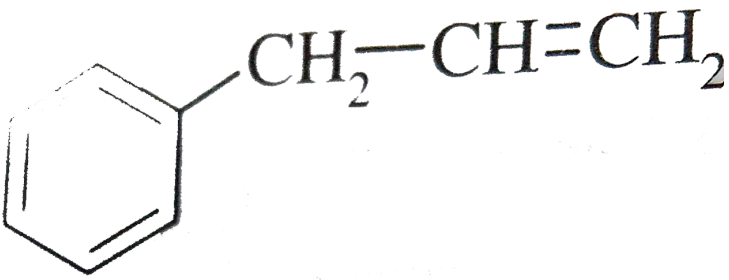
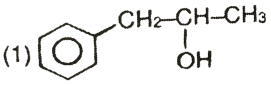
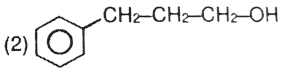
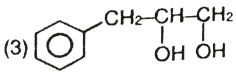


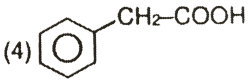
16. on

oxymercuration demercuaration produces the major product

A. 

B. 

C. 

D. 

Answer: A

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17. In the presence of peroxide, hydrogen chloride and hydrogen iodide do not give anti – Markovnikov's addition to alkenes because :

A. One of the steps is endothermic in HCl and HI

B. Both HCl and HI are strong acids.

C. HCl is oxidizing and the HI is reducing

D. All the steps are exothermic in HCl and HI.

Answer: A

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18. The major product obtained in the photo catalyzed bromination of 2-methylbutane is :

A. 1-bromo-2-methylbutane

B. 1-bromo-3-methylbutane

C. 2-bromo-3-methylbutane

D. 2-bromo-2-methylbutane

Answer: D

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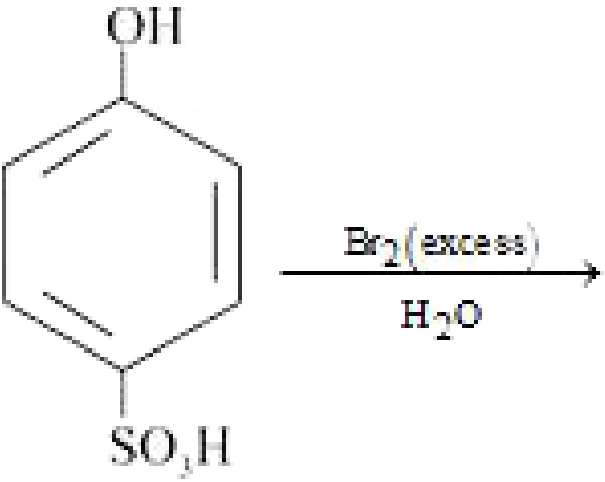
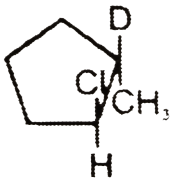
19. The major product of the following reaction contain x bromine atoms in one entities. What is numerical value of x?

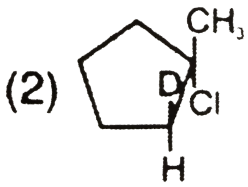


A.

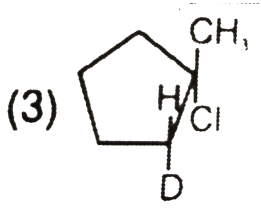
(1)



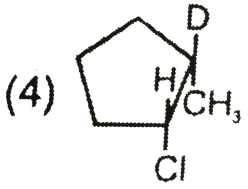
B.



C.



D.



Answer: B::C

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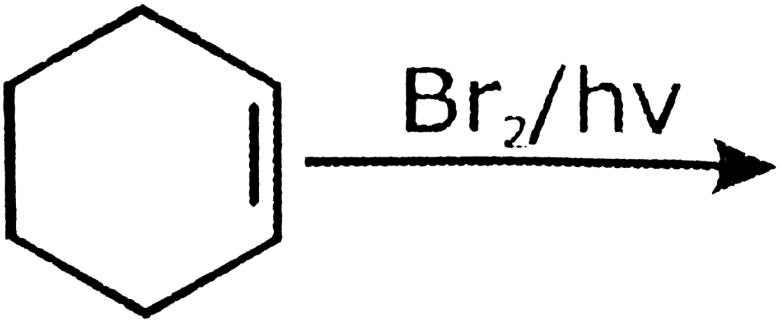
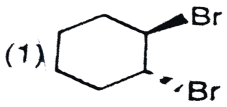
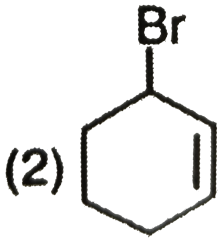
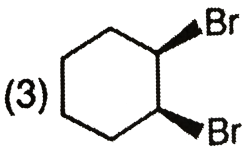
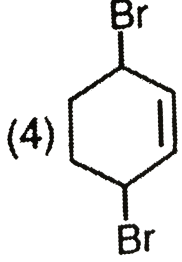
20. Bromination of cyclohexene under conditions given below yields :



A. 

B. 

C. 

D. 

Answer: B

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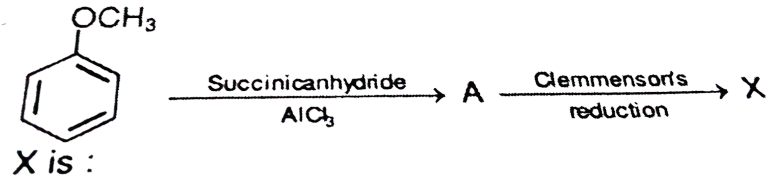
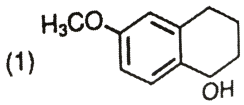
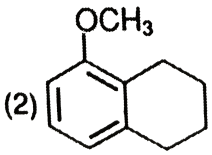
21. Consider the reaction sequence below :



A. 

B. 

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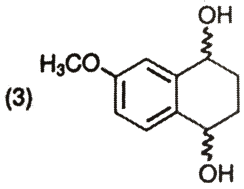
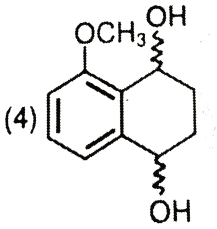


D.



Answer: A

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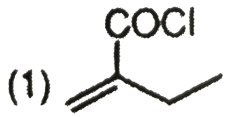
22. Which of the following compounds will not undergo Friedel Craft's reaction with benzene ?

A.



B.

C.

D.

(4) 

Answer: D

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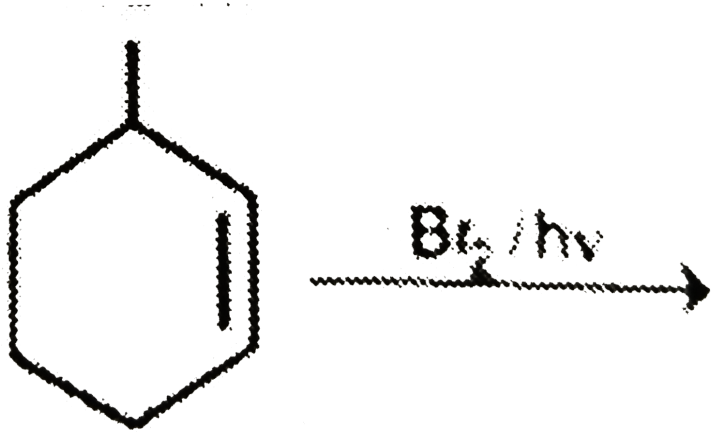
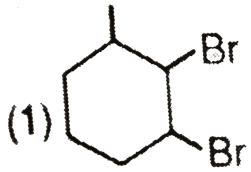
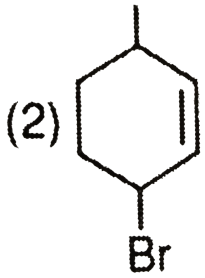
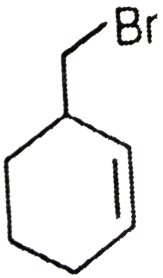
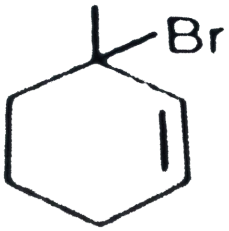
23. The major product of the following reaction is



A. 

B. 

C. 

D. 

Answer: D

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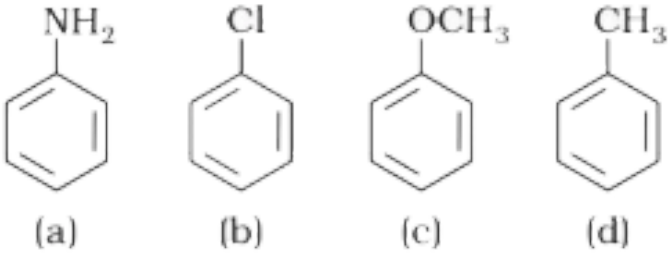
24. The increasing order of nitration of the following compounds is :



A. (a) lt (b) lt (d) lt (c)

B. (a) lt (b) lt (c) lt (d)

C. (b) lt (a) lt (c) lt (d)

D. (b) lt (a) lt (d) lt (c)

Answer: A

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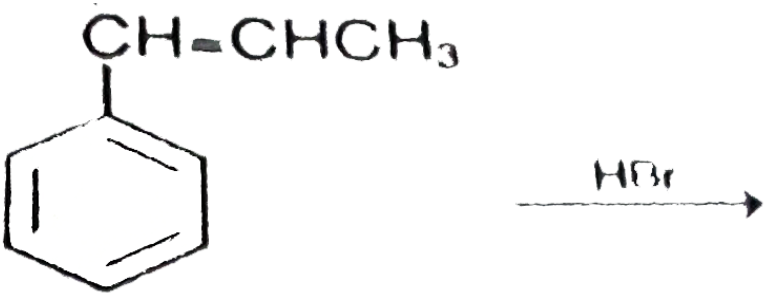
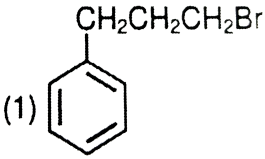
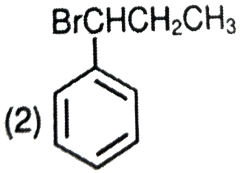
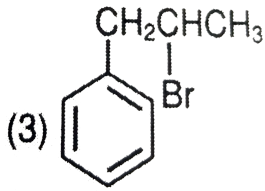
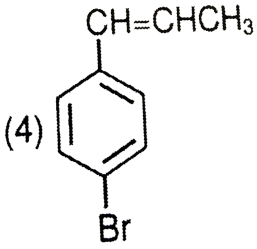
25. The major product of the following reaction is



A. 

