

HYDROCARBONS PYQ

AIPMT 2007

- Reduction of aldehydes and ketones into hydrocarbons using zinc amalgam and conc. HCl is called
 - Cope reduction
 - Dow reduction
 - Wolf-kishner reduction
 - Clemmensen reduction
- Which of the compounds with molecular formula C_5H_{10} yields acetone on ozonolysis
 - 3-Methyl-1-butene
 - Cyclopentene
 - 2-Methyl-1-butene
 - 2-Methyl-2-butene
- Predict the product 'C' obtained in the following reaction of 1-butyne :


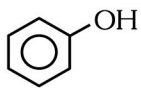
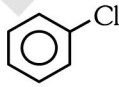
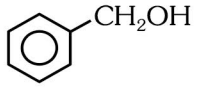
$$CH_3-CH_2-C\equiv CH \xrightarrow{HCl} B \xrightarrow{HI} C$$
 - $CH_3-CH_2-CH_2-\overset{\overset{I}{|}}{\underset{\underset{Cl}{|}}{C}}-H$
 - $CH_3-CH_2-\overset{\overset{I}{|}}{CH}-CH_2Cl$
 - $CH_3-CH_2-\overset{\overset{I}{|}}{C}-CH_3$
 $\quad \quad \quad \quad \quad |$
 $\quad \quad \quad \quad \quad Cl$
 - $CH_3-\overset{\overset{I}{|}}{CH}-CH_2-CH_2I$
 $\quad \quad \quad |$
 $\quad \quad \quad Cl$
- The order of decreasing reactivity towards electrophilic reagent for the following :

| | |
|--------------------|-------------|
| (a) Benzene | (b) Toluene |
| (c) Chloro benzene | (d) Phenol |

 - $b > d > a > c$
 - $d > c > b > a$
 - $d > b > a > c$
 - $a > b > c > d$

AIPMT 2008

- $$H_3C-\overset{\overset{CH_3}{|}}{CH}-CH=CH_2 + HBr \longrightarrow A$$
 A (Predominantly) is :
 - $CH_3-\overset{\overset{CH_3}{|}}{C}-CH_2CH_3$
 $\quad \quad \quad |$
 $\quad \quad \quad Br$
 - $CH_3-\overset{\overset{Br}{|}}{CH}-\overset{\overset{CH_3}{|}}{CH}-CH_3$
 - $CH_3-\overset{\overset{CH_3}{|}}{CH}-\overset{\overset{Br}{|}}{CH}-CH_3$
 - $CH_3-\overset{\overset{CH_3}{|}}{CH}-CH_2-CH_2Br$
- Which one of the following is most reactive towards electrophilic attack ?

| | |
|--|---|
| (1)  | (2)  |
| (3)  | (4)  |

AIPMT 2009

- Benzene reacts with CH_3Cl in the presence of anhydrous $AlCl_3$ to form :-

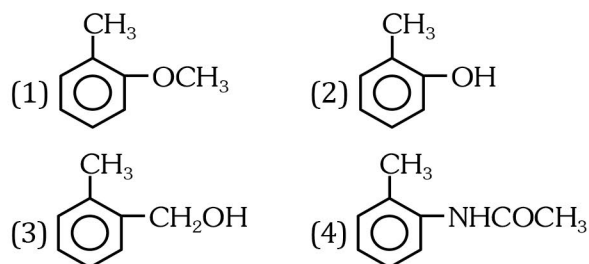
| | |
|-------------------|--------------------|
| (1) Xylene | (2) Toluene |
| (3) Chlorobenzene | (4) Benzylchloride |
- Nitrobenzene can be prepared from benzene by using a mixture of conc. HNO_3 and conc. H_2SO_4 . In the mixture, nitric acid acts as a/an:-

| | |
|--------------|--------------------|
| (1) Catalyst | (2) Reducing agent |
| (3) Acid | (4) Base |

AIPMT 2010

- Liquid hydrocarbons can be converted to a mixture of gaseous hydrocarbons by :-
 - Hydrolysis
 - Oxidation
 - Cracking
 - Distillation under reduced pressure

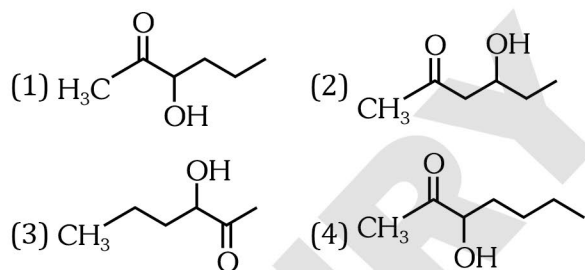
10. Which one is most reactive towards electrophilic reagent ?



11. The reaction of toluene with Cl_2 in presence of FeCl_3 gives 'X' and reaction in presence of light gives 'Y'. Thus, 'X' and 'Y' are :-

- (1) X = Benzyl chloride,
Y = m-chlorotoluene
 (2) X = Benzal chloride,
Y = o-chlorotoluene
 (3) X = m-chlorotoluene,
Y = p-chlorotoluene
 (4) X = o- and p-chlorotoluene
Y = Trichloromethyl benzene

12. Which one of the following compounds will be most readily dehydrated :-

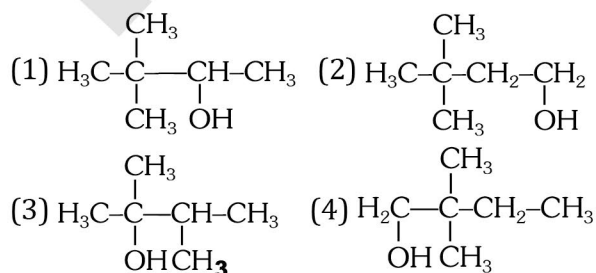


AIPMT Pre.-2012

13. In the following reaction:



The major product is :-



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

- (1) Toluene (2) Benzene
 (3) Benzoic Acid (4) Nitrobenzene

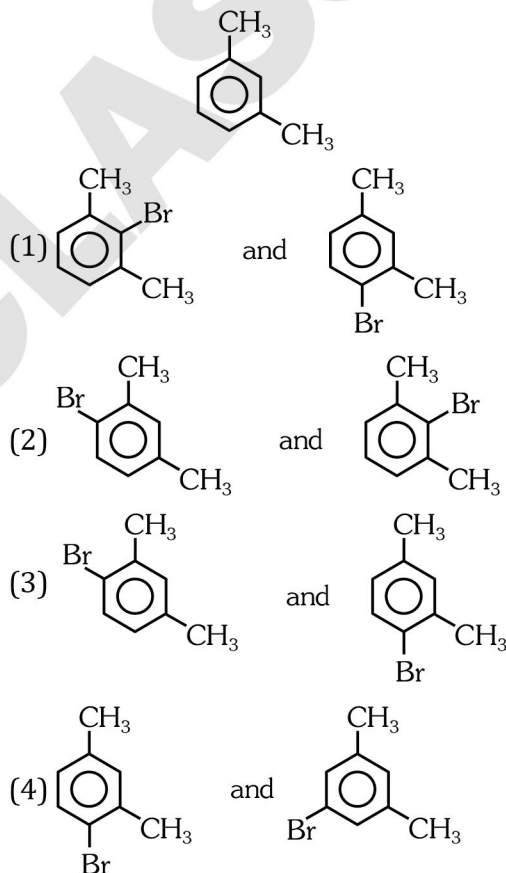
NEET-UG 2013

15. Which of the following compounds will not undergo Friedel-Craft's reaction easily :-

- (1) Toluene (2) Cumene
 (3) Xylene (4) Nitrobenzene

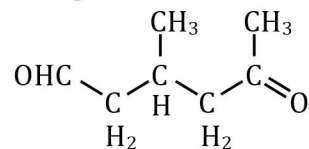
AIPMT 2014

16. What products are formed when the following compound is treated with Br_2 in the presence of FeBr_3 ?

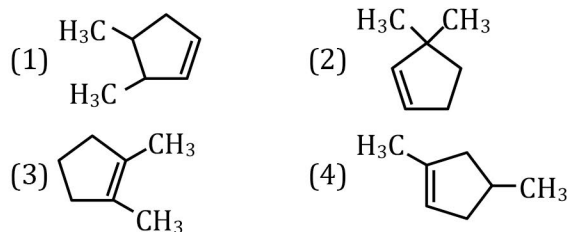


AIPMT 2015

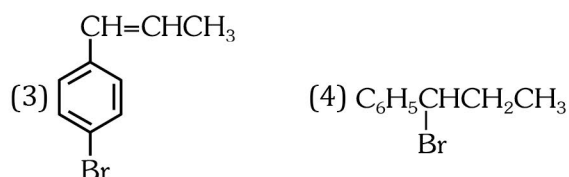
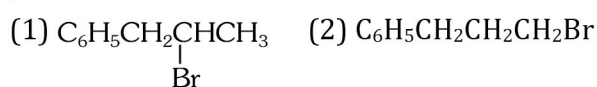
17. A single compound of the structure :-



is obtainable from ozonolysis of which of the following cyclic compounds ?

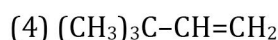
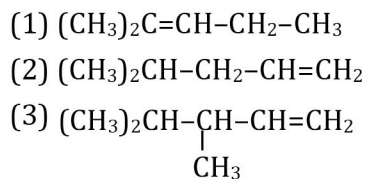


18. The reaction of $C_6H_5CH=CHCH_3$ with HBr produces:-



Re-AIPMT 2015

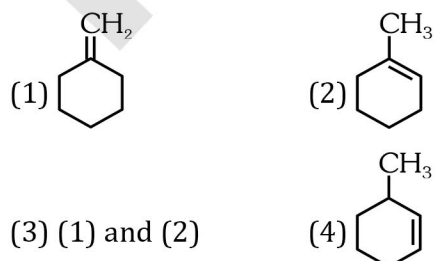
19. 2,3-Dimethyl-2-butene can be prepared by heating which of the following compounds with a strong acid ?



20. The oxidation of benzene by V_2O_5 in the presence of air produces :

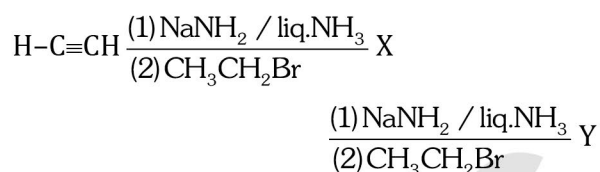
- (1) Benzoic acid
 (2) Benzaldehyde
 (3) Benzoic anhydride
 (4) Maleic anhydride

21. In the reaction with HCl, an alkene reacts in accordance with the Markovnikov's rule, to give a product 1-chloro-1 methylcyclohexane. The possible alkene is :-



NEET-I 2016

22. In the reaction



X and Y are :

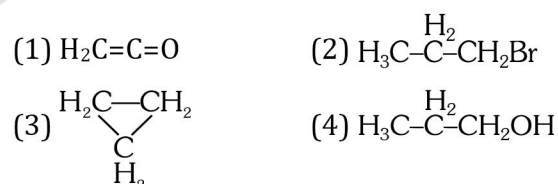
- (1) X = 1-Butyne ; Y = 3-Hexyne
 (2) X = 2-Butyne ; Y = 3-Hexyne
 (3) X = 2-Butyne ; Y = 2-Hexyne
 (4) X = 1-Butyne ; Y = 2-Hexyne

23. Consider the nitration of benzene using mixed conc. H_2SO_4 and HNO_3 . If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be:-

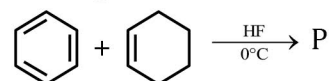
- (1) Faster (2) Slower
 (3) Unchanged (4) Doubled

NEET-II 2016

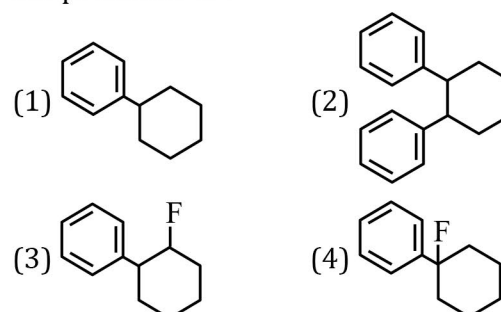
24. Which of the following compounds shall not produced propene by reaction with HBr followed by elimination or direct only by elimination reaction ?



25. In the given reaction



the product P is :-

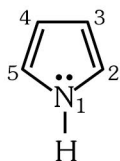


26. The compound that will react most readily with gaseous bromine has the formula

- (1) C_4H_{10} (2) C_2H_4
 (3) C_3H_6 (4) C_2H_2

27. Which of the following can be used as the halide component for Friedel-Crafts reaction ?
 (1) Chloroethene (2) Isopropyl chloride
 (3) Chlorobenzene (4) Bromobenzene

28. In pyrrole

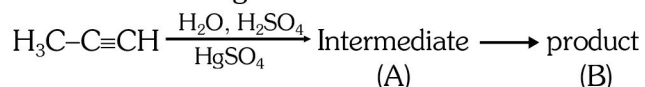


The electron density is maximum on :-

- (1) 2 and 4 (2) 2 and 5
 (3) 2 and 3 (4) 3 and 4

NEET(UG) 2017

29. Predict the correct intermediate and product in the following reaction :



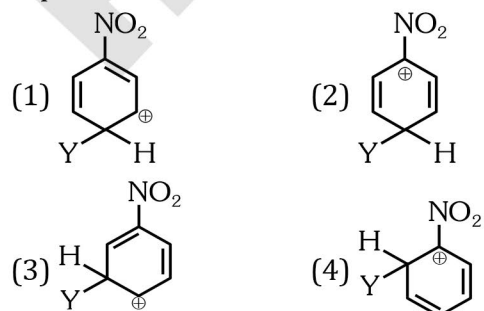
- (1) A : $\text{H}_3\text{C}-\underset{\text{OH}}{\text{C}}=\text{CH}_2$ B : $\text{H}_3\text{C}-\underset{\text{SO}_4}{\text{C}}=\text{CH}_2$
 (2) A : $\text{H}_3\text{C}-\underset{\text{O}}{\text{C}}-\text{CH}_3$ B : $\text{H}_3\text{C}-\text{C}\equiv\text{CH}$
 (3) A : $\text{H}_3\text{C}-\underset{\text{OH}}{\text{C}}=\text{CH}_2$ B : $\text{H}_3\text{C}-\underset{\text{O}}{\text{C}}-\text{CH}_3$
 (4) A : $\text{H}_3\text{C}-\underset{\text{SO}_4}{\text{C}}=\text{CH}_2$ B : $\text{H}_3\text{C}-\underset{\text{O}}{\text{C}}-\text{CH}_3$