B. 

C. 

D. 

Answer: B

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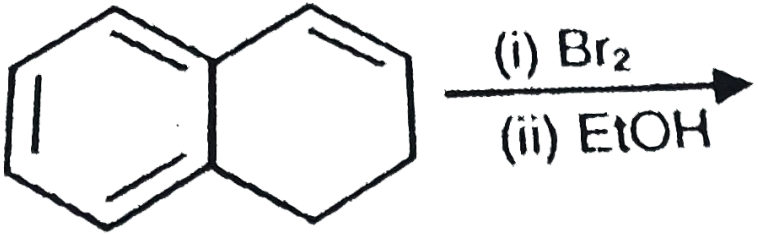
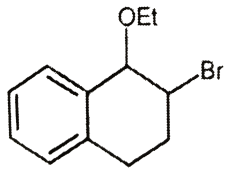
26. The major product of the following reaction is



A. (1)



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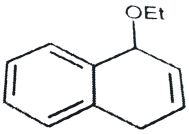

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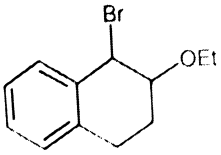

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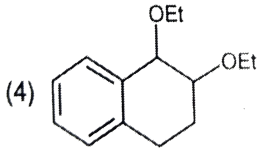

Answer: A

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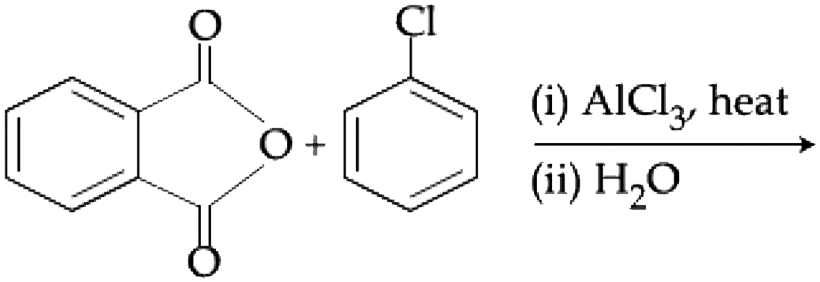
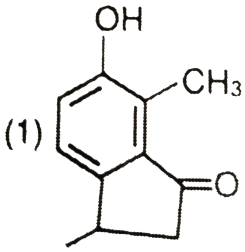
27. The major product of the following reaction is :



A.



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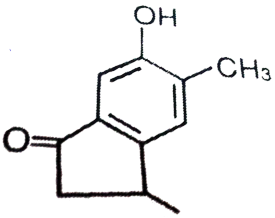
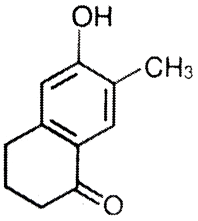


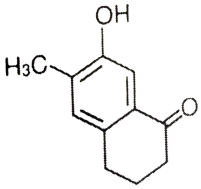
C.

(3)



D.

(4)



Answer: A::B::C::D

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28. Which hydrogen in compound (E) is easily replaceable during bromination reaction in presence of light ?

$$\underset{\delta}{CH_3} - \underset{\gamma}{CH_2} - \underset{\beta}{CH} = \underset{\alpha}{CH_2}$$

(E)

A. α -hydrogen

B. γ-hydrogen

C. β-hydrogen

D. δ-hydrogen

Answer: B

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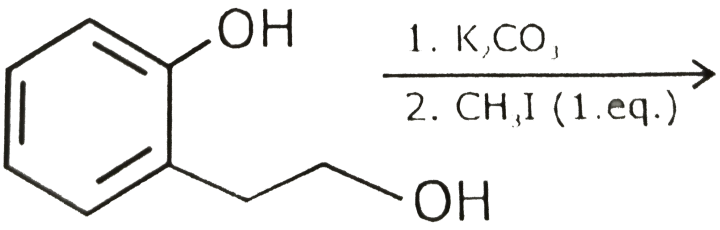
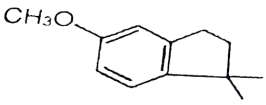
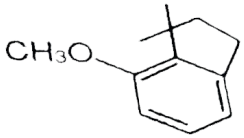
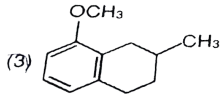
29. The major product of the following reaction is :

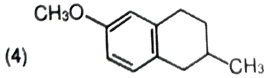


A.



B. 

C. 

D. 

Answer: A

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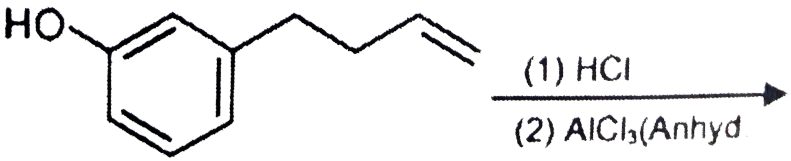
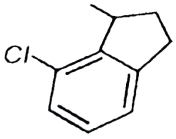
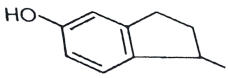
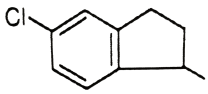
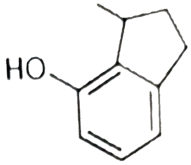
30. The major product of the following reaction is



A. 

B. 

C. (3) 

D. (4) 

Answer: B

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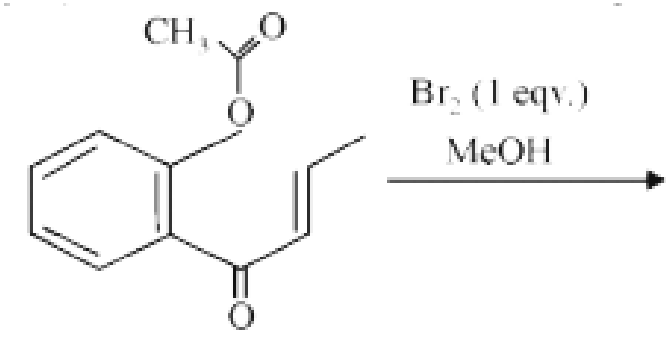
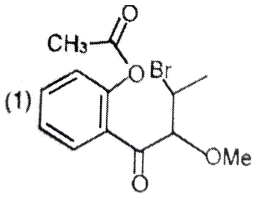
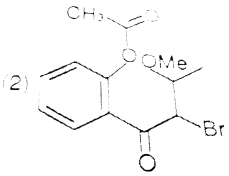
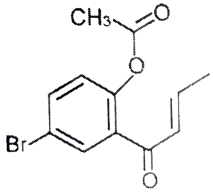
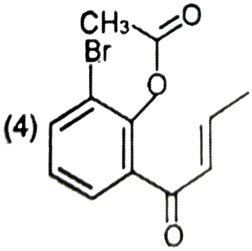
31. The major product obtained in the following conversion is :



A. (1) 

B. 

C. 

D. 

Answer: B

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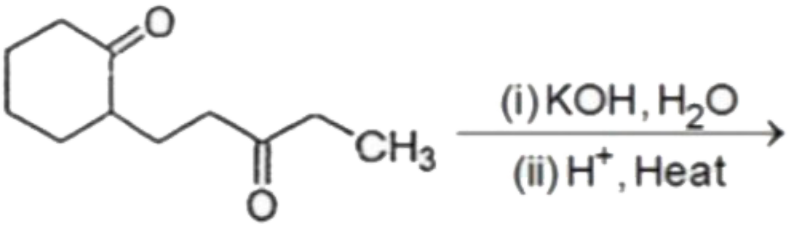
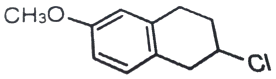
32. The major product of the following reaction is



A.



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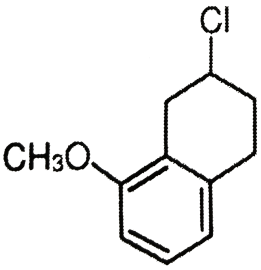

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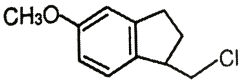
C.



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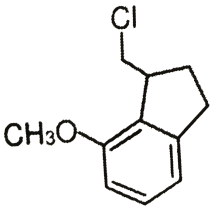

Answer: C

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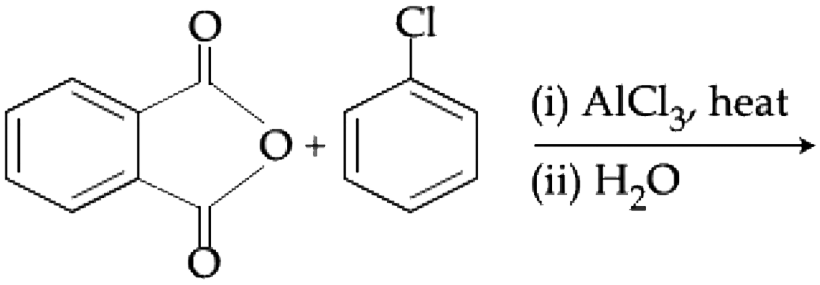
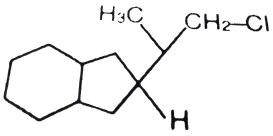
33. The major product of the following reaction is :



A.



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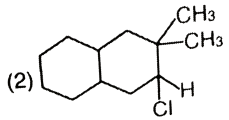

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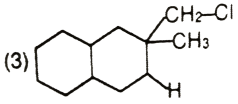

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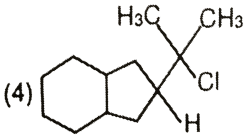

Answer: D

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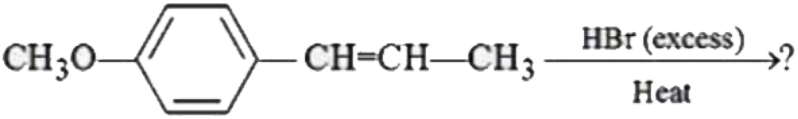
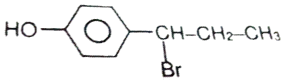
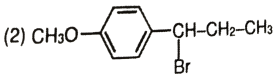
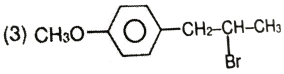
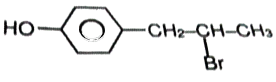
34. The major product in the following conversion is



A. 

B. 

C. 

D. 

Answer: A

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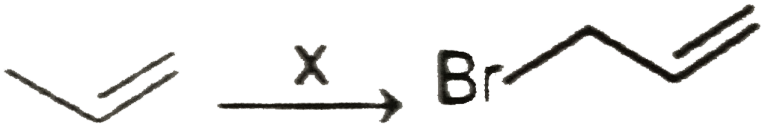
APSP Part - 1

1. 