NEET(UG) 2018

30. Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is

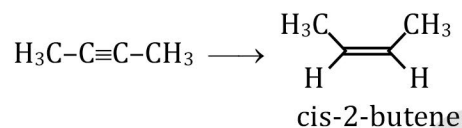
- (1) $\text{CH}\equiv\text{CH}$ (2) $\text{CH}_2=\text{CH}_2$
 (3) CH_3-CH_3 (4) CH_4

31. Which of the following carbocations is expected to be most stable ?



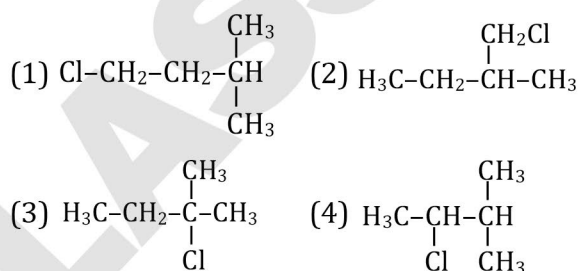
NEET(UG) 2019

32. The most suitable reagent for the following conversion is :-

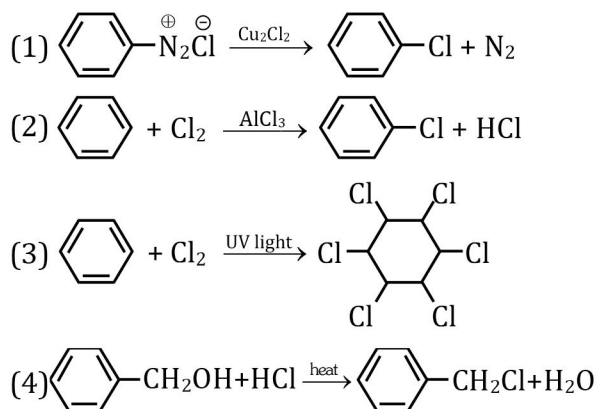


- (1) Na/liquid NH_3 (2) H_2 , Pd/C, quinoline
 (3) Zn/HCl (4) $\text{Hg}^{2+}/\text{H}^+$, H_2O

33. An alkene "A" on reaction with O_3 and Zn- H_2O gives propanone and ethanal in equimolar ratio. Addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is :-



34. Among the following, the reaction that proceeds through an electrophilic substitution is :

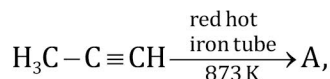


NEET(UG) 2019 (ODISHA)

35. The alkane that gives only one mono-chloro product on chlorination with Cl_2 in presence of diffused sunlight is :-

- (1) 2,2-dimethylbutane
 (2) Neopentane
 (3) n-pentane
 (4) Isopentane

36. In the following reaction,



the number of sigma (σ) bonds present in the product A is :-

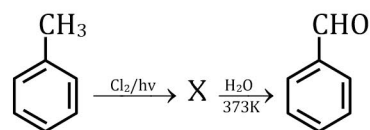
- (1) 21 (2) 9
(3) 24 (4) 18

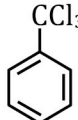
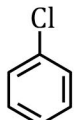
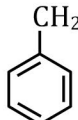

NEET(UG) 2020

37. Which of the following alkane cannot be made in good yield by Wurtz reaction ?

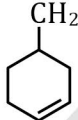
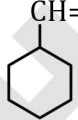
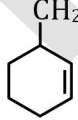
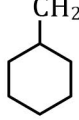
- (1) n-Butane
(2) n-Hexane
(3) 2,3-Dimethylbutane
(4) n-Heptane

38. Identify compound X in the following sequence of reactions :

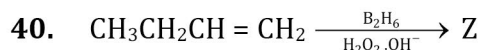


- (1)  (2) 
(3)  (4) 

39. An alkene on ozonolysis gives methanal as one of the product. Its structure is :

- (1) 
(2) 
(3) 
(4) 

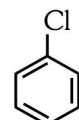
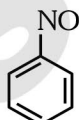

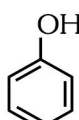
NEET(UG) 2020 (COVID-19)



What is Z ?

- (1) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
(2) $\text{CH}_3\text{CH}_2\underset{\text{OH}}{\text{CH}}\text{CH}_3$
(3) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$
(4) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

41. Which of the following compound is most reactive in electrophilic aromatic substitution?

- (1)  (2) 
(3)  (4) 

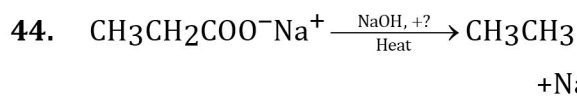
42. Which of the following is a free radical substitution reaction ?

- (1) Benzene with $\text{Br}_2/\text{AlCl}_3$
(2) Acetylene with HBr
(3) Methane with $\text{Br}_2/h\nu$
(4) Propene with $\text{HBr}/(\text{C}_6\text{H}_5\text{COO})_2$

NEET(UG) 2021

43. The major product formed in dehydrohalogenation reaction of 2-Bromopentane is Pent-2-ene. This product formation is based on ?

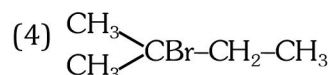
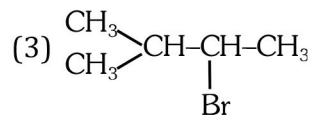
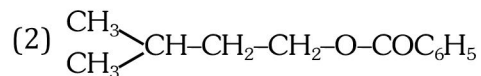
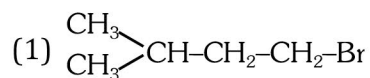
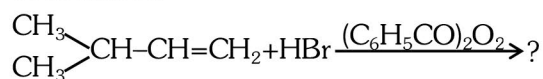
- (1) Saytzeff's Rule
(2) Hund's Rule
(3) Hoffmann Rule
(4) Huckel's Rule



Consider the above reaction and identify the missing reagent/chemical.

- (1) B_2H_6
(2) Red Phosphorus
(3) CaO
(4) DIBAL-H

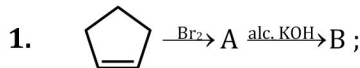
45. The major product of the following chemical reaction is:



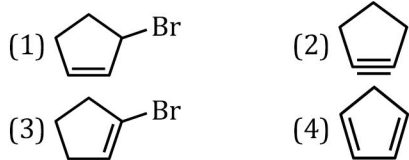
EXERCISE-II (Previous Year Questions)

ANSWER KEY

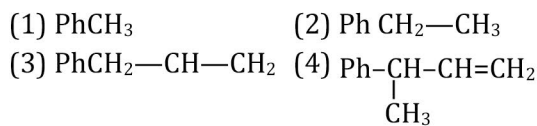
| | | | | | | | | | | | | | | | |
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Answer | 4 | 4 | 3 | 3 | 1 | 2 | 2 | 4 | 3 | 2 | 4 | 2 | 3 | 1 | 4 |
| Question | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Answer | 3 | 4 | 4 | 4 | 4 | 3 | 1 | 2 | 1 | 1 | 3 | 2 | 2 | 3 | 4 |
| Question | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| Answer | 3 | 2 | 3 | 2 | 2 | 1 | 4 | 4 | 4 | 1 | 4 | 3 | 1 | 3 | 1 |



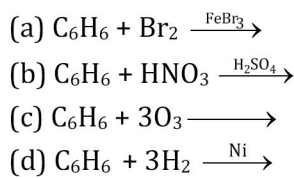
What is the structure of B



2. Which of the following is maximum reactive for NBS

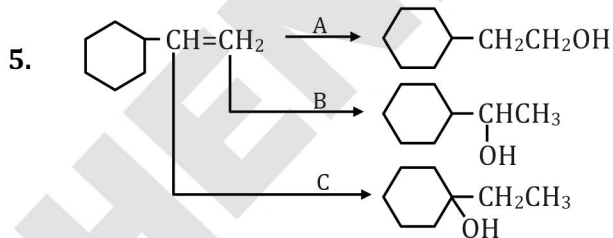
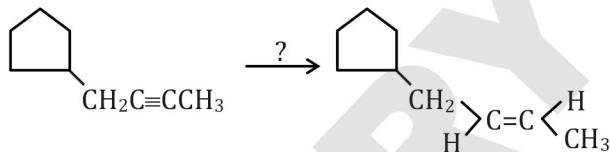


3. Which of the following reactions show that there are three C=C bond in benzene



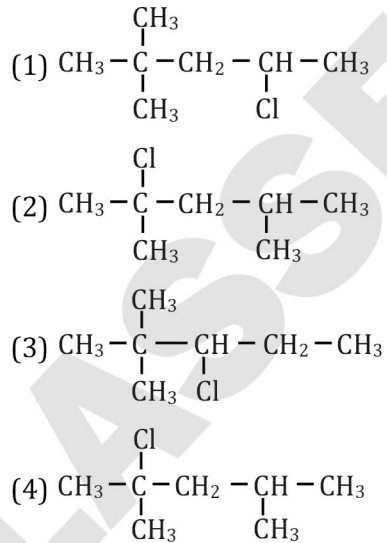
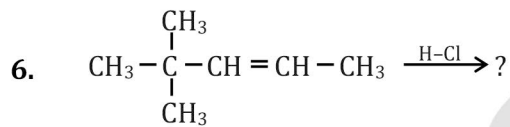
(1) a, c (2) b, d (3) b, c, d (4) c, d

4. Reagent used to carry out following alkyne to alkene is

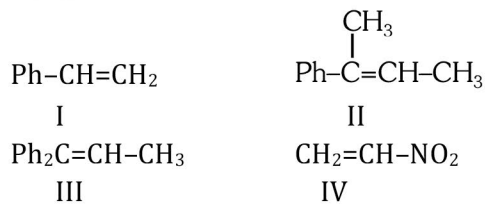


Schemes; A, B and C are :-

- (1) Simple hydration
 (2) Hydroboration, mercuration-demercuration, hydration
 (3) Hydration, hydroboration, mercuration-demercuration
 (4) Mercuration-demercuration, hydration, hydroboration

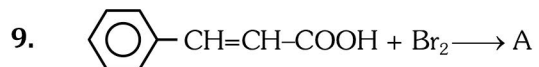
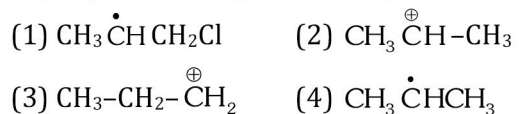


7. Correct reactivity order for EAR of following compounds is



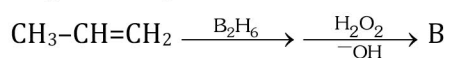
(1) IV > I > II > III (2) III > II > I > IV
 (3) II > III > I > IV (4) II > III > IV > I

8. The intermediate during the addition of HCl to propene in the presence of peroxide is



the number of chiral carbons in 'A' are

(1) 1 (2) 2 (3) 3 (4) 4



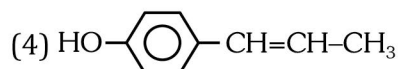
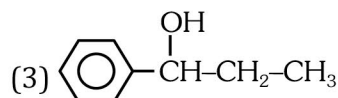
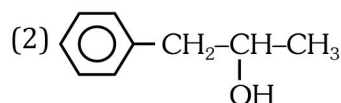
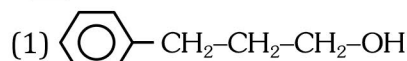
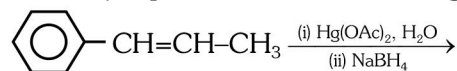
Wrong statement about the product is

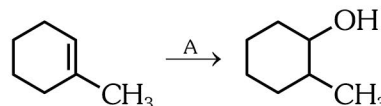
- (1) A and B have the same functional group
 (2) A and B are position isomers.
 (3) A and B show chain isomerism
 (4) Mixed ether is the isomer of both A and B

11. Which of the following alkene is most reactive for hydration

- (1) Ethene (2) Propene
(3) 1-butene (4) 2-methyl propene

12. The major product of the following reaction is



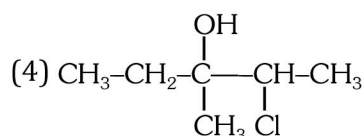
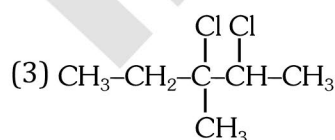
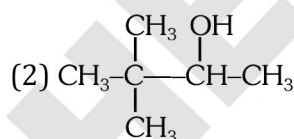
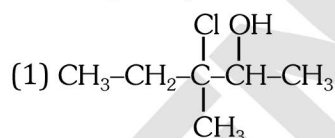
13. ; Reagent 'A' is

- (1) $\text{BH}_3, \text{H}_2\text{O}_2 / \text{OH}^-$
(2) $\text{H}_2\text{O} / \text{H}^+$
(3) $\text{Hg}(\text{OCOCH}_3)_2, \text{H}_2\text{O} / \text{NaBH}_4$
(4) $\text{Cl}_2 / \text{aq. NaOH}$

14. Which of the following alkenes on hydration gives a tertiary alcohol

- (1) 2-Butene (2) Isobutylene
(3) Ethene (4) α -Butylene

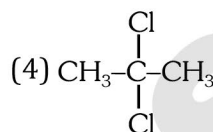
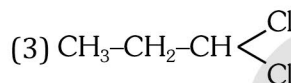
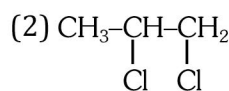
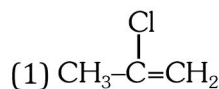
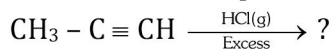
15. The predominant product formed when 3-methyl-2-pentene reacts with HOCl is