'X' is

A. $Br_2/\ H_2O$

B. HBr

C. HBr/Peroxide

D. NBS

Answer: D

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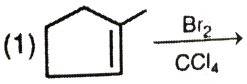
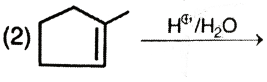
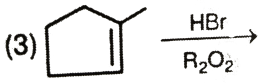
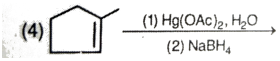
2. Which of the following reactions is not an example of electrophilic substitution in benzene ring?

A. 

B. 

C. 

D. 

Answer: C

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3. The reaction of toluene with chlorine in presence of ferric chloride gives predominantly :

A. Benzyl chloride

B. m-chlorotoluene

C. Benzal chloride

D. o- and p- Chlorotoluene

Answer: D

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4. Nitrobenzene can be prepared from benzene by using a mixture of conc. HNO_3 and conc. H_2SO_4 . In the mixture, nitric acid acts as a/an -

A. Base

B. Acid

C. Reducing agent

D. Catalyst

Answer: A

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5. Ethylbenzene $+Cl_2 \xrightarrow{\text{Light}}$ (main) compound is :

A. o- and p- chloroethylbenzene

B. 1-Chloroethylbenzene

C. 2-Chloroethylbenzene

D. m-Chloroethylbenzene

Answer: B

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6. Which of the following is an $o-, p-$ directing but deactivating substituent in an electrophilic aromatic substitution :

A. $-NH_2$

B. $-OH$

C. $-X$(halogens)

D. $-CHO$

Answer: D

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7. Presence of a nitro group in a benzene ring

A. activates the ring towards electrophilic substitution.

B. renders the ring basic

C. deactivates the ring towards nucleophilic substitution

D. deactivates the ring towards electrophilic substitution

Answer: D

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8. The relative rates of diffusion of substances are

A. $CH_3 > OH > NO_2 > Cl$

B. $OH > Cl > CH_3 > NO_2$

C. $OH > CH_3 > NO_2 > Cl$

D. $OH > CH_3 > Cl > NO_2$

Answer: D

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9. In the free-radical chlorination of methane, the chain-intiation step involves the formation of:

A. Chlorine radical

B. Hydrogen chloride

C. Methyl radical

D. Chloromethyl radical

Answer: A

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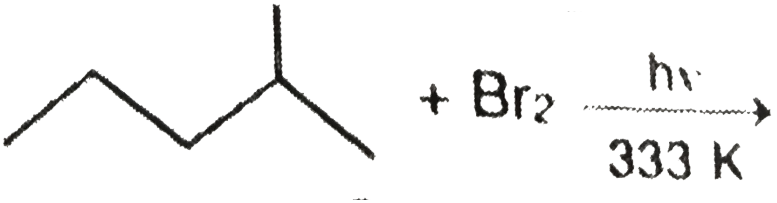
10. Which of the following is the major product for the given reaction ?



A. 2-Bromo-2-methylpentane

B. 1-Bromo-2-methylpentane

C. 4-Bromo-2-methylpentane

D. 3-Bromo-2-methylpentane

Answer: A

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11. 1° allylic halides are more reactive than $1^\circ RX$ in SN^1 reaction.

Allylic carbocation intermediate is stabilished by resonance.

A. Nucleophilic substitution

B. Electrophilic substitution

C. Free radical substitution

D. Electrophilic addition

Answer: C

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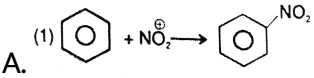
12. Which one of the following is a free-radical substitution reaction :

A. 

B. $CH_2 = CH_2 + HBr \rightarrow CH_3 - CH_2 - Br$

C. $CH_3 - CH = CH_2 + HBr \xrightarrow{R_2O_2} CH_3 - CH_2 - CH_2 - Br$

D. $CH_3 - CH = CH_2 + HCl \rightarrow CH_3 - \underset{Cl}{CH} - CH_3$

Answer: C

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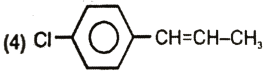
13. Complete the reaction

$Ph - CH = CH - CHO \xrightarrow[H_3O^+]{PhMgBr}$ Product

A. $Ph - \underset{Cl}{CH} - \overset{OH}{CH} - CH_3$

B. $Ph - \underset{\underset{OH}{|}}{CH} - \overset{\overset{Cl}{|}}{CH} - CH_3$

C. $Ph - CH = CH - CH_2Cl$

D. 

Answer: B

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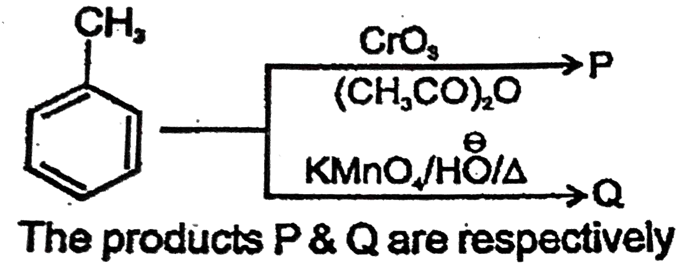
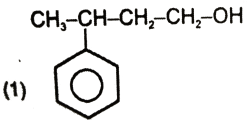
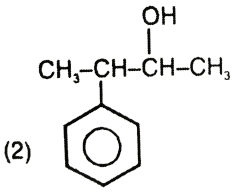
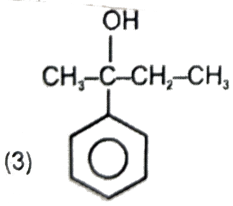
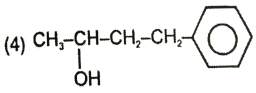
14. 

The products P & Q are respectively

A. 

B. 

C. 

D. 

Answer: C

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15. To which of the following compounds H_2 adds most readily?

A. $CH_2 = CH_2$

B. $CH_3 - CH = CH_2$

C. $CH_3 - CH = CH - CH_3$

D. $CH_3 - \underset{CH_3}{\underset{|}{C}} = CH - CH_3$

Answer: D

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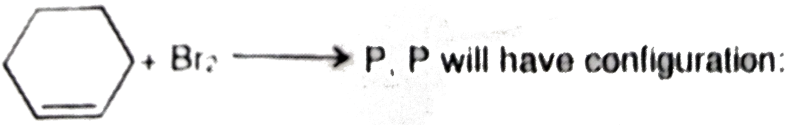
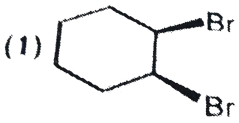
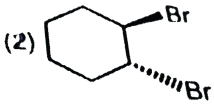
16. Complete the following reaction



A. 

B. 

C. both are true

D. none is true

Answer: B

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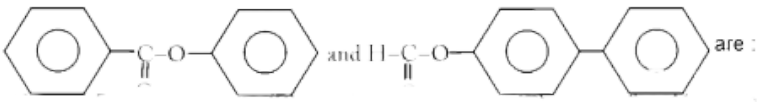
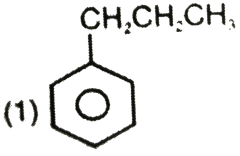
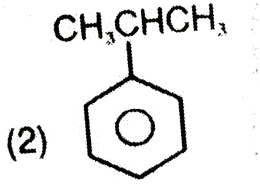
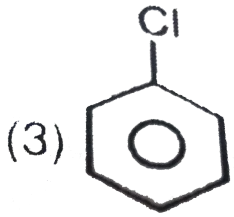
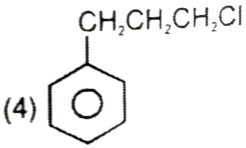
17. 

are :

A. 

B. 

C. 

D. 

Answer: B

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18. Which is most reactive towards Br_2 in the prsence of $FeBr_3$?

A. CH_3CH_3

B. CH_4

C. $CH_3CH_2CH_3$

D. $CH_3 - \underset{CH_3}{\underset{|}{C}}H - CH_3$

Answer: D

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19. $CH_3 - CH_2 - CH_2 - CH_3 + Cl_2 \xrightarrow{hv}$ Major product :

A. $CH_3 - CH_2 - CH_2 - CH_2 - Cl$

B. $CH_3 - \underset{Cl}{\underset{|}{C}}H - CH_2 - CH_3$

C. $CH_3 - \underset{CH_3}{\underset{|}{C}}H - CH_2 - Cl$

D. $CH_3 - \underset{CH_3}{\overset{Cl}{\overset{|}{\underset{|}{C}}}} - CH_3$

Answer: B

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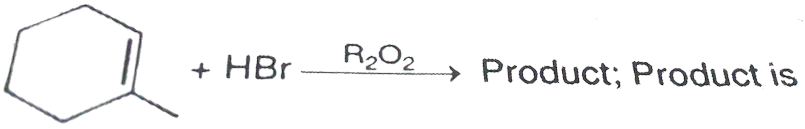
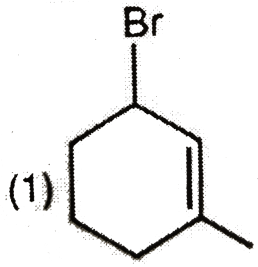
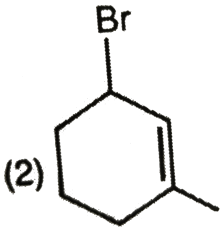
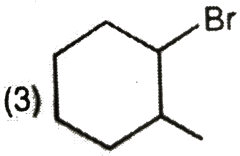
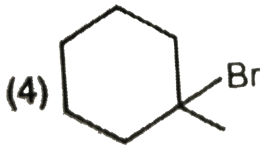
20. Complete the following reaction



A. 

B. 

C. 

D. 

Answer: C

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21. Which of the following is the predominant product in the reaction of HOBr with propene?