16. Propene on addition with HI, gives

- (1) $\text{CH}_3-\text{CHI}-\text{CH}_3$ (2) $\text{CH}_3-\text{CH}_2-\text{CH}_2\text{I}$
(3) $\text{CH}_3-\text{CHI}-\text{CH}_2\text{I}$ (4) None of the above

17. What is the main product of this reaction?



18. 3-Phenyl propene on reaction with HBr gives (as a major product)

- (1) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}(\text{Br})\text{CH}_3$
(2) $\text{C}_6\text{H}_5\text{CH}(\text{Br})\text{CH}_2\text{CH}_3$
(3) $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$
(4) $\text{C}_6\text{H}_5\text{CH}(\text{Br})\text{CH}=\text{CH}_2$

19. Reaction of HBr with propene in the presence of peroxide gives

- (1) 3-bromo propane (2) Allyl bromide
(3) n-propyl bromide (4) Isopropyl bromide

20. Isobutylene $\xrightarrow[\text{H}_2\text{O}_2]{\text{HBr}}$ "product". The product is



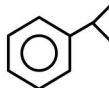
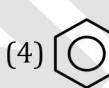
- (1) Isobutyl bromide
(2) Tert. butyl bromide
(3) Tert. butyl alcohol
(4) isobutyl alcohol

21. The nitrating agent for the nitration of alkanes is:

- (1) Conc. HNO_3
(2) Mixture of conc. HNO_3 and conc. H_2SO_4
(3) Acetyl nitrate
(4) HNO_3 vapours at high temperature

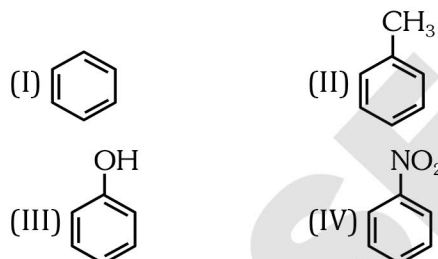
22. The chain propagating step is fastest in the reaction of an alkane with

- (1) Fluorine free radical
(2) Chlorine free radical
(3) Iodine free radical
(4) Bromine free radical

23. In the nitration of propane, the product obtained in maximum yield is
 (1) 1-nitropropane (2) 2-nitropropane
 (3) Nitroethane (4) Nitromethane
24. Only two isomeric monochloro derivatives are possible for (exclude stereo isomers)
 (1) n-butane
 (2) 2, 4-dimethyl pentane
 (3) Benzene
 (4) 2-methyl butane
25. What is the chief product obtained when n-butane is treated with bromine in the presence of light at 130°C?
 (1) $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-Br}$
 (2) $\text{CH}_3\text{-CH}_2\text{-CH}(\text{Br})\text{-CH}_3$
 (3) $\text{CH}_3\text{-CH}(\text{CH}_3)\text{-CH}_2\text{-Br}$
 (4) $\text{CH}_3\text{-C}(\text{CH}_3)_2\text{-CH}_2\text{-Br}$
26. The strongest deactivating effect on aromatic ring is
 (1) $-\text{CH}_2\text{Cl}$ (2) $-\text{OCH}_3$
 (3) $-\text{CH}_3$ (4) $-\text{CCl}_3$
27. Which of the following is maximum reactive towards E.S.R. :-
 (1)  (2) 
 (3)  (4) 
28. Correct order of reactivity of following compound with an electrophile :-
 (I) $p\text{-CH}_3\text{-C}_6\text{H}_4\text{-CH}_3$ (II) $\text{C}_6\text{H}_5\text{-CH}_3$
 (III) $p\text{-CH}_3\text{-C}_6\text{H}_4\text{-NO}_2$ (IV) $p\text{-O}_2\text{N-C}_6\text{H}_4\text{-NO}_2$
 (1) $\text{I} > \text{II} > \text{III} > \text{IV}$ (2) $\text{II} > \text{I} > \text{IV} > \text{III}$
 (3) $\text{III} > \text{II} > \text{I} > \text{IV}$ (4) $\text{IV} > \text{III} > \text{II} > \text{I}$
29. Toluene is more reactive than benzene towards electrophilic reagents due to :-
 (1) Inductive effect only
 (2) Hyperconjugative effect only
 (3) Both inductive as well as hyperconjugative effects
 (4) Strong mesomeric effect

30. Nitration of benzene is
 (1) Nucleophilic substitution
 (2) Nucleophilic addition
 (3) Electrophilic substitution
 (4) Electrophilic addition

31. Consider the following compounds :



Correct order of their reactivity in electrophilic substitution reactions would be:-

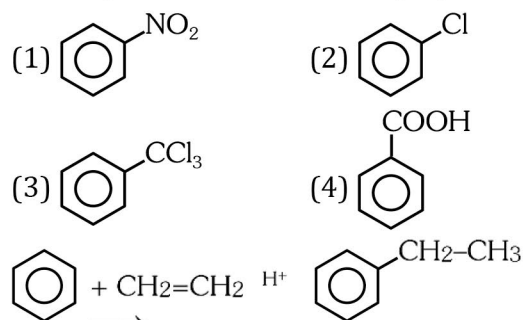
- (1) $\text{I} > \text{II} > \text{III} > \text{IV}$ (2) $\text{IV} > \text{III} > \text{II} > \text{I}$
 (3) $\text{III} > \text{II} > \text{I} > \text{IV}$ (4) $\text{III} > \text{IV} > \text{I} > \text{II}$
32. The active species in the nitration of benzene is

- (1) NO_2^+ (2) HNO_3 (3) NO_3^- (4) NO_2^-

33. The function of anhydrous AlCl_3 in the Friedel craft's reaction

- (1) To absorb water
 (2) To absorb HCl
 (3) To produce electrophile
 (4) To produce Nucleophile

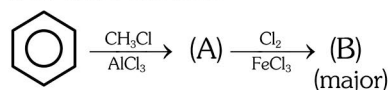
34. In which of the following compound the electrophile attack on o- and p- positions :



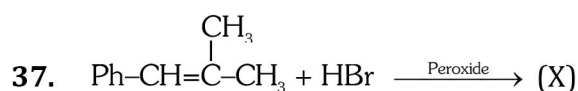
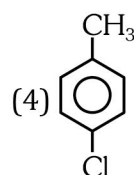
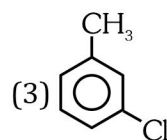
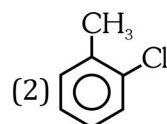
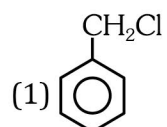
Incorrect statement about this reaction

- (1) Benzene is substrate
 (2) Ethene is reagent
 (3) Reaction is EAR with respect to ethene
 (4) Reaction is NSR for benzene