A. 2-Bromo-1-propanol

B. 3-Bromo-1-propanol

C. 2-Bromo-2-propanol

D. 1-Bromo-2-propanol

Answer: D

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22. $Ph - CH = CH_2 \xrightarrow{ICl} P$, Identify major product 'P' is :

A. $Ph - \underset{I}{\underset{|}{C}}H - CH_2 - Cl$

B. $Ph - \underset{Cl}{\underset{|}{C}}H - CH_2 - I$

C. $Ph - \underset{Cl}{\underset{|}{C}}H - CH_2 - Cl$

D. $Ph - \underset{I}{\underset{|}{C}}H - CH_2 - I$

Answer: B

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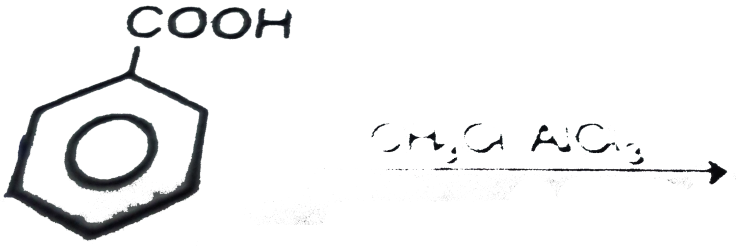
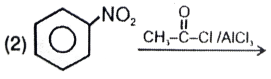
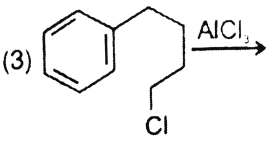
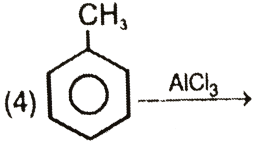
23. Which of the following reaction is feasible ?

A. 

B. 

C. 

D. 

Answer: C

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24. o,p-directing group are mostly :

A. Activation group

B. Deactivating groups

C. Neutral groups

D. None of these

Answer: A

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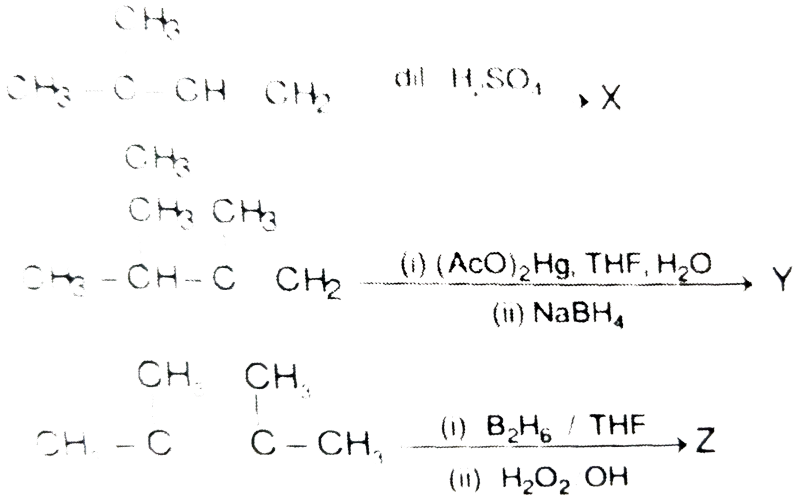
25. Find the final product X,Y,Z of the reaction and which All three products (X,Y,Z) are identical.



A. All three products (X,Y,Z) are different .

B. X and Y are identical but Z is different.

C. Y and Z are identical but X is different

D. All three products (X,Y,Z) are identical.

Answer: D

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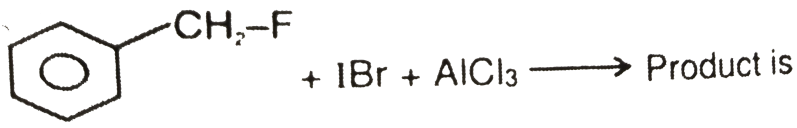
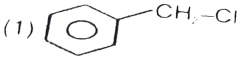
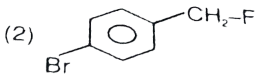
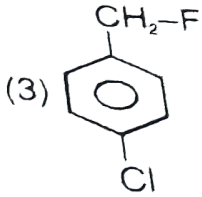
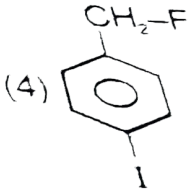
26. Complete the following reaction



A. 

B. 

C. 

D. 

Answer: D

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27. When HBr adds to 1-butene in the presence of benzoyl peroxide, the product obtained is

A. 1-Bromobutane

B. 2-Bromobutane

C. 1-Bromobutene

D. 2-Bromobutene

Answer: A

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28. $Ph - C \equiv C - CH_2 - CH_3 \xrightarrow[D_2SO_4 / D_2O]{Hg^{2+} / D^{\oplus}} A$, A is:

A. $Ph - \underset{\underset{O}{||}}{C} - CH_2 - \underset{\underset{D}{|}}{CH} - CH_3$

B. $Ph - \underset{\underset{O}{||}}{C} - \underset{\underset{D}{|}}{CH} - CH_2 - CH_3$

C. $Ph - \underset{\underset{O}{||}}{C} - CD_2 - CH_2 - CH_3$

D. $Ph - \underset{\underset{OH}{|}}{CD} - CH_2 - CH_2 - CH_3$

Answer: C

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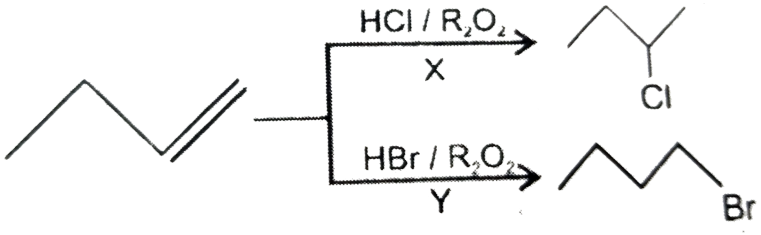
29.



Which is correct statement about X and Y.

A. X is product of ionic reaction and Y is product of radical reaction

B. X and Y both are product of ionic reaction

C. X and Y both are product of radical reaction

D. X is product of radical reaction and Y is product of ionic reaction

Answer: A

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30. Which of the following is the best reagent to convert 1-Methylcyclohexene into 2-methylcyclohexanol ?

A. Dil H_2SO_4

B. $Hg(OAc)_2 / NaBH_4, H_2O$

C. $B_2H_6 / H_2O_2, OH$

D. $Conc.\ H_2SO_4$

Answer: C

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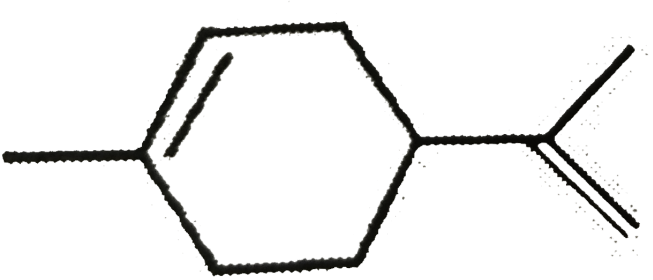
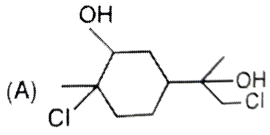
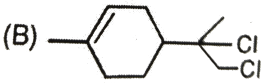
APSP Part - 2

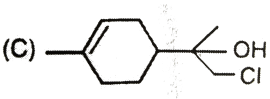
1. The alkene limonene has the following structure.

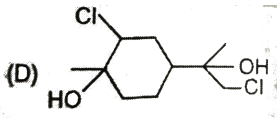


What product results from the reaction of limonene and chlorine water ?

A. 

B. 

C. 

D. 

Answer: B

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2. An unknown compound is analyzed to have a molecular mass of 84 and elements has carbon and hydrogen only.When subjected to chlorination in the presence of light, three monochlorinated products are isolated . This compound must be

A. methylcyclopentane

B. cyclohexane

C. hexane

D. 1,3-dimethylcyclobutane

Answer: D

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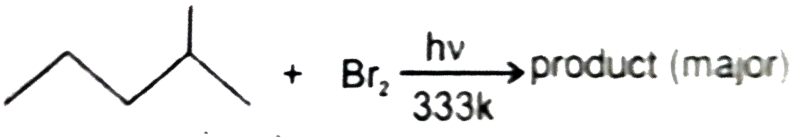
3. Which of the following is the major product for the given reaction ?



A. 3-bromo-2-methylpentane

B. 2-bromo-2-methylpentane

C. 1-bromo-2-methylpentane

D. 4-bromo-2-methylpentane

Answer: B

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4. The peroxide effect occurs by :

A. ionic mechanism

B. homolytic fission of double bond

C. heterolytic fission of double bond

D. free radical mechanism

Answer: D

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5. Benzene does not readily undergo

A. halogenation

B. nitration

C. sulphonation

D. oxidation

Answer: D

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6. Which compound amongst the following is nitrated with most difficulty ?

A. nitrobenzene

B. m-dinitrobenzene

C. phenol

D. quinol

Answer: B

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7. The reaction of toluene with CI_2 in presence of $FeCI_3$ gives predominantly

A. benzoyl chloride

B. benzyl chloride

C. m-chlorotoluene

D. a mixture of o- and p- chlorotoluenes.

Answer: D

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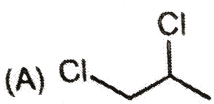
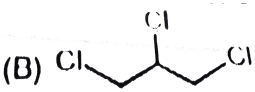
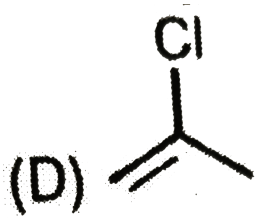
8. In the reaction of chlorine with propene at $450^{\circ} C$, the major product is

A. 

B. 

C. 

D. 

Answer: C

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9. In the nitration of an aromatic compound using a mixture of concentrated nitric acid and sulphuric acid, the acids respectively function as

A. an oxidising agent and an acid

B. a Bronsted and a Lewis acid

C. a base and an acid

D. an acid and an oxidising agent

Answer: C

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10. Select the major product obtained from the addition of HBr to 1-methylcyclohexene.

A. 1-bromo-2-methylcyclohexane

B. 6-bromo-1-methylcyclohex-I-ene

C. 3-bromo-1-methylcyclohex-1-ene

D. 1-bromo-1-methylcyclohexane

Answer: D

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11. Reaction of benzene with isobutylchloride $(CH_3CH(CH_3)CH_2Cl)$ in the presence of anhydrous $AlCl_3$ yields.

A. tert-butylbenzene

B. iso-butylbenzene

C. n-butylbenzene

D. chlorobenzene

Answer: A

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12. The reagent system for preparing propan-1-ol from propene is :-

A. $Hg(OAc)_2 / H_2O$ followed by $NaBH_4$

B. H_2SO_4 / H_2O

C. B_2H_6 followed by H_2O_2

D. HCO_2H / H_2SO_4

Answer: C

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13. In Friedel - Craft acylation the amount of $AlCl_3$ that must be taken is

A. in catalytic amount

B. one equivalent

C. more than one equivalent

D. amount does not matter

Answer: C

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14. For a Friedel - Craft reaction using $AlCl_3$which compound can be used as solvent, benzene or nitrobenzene ?

A. nitrobenzene but not benzene

B. benzene but not nitrobenzene

C. both benzene and nitrobenzene

D. neither benzene nor nitrobenene

Answer: A

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15. Predict the product of the reaction given below :

$$CH_3 - CH_2 - CH = CH_2 \xrightarrow[\text{Peroxide or light}]{HBr}$$

A. $CH_3 - CH_2 - CH_2 - Br$

B. $CH_3 - CH(Br) - CH_3$

C. $BrCH_2 - CH = CH_2$

D. (D) 

Answer: A

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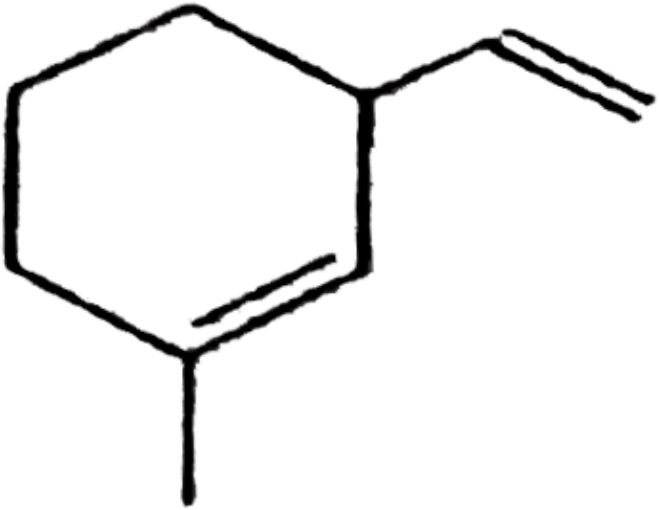
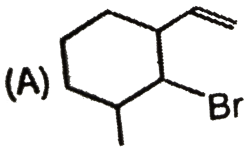
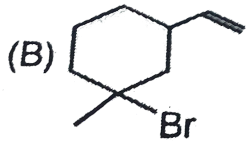
16. Which can not be the major product formed upon addition of 1 mole of HBr in the following reactions is:

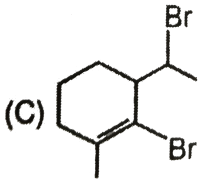


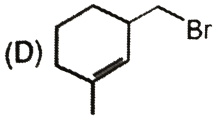
$$\overset{HBr}{1mol} \rightarrow$$

major

A. 

B. 

C. 

D. 

Answer: B

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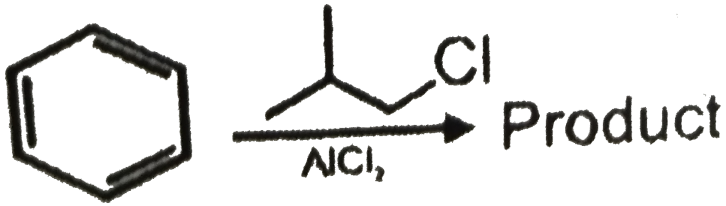
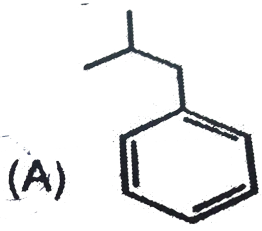
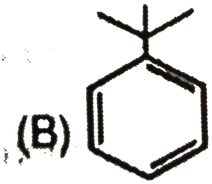
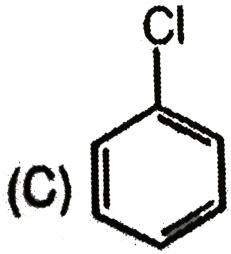
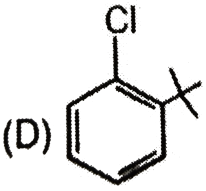
17. Predict the product formed in the following reaction



A. 

B. 

C. 

D. 

Answer: B

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18. What is the major product that will be formed in the following reaction ?

$$CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH = CH_2 + HCl \rightarrow$$

A. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - \underset{\underset{CH_3}{|}}{CH} - CH_3$

B. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{Cl}{|}}{C}} - \underset{\underset{CH_3}{|}}{CH} - CH_3$

C. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH_2 - CH_2 - Cl$

D. $CH_3 - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - \underset{\underset{Cl}{|}}{CH} - CH_2 - CH_2 - \underset{\underset{Cl}{|}}{CH} - \overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH_3$

Answer: B

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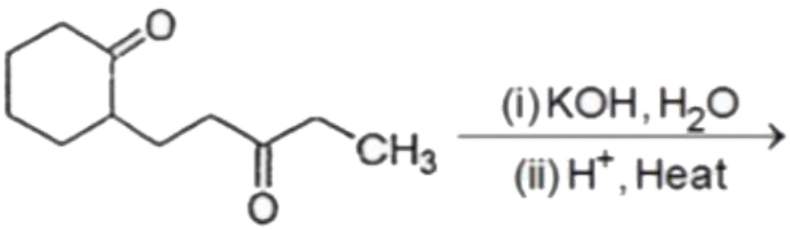
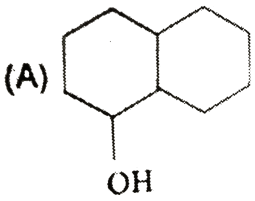
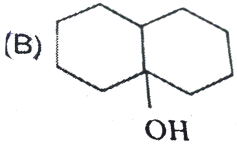
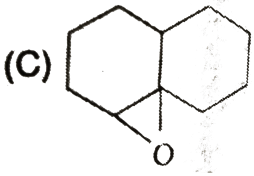
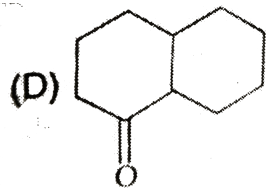
19. The major product of the following reaction is



A. 

B. 

C. 

D. 

Answer: A

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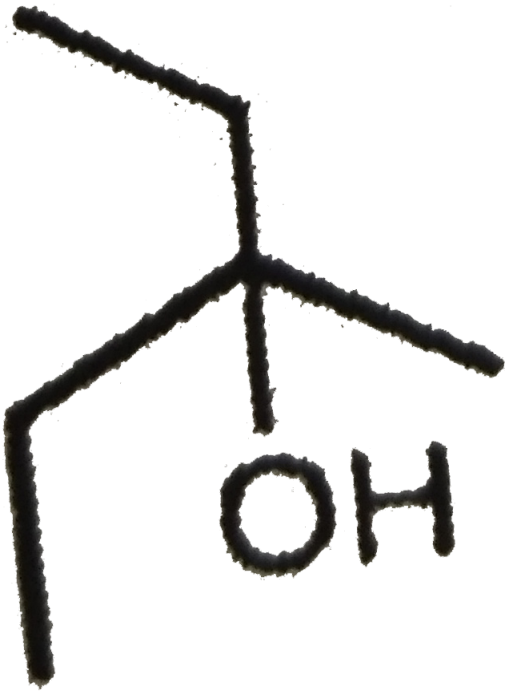
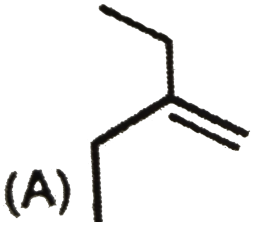
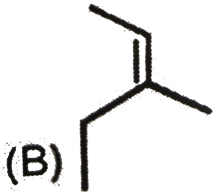
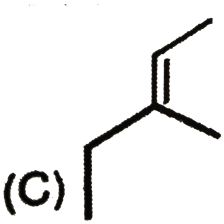
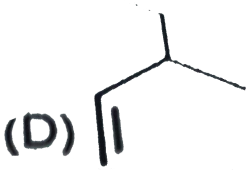
20. Identify the alkene which will not provide the following alcohol upon oxymercuration demercuration.



A. 

B. 

C. 

D. 

Answer: D

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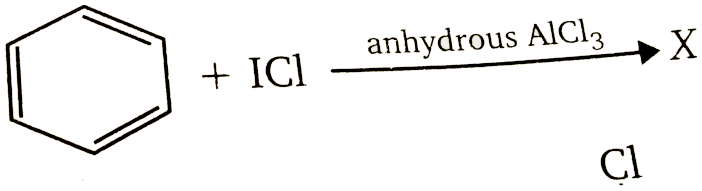
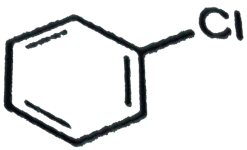
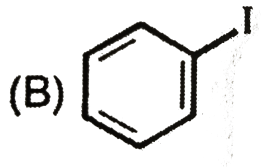
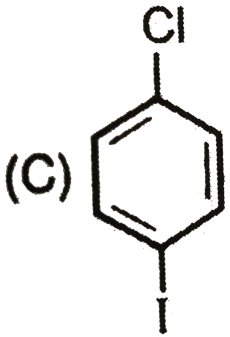
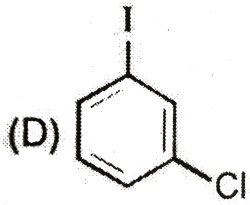
21. The compound X in the reaction.



A. 

B. 

C. 

D. 

Answer: B

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22. Cyclohexene reacts with limited amount of bromine in the presence of light to form product X (C_6H_9Br)

The statement correct about X is :

A. It is racemate

B. It is a product of an addition reaction

C. It is formed through a cationic intermediate

D. It is optically active

Answer: A

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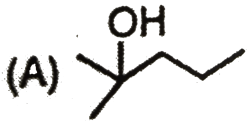
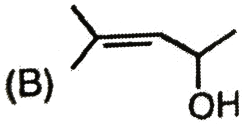
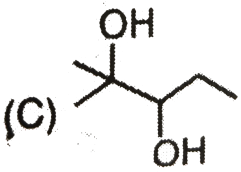
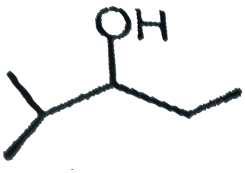
23. The major product of the following reaction is :

$$(CH_3)_2C = CH - CH_2 - CH_3 \xrightarrow{(i)\, B_2H_6, \text{ether}\ (ii)\, H_2O_2, \text{NaOH}}$$

A. 

B. 

C. 

D. 