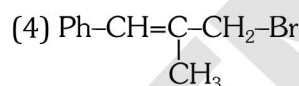
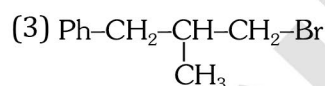
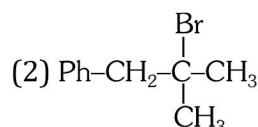
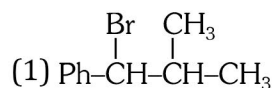
36. For the reaction



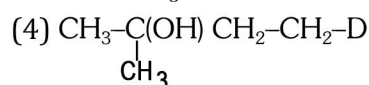
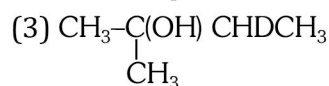
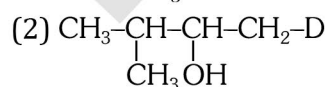
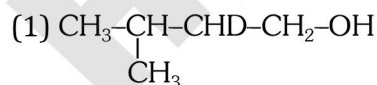
Product B is :



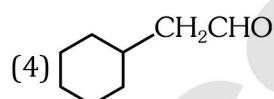
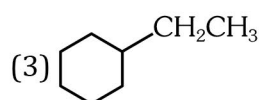
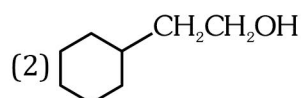
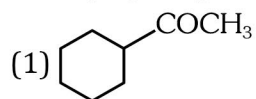
'X' is



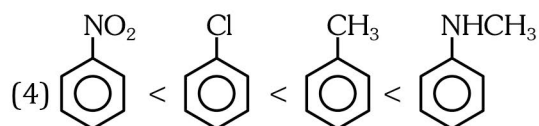
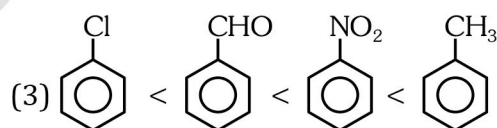
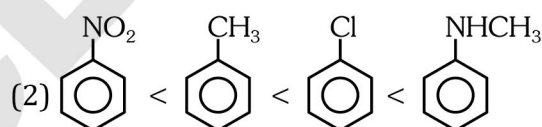
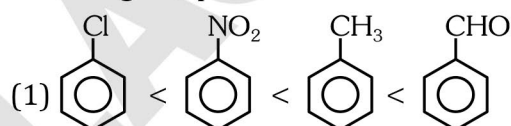
A (major product) is



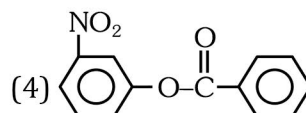
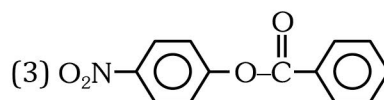
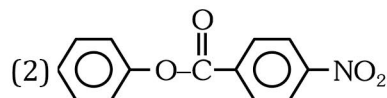
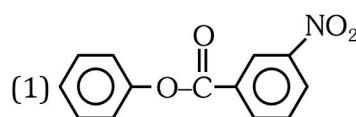
39. Hydration of in presence of $\text{H}_2\text{SO}_4/\text{HgSO}_4$ gives



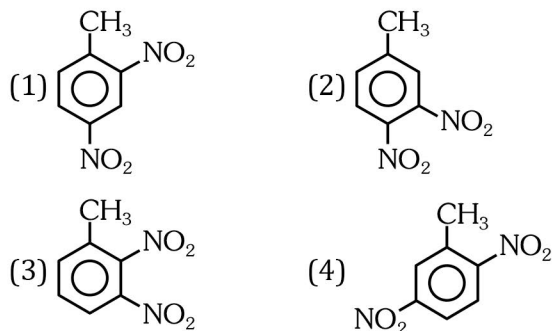
40. Identify correct order of reactivity for electrophilic substitution reaction of the following compounds :-



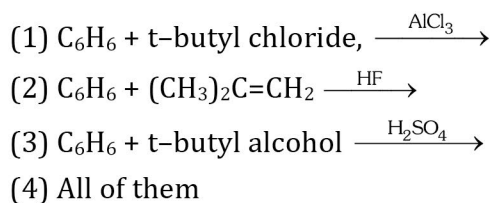
41. Product is :-



42. p-nitro toluene on further nitration gives



43. Which of the following reaction gives t-butyl benzene:



44. Halogenation of alkanes gives a mixture of monohalo products. The ease of substitution follows the order

- (1) Tertiary H > primary H > secondary H
 (2) Primary H < secondary H < tertiary H
 (3) Primary H > secondary H > tertiary H
 (4) Secondary H > tertiary H < primary H

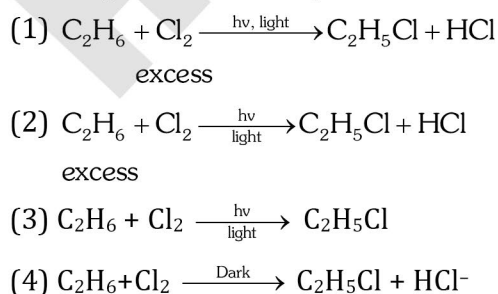
45. The number of different substitution products possible when ethane is allowed to react with bromine in sunlight are

- (1) 9 (2) 6 (3) 8 (4) 5

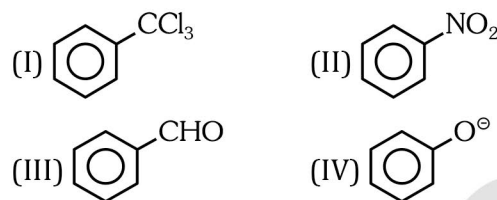
46. Chlorination of toluene in the presence of light and heat followed by treatment with aqueous NaOH gives

- (1) o-cresol
 (2) p-cresol
 (3) 2, 4-dihydroxy toluene
 (4) Benzyl alcohol

47. Which gives maximum yield of C_2H_5Cl



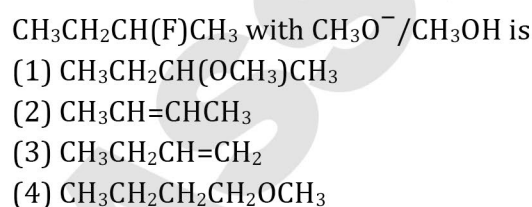
48. Electrophile NO_2^+ attacks the following :

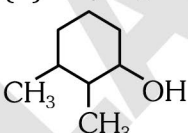


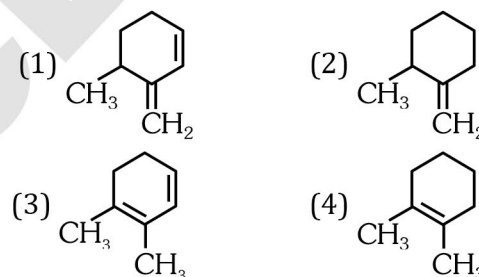
in which cases NO_2^+ will attack at meta position

- (1) II and IV (2) I, II and III
 (3) III and IV (4) I only

49. The major product obtained on treatment of



50.  $\xrightarrow[\Delta]{H^+}$ X (major) 'A' is



51. Which is not correct about nitration ?

- (1) NO_2^+ is an attacking electrophile
 (2) In general, nitration is monosubstitution process
 (3) In nitrating mix, HNO_3 acts as acid, & H_2SO_4 acts as base
 (4) In nitrating mix, HNO_3 acts as base, & H_2SO_4 acts as an acid