Answer: D

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24. The compound which does not react with bromine easily at room temperature is

A. phenol

B. 2-butyne

C. chlorobenzene

D. 1-pentene

Answer: C

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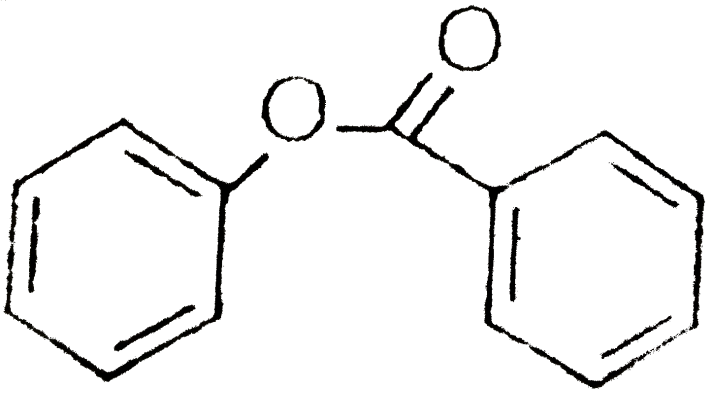
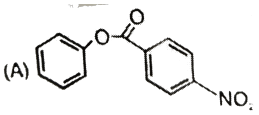
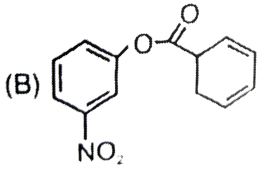
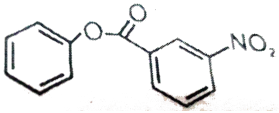
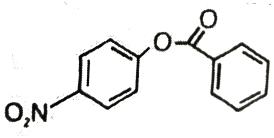
25. Major product of mononitration of the following compound is :



A. 

B. 

C. 

D. 

Answer: D

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26. The product obtained from the following sequence of reactions is

$$H_3C - C \equiv CH \xrightarrow[H_2SO_4]{HgSO_4} A \xrightarrow{NaBH_4} B$$

A. propanal

B. 2-propanol

C. 1-propanol

D. propane

Answer: B

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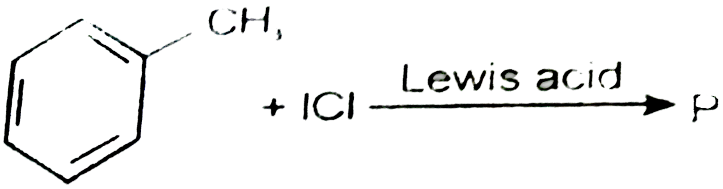
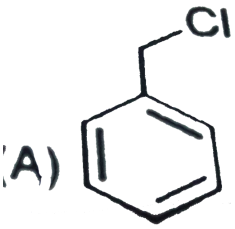
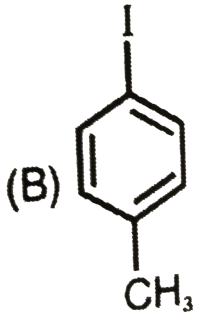
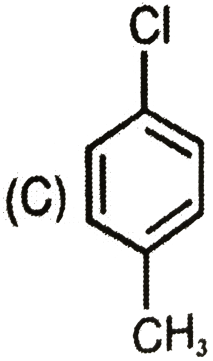
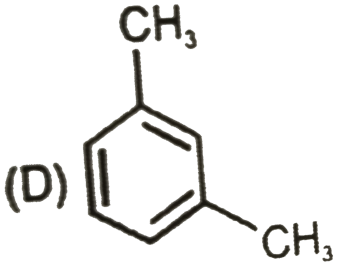
27. The product (P) of the following reaction is:



A. 

B. 

C. 

D. 

Answer: B

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28. Which isomer of xylene can give three different monochloroderivatives ?

A. o-xylene

B. m-xylene

C. p-xylene

D. xylene cannot give a monochioro derivative

Answer: B

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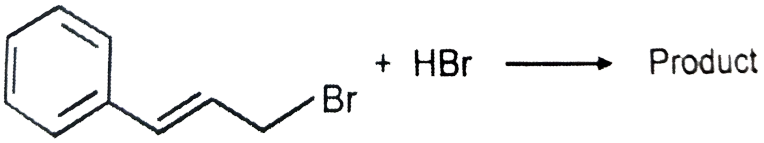
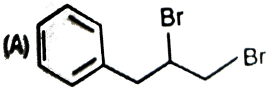
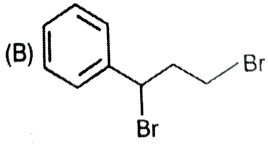
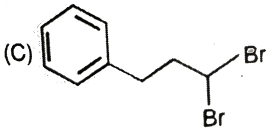
29.



The 'product' in the above reaction is :

A. 

B. 

C. 

D. This reaction cannot take place

Answer: B

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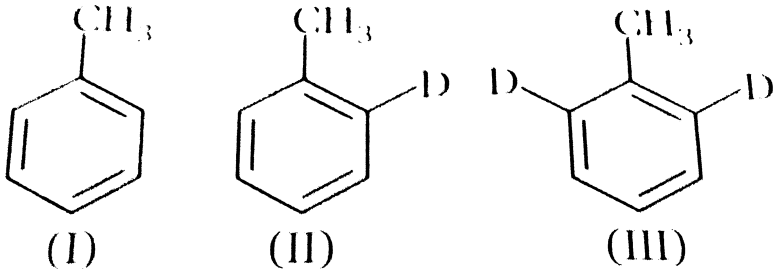
30. (I) 

The rate of $o-$ nitration of the above compounds, (I) toluene, (II) 2-D-toluene and (III) $2,6-D_2-$ toluene is in the following order

A. $I > II > III$

B. $II > I > III$

C. $III > I > II$

D. The rate is the same for all

the three compounds

Answer: D

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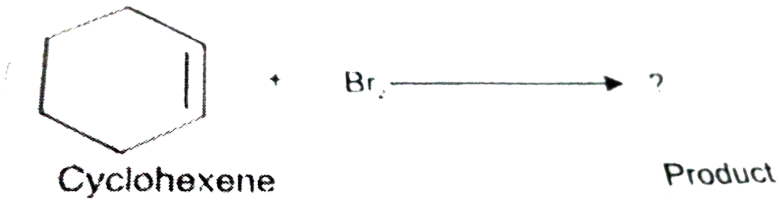
31.



The correct name of the product obtained is

A. cis-1,2-dibromocyclohexane

B. cis-1,4-dibromocyclohexane

C. trans-1,2-dibromocyclohexane

D. trans-1,4-dibromocyclohexane

Answer: C

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32. Which of the following statements is correct ?

A. $-NO_2$ group activates the benzene ring for attack of electrophile at ortho and para position

B. $-NH_2$ group activates the benzene ring for attack of electrophile at ortho and para position

C. Both $-NO_2$ group as well as $-NH_2$ group activate the benene ring for attack of electrophile at ortho and para position.

D. Neither $-NO_2$ group nor $-NH_2$ group activate the benzene ring the attack of electrophile at ortho and para position.

Answer: B

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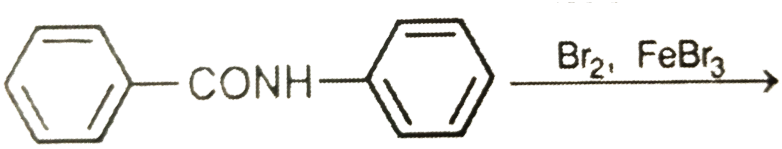
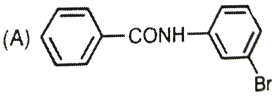
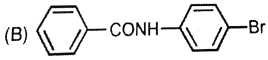
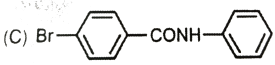
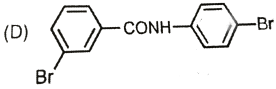
33. The major product of the following reaction is



A. 

B. 

C. 

D. 

Answer: B

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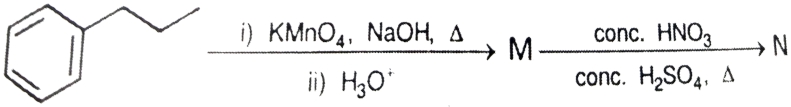
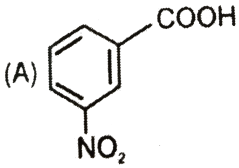
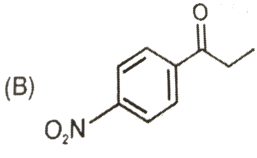
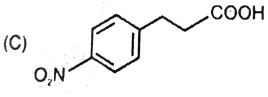
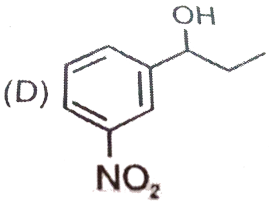
34. The product 'N' of the following reaction is



A. 

B. 

C. 

D. 

Answer: A

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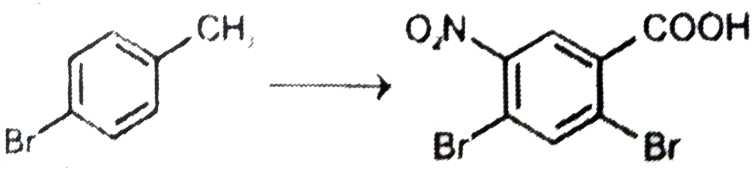
35. The best sequence of reactions for the following conversion is



A. (i)1 mol $Br_2/FeBr_3$ $(ii)KMnO_4$, heat $(iii)HNO_3 + H_2SO_4$

B. (i)$HNO_3 + H_2SO_4$ $(ii)1\ \text{mol}Br_2/FeBr_3$ $(iii)KMnO_4$, heat

C. (i)$KMnO_4$, heat $(ii)HNO_3 + H_2SO_4$ $(iii)1\ \text{mol}Br_2/FeBr_3$

D. (i)

$1\ \text{mol}Br_2/FeBr_3$ $(ii)HNO_3 + H_2SO_4$ $(iii)KMnO_4$, heat

Answer: A

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36. 1,3-pentadiene and 1,4-pentadiene are compared with respect to their intrinsic stability and reaction with HI. The correct statement is :

A. 1,3-pentadiene is more stable and more reactive than 1,4-pentadiene

B. 1,3-pentadiene is less stable and less reactive than 1,4-pentadiene

C. 1,3-pentadiene is more stable but less reactive than 1,4-pentadiene

D. 1,3-pentadiene is less stable but more reactive than 1,4-pentadiene

Answer: A

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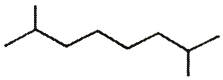
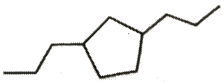
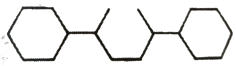
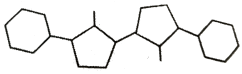
37. The hydrocarbon that cannot be prepared effectively by Wurtz reaction is

A. (A) 

B. (B) 

C. (C) 

D. (D) 

Answer: B

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38. The reaction of 1-phenylpropane with limited amount of chlorine in the presence of light gives mainly .

A. 4-chloropropylbenzene

B. 1-chloro-1-phenylpropane

C. 3-chloro-1-phenylpropane

D. 2-chloro-1-phenylpropane

Answer: B

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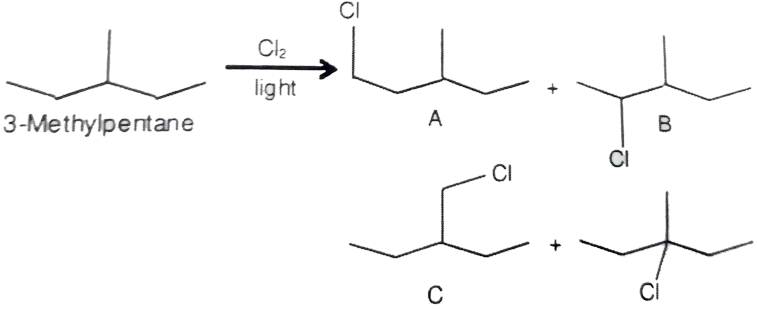
39. 3-Methylpentane on monochlorination gives four possible products. The reaction follows free radical mechanism.The relative reactivities for replacement of -H are 3° : 2° : 1° =6:4:1.



Relative amounts of A,B,C and D formed are

A. 6/31,16/31,6/31,3/31

B. 16/31,6/31,6/31,3/31

C. 6/31,16/31,3/31,6/31

D. 6/31,3/31,6/31,16/31

Answer: C

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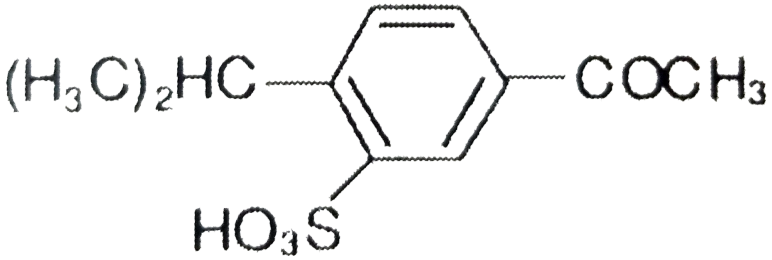
40. The best sequence of reactions for preparation of the following compound from benzene is



A. (i)CH_3COCl/$AlCl_3$ (ii)Oleum (iii)$(CH_3)_2$CH-Cl(1 mole) /$AlCl_3$

B. (i)$(CH_3)_2CH-Cl$ (1 mole)/$AlCl_3$ (ii)$CH_3COCl/AlCl_3$(iii)Oleum

C. (i)Oleum (ii)$CH_3COCl/AlCl_3$ (iii)$(CH_3)_2CH-Cl$(1 mole) /$AlCl_3$

D. (i)$(CH_3)_2CH-Cl$(1 mole) /$AlCl_3$(ii) Oleum (iii)$CH_3COCl/AlCl_3$

Answer: B

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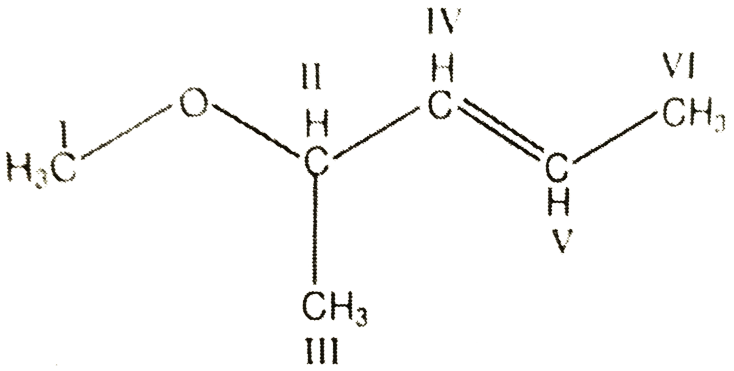
41. In the given compound the order of case with which hydrogen atom can be abstracted from carbon I to VI is :



A. I gt VI gt IV = V gt I gt III

B. II gt I gt VI gt III gt IV =V

C. II gt I gt III gt VI gt IV = V

D. IV gt II gt I gt III gt IV = V

Answer: B

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42. Addition of bromine to cis-3 hexene gives

A. racemic dibromide

B. a mixture of diastereomeric dibromides

C. optically active dibromide

D. meso dibromide

Answer: A

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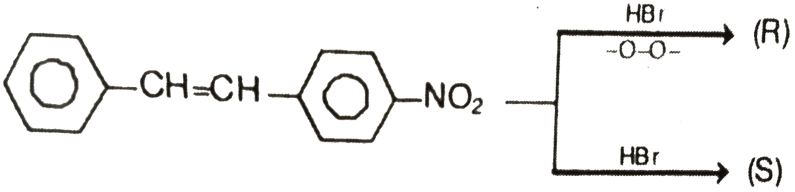
APSP Part - 3

1.



R & S are :

A. Positional isomer

B. Geometrical isomer

C. Optical isomer

D. Chain isomer

Answer: A

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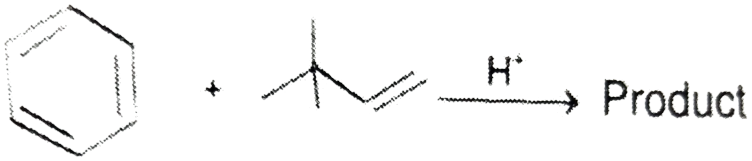
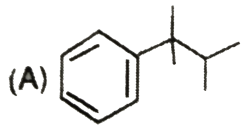
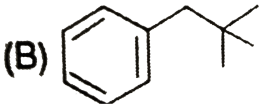
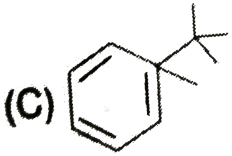
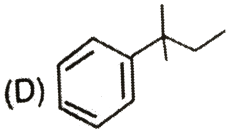
2. What is the product formed in the following reaction.



A. 

B. 

C. 

D. 

Answer: A

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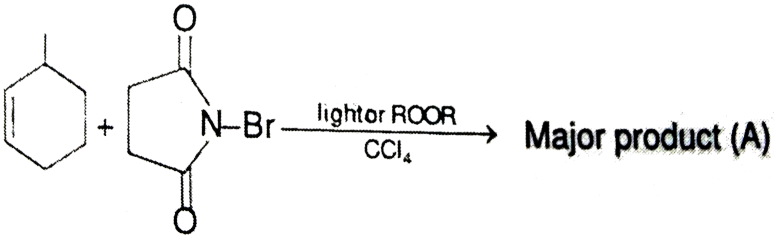
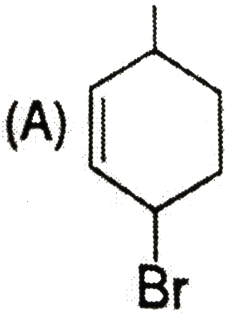
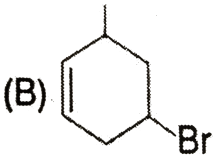
3. Complete the following reaction

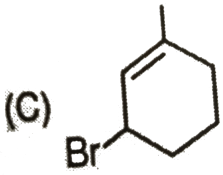


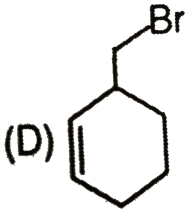


A.



B.

C. 

D. 

Answer: C

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4. The reaction of toluene with CI_2 in presence of $FeCI_3$ gives X and reaction in presence of light gives Y Thus X and Y are .

A. X=Benzyl chloride , Y=m-chlorotoluene

B. X=Benzyl chloride , Y=o-chlorotoluene

C. X=m-chlorotoluene , Y=p-chlorotoluene

D. X=o- and p-chlorotoluene , Y=Trichloromethyl benzene

Answer: D

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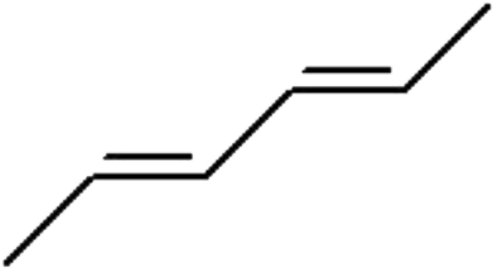
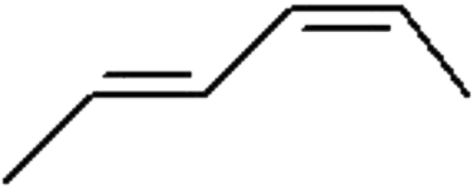
5. The correct order of heat of combustion for following alkadienes is

(i)



(ii)



(iii)

A. II gt IV gt I gt III

B. IV gt III gt II gt I

C. III gt I gt IV gt II

D. I gt II gt III gt IV

Answer: C

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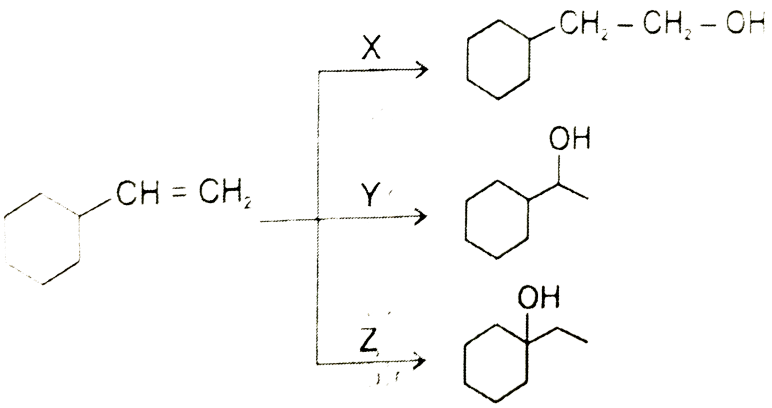
6.



X,Y and Z reaction are :

A. Simple hydration reaction

B. Hydroboration oxidation, hydration and oxymercuration demercuration

C. Hydroboration oxidation, oxymercuration demercuration and hydration

D. Oxymercuration demercuration , hydroboration oxidation and hydration

Answer: C

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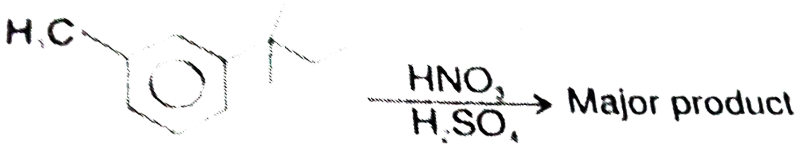
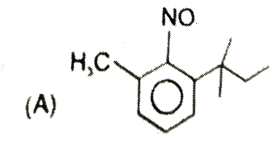
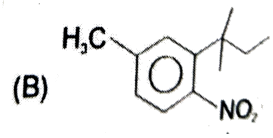
7. The major product of the given reaction is :



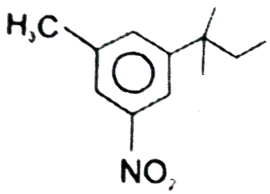
A.