52. Match the column :-

| | Column-I (Reactants) | | Column-II (Product) |
|-----|------------------------------|-----|------------------------|
| (a) | $CaC_2 + H_2O$ | (p) | CaC_2 |
| (b) | $CaO + C$ | (q) | H_2 |
| (c) | $HC \equiv CH + Na$ | (r) | CH_4 |
| (d) | CH_3COOH + $NaOH + CaO$ | (s) | C_2H_2 |




- (1) a - q, b - p, c - r, d - s
 (2) a - p, b - q, c - s, d - r
 (3) a - s, b - p, c - q, d - r
 (4) a - p, b - q, c - r, d - s

53. Match the column :-

| Column-I (Reaction) | Column-II (Product) |
|--|------------------------|
| (a) $\text{HC} \equiv \text{CH} + \text{H}_2\text{O} \rightarrow$ | (p) Benzene |
| (b) $\text{HC} \equiv \text{CH} + \text{H}_2\text{O} \xrightarrow{\text{Hg}^{+2}/\text{H}^{\oplus}}$ | (q) Ammonia |
| (c) $\text{HC} \equiv \text{CH} + \text{NaNH}_2 \rightarrow$ | (r) No reaction |
| (d) $\text{HC} \equiv \text{CH} \xrightarrow[\text{Fe tube}]{\text{Red hot}}$ | (s) Acetaldehyde |



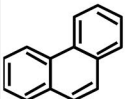
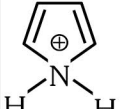
- (1) a - q, b - p, c - r, d - s
 (2) a - r, b - s, c - q, d - p
 (3) a - q, b - p, c - s, d - r
 (4) a - p, b - q, c - r, d - s

54. Match the column :-

| Column-I (Reaction) | Column-II (Type of reaction) |
|---|---------------------------------|
| (a)  + $\text{Cl}_2 \xrightarrow{\text{AlCl}_3}$ | (p) Free radical addition |
| (b)  + $\text{Cl}_2 \xrightarrow{h\nu}$ (excess) | (q) Free radical substitution |
| (c) $\text{CH}_4 + \text{Br}_2 \xrightarrow{h\nu}$ | (r) Electrophilic addition |
| (d)  + $\text{HCl} \rightarrow$ | (s) Electrophilic substitution |

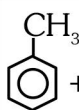
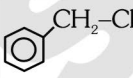
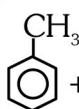
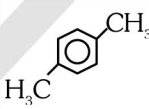
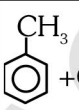
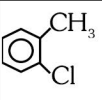
- (1) a - p, b - q, c - s, d - r
 (2) a - q, b - p, c - s, d - r
 (3) a - p, b - q, c - r, d - s
 (4) a - s, b - p, c - q, d - r

55. Match the column :-

| Column-I | Column-II |
|-------------------|---|
| (a) Aromatic | (p)  |
| (b) Anti aromatic | (q)  |
| (c) Non-aromatic | (r)  |
| | (s)  |

- (1) a - q, b - p, c - r, s
 (2) a - p, b - q, c - r, s
 (3) a - r, b - q, c - p, s
 (4) a - p, s, b - q, c - r

56. Match the column :-

| Column-I (Reaction) | Column-II (Product) |
|--|---|
| (a)  + $\text{Cl}_2 \xrightarrow{\text{AlCl}_3}$ | (p)  |
| (b)  + $\text{Cl}_2 \xrightarrow{h\nu}$ | (q)  |
| (c)  + $\text{CH}_3\text{-Cl} \xrightarrow{\text{AlCl}_3}$ | (r)  |


- (1) a - q, b - p, c - r
 (2) a - r, b - p, c - q
 (3) a - q, b - r, c - p
 (4) a - p, b - q, c - r

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

| Column-I | Column-II |
|------------------------|--|
| (a) Lindlar's catalyst | (p) Na/liq. NH_3 |
| (b) Birch catalyst | (q) $\text{H}_2/\text{Pd}-\text{CaCO}_3$ |
| (c) Baeyer's Reagent | (r) $\text{HBr}/(\text{PhCO})_2\text{O}_2$ |
| (d) Kharasch effect | (s) Dil. $\text{KMnO}_4/273\text{K}$ |

- (1) a - q, b - p, c - r, d - s
 (2) a - p, b - q, c - s, d - r
 (3) a - q, b - p, c - s, d - r
 (4) a - p, b - q, c - r, d - s

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

| Column-I (Reaction) | Column-II (Product) |
|--|---|
| (a) $2\text{CH}_3\text{CH}_2\text{Br} \xrightarrow[\text{dry ether}]{2\text{Na}}$ | (p)  |
| (b) $\text{CH}_3\text{COO}^{\ominus}\text{Na}^{\oplus} \xrightarrow[\Delta]{\text{CaO}+\text{NaOH}}$ | (q) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ |

| | | | |
|--|---|-----|-------------------------|
| (c) | $\text{CH}_3(\text{CH}_2)_4\text{CH}_3$ | (r) | $2\text{CH}_3\text{OH}$ |
| $\xrightarrow[10-20 \text{ atm}]{\text{V}_2\text{O}_5, 773\text{K}}$ | | | |
| (d) | $2\text{CH}_4 + \text{O}_2$ | (s) | CH_4 |
| $\xrightarrow[100 \text{ atm}]{\text{Cu}/523\text{K}}$ | | | |



- (1) a - q, b - p, c - r, d - s
 (2) a - q, b - s, c - p, d - r
 (3) a - q, b - p, c - s, d - r
 (4) a - p, b - q, c - r, d - s

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

| Column-I (Reaction) | Column-II (Product) |
|--|---|
| (a) $\text{CH}_4 + \text{O}_2 \xrightarrow[\Delta]{\text{Mo}_2\text{O}_3}$ | (p) $(\text{CH}_3)_3\text{C} - \text{OH}$ |
| (b) $2\text{CH}_3\text{CH}_3 + 3\text{O}_2 \xrightarrow[\Delta]{(\text{CH}_3\text{COO})_2\text{Mn}}$ | (q) $\text{HCHO} + \text{H}_2\text{O}$ |
| (c) $(\text{CH}_3)_3\text{CH} \xrightarrow[\text{Oxidation}]{\text{KMnO}_4}$ | (r) $\text{CO} + 3\text{H}_2$ |
| (d) $\text{CH}_4 + \text{H}_2\text{O} \xrightarrow[\Delta]{\text{Ni}}$ | (s) $2\text{CH}_3\text{COOH} + 2\text{H}_2\text{O}$ |

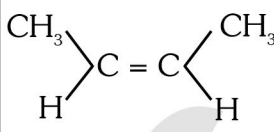
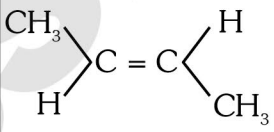
- (1) a - q, b - p, c - r, d - s
 (2) a - r, b - s, c - p, d - r
 (3) a - q, b - s, c - p, d - r
 (4) a - p, b - q, c - r, d - s