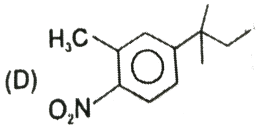


B.



C.



D. (D) 

Answer: D

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8. In which reaction incorrect products have been reported.

A. $CH_2 = CH - CHO \xrightarrow{HCl\,(g)\ (-10^\circ C)} \underset{Cl}{CH_2} - CH_2 - CHO$

B. $CH_2 = CH - COOH \xrightarrow{H_2O\,/\,H_2SO_4} \underset{OH}{CH_2} - CH_2 - COOH$

C.

$$CH_3 - \overset{CH_3}{\overset{|}{C}} = CH - \underset{O}{\overset{||}{C}} - CH_3 \xrightarrow{CH_3OH\,/\,H_2SO_4} CH_3 - \overset{CH_3}{\overset{|}{C}}H - \underset{OCH_3}{\overset{|}{C}}H -$$

D.

$$CH_3 - CH = CH - OCH_3 \xrightarrow{CH_3OH\,/\,H^+} CH_3 - CH_2 - \underset{OCH_3}{\overset{|}{C}}H - OC$$

Answer: C

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9. In the chlorination of Methane which of the following reaction involve in the chain termination step .

A. $Cl - Cl \rightarrow 2\dot{C}l$

B. $\dot{C}l + \dot{C}l \rightarrow Cl - Cl$

C. $\dot{C}H_3 + \dot{C}l \rightarrow CH_3 - Cl$

D. $\dot{C}H_3 + Cl - Cl \rightarrow CH_3 - Cl + \dot{C}l$

Answer: B::C

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10. Which of the following reactions are completed through free radical intermediate ?

A. $(CH_3)_3CH + Br_2 \xrightarrow{hv} (CH_3)_3CBr + HBr$

B. $(CH_3)_3C = CH_2 + Br_2 \rightarrow CH_3 - \underset{CH_3}{\overset{Br}{\underset{|}{\overset{|}{C}}}} - \overset{Br}{\overset{|}{CH_2}}$

C. $CH_3 - CH = CH_2 + Cl_2 \xrightarrow{h\upsilon} \underset{Cl}{\underset{|}{CH_2}} - CH = CH_2$

D. $Ph - CH = CH_2 + HBr \xrightarrow[h\upsilon]{R_2O_2} Ph - CH_2 - \underset{Br}{\underset{|}{CH_2}}$

Answer: A::C::D

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11. Which of the following statement are correct for give reaction.

$$CH_3 - \underset{CH_3}{\underset{|}{C}} = CH - CH_3 + HBr \xrightarrow{\text{Peroxide}} CH_3 - \underset{CH_3}{\overset{Br}{\underset{|}{\overset{|}{C}}}} - CH_2 - CH_3 \quad CH_3$$

A. Major product is mixture of two enantiomers.

B. Less stable carbocation give major product

C. Less stable free radical give major product

D. More stable free radical give major product

Answer: A::D

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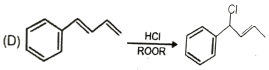
12. In which of the following reactions and products are correctly matched ?

A. $F_3C - CH = CH_2 + HCl \rightarrow F_3C - \underset{Cl}{\underset{|}{CH}} - CH_3$

B.

$$CH_3 - CH = CH - \overset{O}{\overset{||}{C}} - OCH_3 + ICl \rightarrow CH_3 - \underset{Cl}{\underset{|}{CH}} - \underset{I}{\underset{|}{CH}} - \overset{O}{\overset{||}{C}}$$

C. $C_6H_5CH = CHCH_3 + HBr \xrightarrow{ROOR} C_6H_5CH_2 - \underset{Br}{\underset{|}{CH}} - CH_3$

D. 

Answer: B::C::D

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13. Which statement is/are correct.

A. No primary kinetic isotope effect is observed during nitration of benzene

B. K_H / K_D=1 for halogenation of benzene

C. K_H / K_D=1 for sulphonation of benzene

D. K_H / K_D is >greater than 1 for alkylation of benzene

Answer: A::B

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14. Which of the following statements is/are incorrect ?

A. Nitrobenzene will give meta-nitrotoluene on reaction with $CH_3Cl / AlCl_3$

B. Chlorobenzene will give meta-substituted product on electrophilic substitution since it exerts -I gt + M effect.

C. n-Propyl benzene can be easily obtained on Friedral crafts alkylation of benzene with n-propyl chloride.

D. Toluene can be obtained in better yield when excess of benzene with react with $CH_3Cl / AlCl_3$.

Answer: A::B::C

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15. How many of the following substituents can cause aromatic electrophilic substitution faster than benzene ?

(a) $-NH_2$, (b) $-NR_2$, (C) $-NO_2$, (d) $-\overset{+}{N}H_3$

(e) $-O-\overset{O}{\overset{||}{C}}-R$, (f) $-NH-\overset{O}{\overset{||}{C}}-R$, (g) $-\overset{O}{\overset{||}{C}}-Cl$, (h) $-\overset{O}{\overset{||}{C}}-H$

(i) $-SO_3H$, (j) $-CH_3$, (k) $-CH-CR_2$

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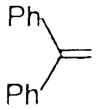
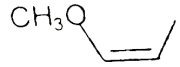
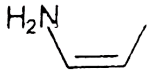
16. How many alkene/s react faster than propane with dil. H_2SO_4?

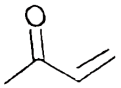
(a) 

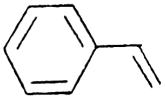
(b) 

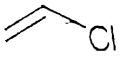
(c) 

(d) 

(e) 

(f) 

(g) 

(h) 

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17. When addition of Br_2 was carried out in presence of aq. NaCl on ethene than total number of possible products is:

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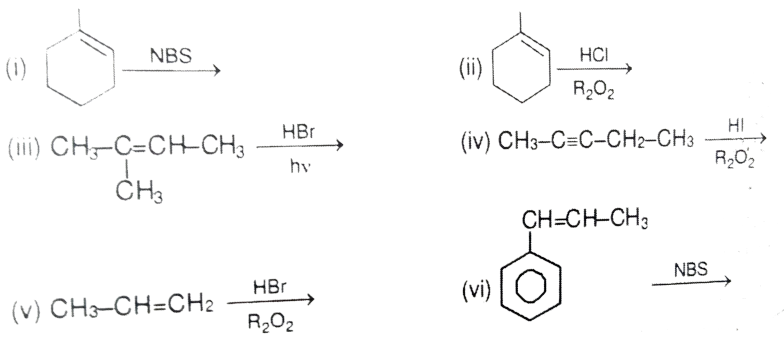
18. How many reactions will proceed through free radical addition mechanism ?



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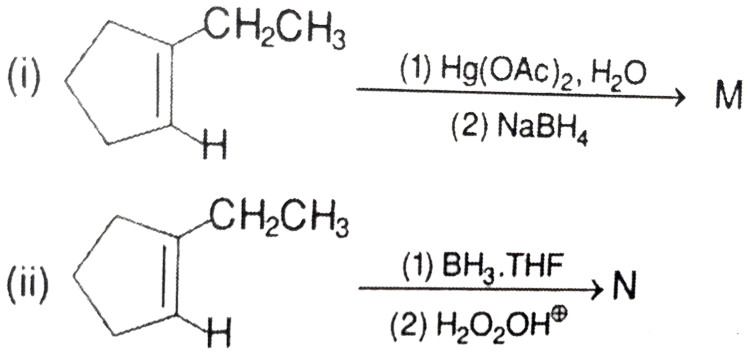
19. In the given reactions M is the number of major products obtained in I^{st} reaction and N number of major products obtained in II^{nd} reaction. Report your answer as MN.



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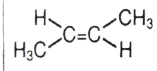
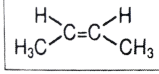
20. Consider experimental data shown in the table :

Alkene	Relative rate	Alkene	Relative rate
$CH_2=CH_2$	1	$(CH_3)_2C=CH_2$	5,400
$CH_2=CH-CH_3$	61	$(CH_3)_2C=CHCH_3$	130,000
	1700	$(CH_3)_2C=C(CH_3)_2$	1,800,000
	2600		

Rate of electrophilic addition on isobutylene is significantly higher than cis or trans-2-Butene chiefly due to -

A. (A) Lesser stability of  (isobutylene) in comparison to or 

B. 

C. Better stabilization of positive charge acquired during formation of bromonium ion intermediate by Me-groups.

D. High angle strain in the molecule.

Answer: C

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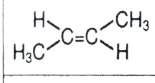
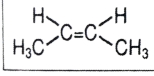
21. Consider experimental data shown in the table :

Alkene	Relative rate	Alkene	Relative rate
$CH_2=CH_2$	1	$(CH_3)_2C=CH_2$	5,400
$CH_2=CH-CH_3$	61	$(CH_3)_2C=CHCH_3$	130,000
	1700	$(CH_3)_2C=C(CH_3)_2$	1,800,000
	2600		

Which of the following would be expected to have highest rate of electrophilic addition of Br_2 ?

A. $Ph-CH=CH_2$

B. 

C. $Ph-CH=CH-CH_3$

D. All reacts with the same rate, since the rate depends only on $[Br_2]$ and not on the substrate.

Answer: B

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22. Match List-I (Compounds) with List-II (% meta electrophilic substitution product) and select the correct answer using the code given below the lists :

	List-I		List-II
(P)	$Ar-CH_3$	(1)	64.6
(Q)	$ArCH_2Cl$	(2)	34
(R)	$ArCHCl_2$	(3)	4.5
(S)	$ArCCl_3$	(4)	15

A. $\begin{matrix} P & Q & R & S \\ 1 & 3 & 2 & 4 \end{matrix}$

B. $\begin{matrix} P & Q & R & S \\ 3 & 4 & 2 & 1 \end{matrix}$

C. $\begin{matrix} P & Q & R & S \\ 4 & 2 & 3 & 1 \end{matrix}$

D. $\begin{matrix} P & Q & R & S \\ 2 & 1 & 3 & 4 \end{matrix}$

Answer: B

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