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

| Column-I (Reaction) | Column-II (Type of reaction) |
|--|---------------------------------|
| (a) $\text{HC} \equiv \text{CH} \xrightarrow[\text{Pd}]{\text{H}_2}$ | (p) Pyrolysis |
| (b)  $\xrightarrow[\text{AlCl}_3 + \text{HCl}]{\text{Anhydrous}}$ | (q) Reduction |
| (c)  $\xrightarrow{773\text{K}}$ | (r) Free radical substitution |
| (d) $\text{CH}_3\text{CH}_3 \xrightarrow[\text{h}\nu]{\text{Cl}_2}$ | (s) Isomerisation |

- (1) a - q, b - s, c - p, d - r
 (2) a - p, b - q, c - s, d - r
 (3) a - q, b - p, c - s, d - r
 (4) a - p, b - q, c - r, d - s

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

| Column-I (Reaction) | Column-II (Product) |
|---|---|
| (a) $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3 \xrightarrow[\text{Pd/C}]{\text{H}_2}$ | (p)  |
| (b) $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3 \xrightarrow{\text{Na/liq. NH}_3}$ | (q) $\text{CH}_3 - \text{C} \equiv \text{C} \text{Na}^\oplus$ |
| (c) $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3 \xrightarrow[\text{Quinoline}]{\text{H}_2/\text{Pd-C}}$ | (r) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ |
| (d) $\text{CH}_3 - \text{C} \equiv \text{CH} \xrightarrow{\text{Na/liq. NH}_3}$ | (s)  |

- (1) a - s, b - r, c - q, d - p
 (2) a - p, b - s, c - r, d - q
 (3) a - r, b - s, c - p, d - q
 (4) a - p, b - q, c - r, d - s

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

| Column-I (Compound) | Column-II (Boiling point) |
|-------------------------|------------------------------|
| (a) 2-Methyl propane | (p) 309.1 K |
| (b) Pentane | (q) 282.5 K |
| (c) 2-Methyl butane | (r) 261 K |
| (d) 2,2-Dimethylpropane | (s) 300.9 K |

- (1) a - r, b - p, c - s, d - q
 (2) a - q, b - r, c - s, d - p
 (3) a - r, b - s, c - q, d - p
 (4) a - s, b - r, c - q, d - p

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

| Column-I | Column-II |
|-----------------------------------|-------------------------|
| (a) 2,8-Dimethyl-3,6-decadiene | (p) 41σ & 1π |
| (b) 1,3,5,7-octatetraene | (q) 23σ & 1π |
| (c) 2-n-propylpent-1-ene | (r) 17σ & 4π |
| (d) 4-ethyl-2,6-dimethyldec-4-ene | (s) 33σ & 2π |

- (1) a - s, b - p, c - r, d - q
 (2) a - s, b - r, c - q, d - p
 (3) a - r, b - p, c - s, d - q
 (4) a - q, b - s, c - r, d - p

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

| Column-I | | Column-II | |
|----------|---|-----------|-------------------|
| (a) | $\text{CH}_3 - \text{CH} = \text{CH}_2$ $\xrightarrow[\text{H}_2\text{O}]{\text{H}^\oplus}$ $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3$ | (p) | Hydrogenation |
| (b) | $\text{CH}_3 - \text{CH} = \text{CH}_2$ $\xrightarrow[\text{R}_2\text{O}_2]{\text{HBr}}$ $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Br}$ | (q) | Hydration |
| (c) | $\text{CH}_3 - \text{CH} = \text{CH}_2$ $\xrightarrow[\text{CCl}_4]{\text{Br}_2}$ $\text{CH}_3 - \underset{\text{Br}}{\text{CH}} - \text{CH}_2 - \text{Br}$ | (r) | Halogenation |
| (d) | $\text{CH}_2 = \text{CH}_2$ $\xrightarrow[\text{Pd}]{\text{H}_2} \text{CH}_3 - \text{CH}_3$ | (s) | Hydrohalogenation |

(1) a - s, b - r, c - q, d - p

(2) a - q, b - s, c - r, d - p

(3) a - r, b - s, c - p, d - q

(4) a - p, b - q, c - r, d - s

65. Given below are two statements:

Statement-I : Alkenes decolourise KMnO_4 solution.

Statement-II : Alkenes undergo addition reactions, which are mainly nucleophilic addition reactions.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement-I and Statement-II are correct.

(2) Both Statement-I and II are incorrect.

(3) Statement-I is correct but Statement-II is incorrect.

(4) Statement-I is incorrect but Statement-II is correct.

66. Given below are two statements:

Statement-I : Ozonolysis of alkenes involves the addition of ozone molecule to alkene to form ozonide and then cleavage of the ozonide by $\text{Zn-H}_2\text{O}$ to smaller molecules.

Statement-II : Ozonolysis reaction is highly useful in detecting the position of double bond in alkenes or in other unsaturated compounds.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both Statement-I and Statement-II both are correct.

(2) Statement-I and II both are incorrect.

(3) Statement-I is wrong but Statement-II is correct.

(4) Statement-I is correct but Statement-II is wrong.

67. Given below are two statements:

Statement-I : Peroxide effect is not observed in addition of HCl & HI

Statement-II : HCl bond is stronger than HBr bond and H-I bond is weaker than H-Br bond.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both Statement-I and Statement-II are correct.

(2) Statement-I is correct but Statement-II is incorrect.

(3) Statement-I is incorrect but Statement-II is correct.

(4) Statement-I and II both are incorrect.

68. Given below are two statements:

Statement-I : Cis-But-2-ene has less dipole moment than trans-but-2-ene.

Statement-II : $\text{R-C} \equiv \text{C-R}'$ reacts with H_2 in presence of Na/liq. NH_3 to form cis-alkene.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement-I is correct but Statement-II is incorrect.

(2) Statement-I is incorrect but Statement-II is correct.

(3) Statement-I and Statement-II are correct.

(4) Both Statement-I and II are incorrect.

69. Given below are two statements:

Statement-I : Dihydrogen gas adds to alkenes and alkynes in the presence of finely divided catalyst like platinum, palladium or Nickel to form alkanes.

Statement-II : Metals adsorb dihydrogen gas on their surfaces and activate the hydrogen-hydrogen bond.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Both statements-I and II are correct.
- (2) Both Statement-I and II are incorrect
- (3) Statement-I is correct but Statement-II is incorrect.
- (4) Statement-I is incorrect but Statement-II is correct.

70. Given below are two statements:

Statement-I : Sodium metal reacts with Ethyne and form sodium acetylide with liberation of nascent oxygen gas.

Statement-II : Alkynes are more acidic than alcohols.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statements-I and II both are incorrect.
- (2) Statement-I is correct but Statement-II is incorrect.
- (3) Statement-I is incorrect but Statement-II is correct.
- (4) Statement-I and II both are correct

71. Given below are two statements:

Statement-I : Ethyne is formed from dibromoethane by using alcoholic KOH followed by NaNH_2 .

Statement-II : Ethyne is formed from geminal dibromo ethane by using one equivalent of alcoholic KOH.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement-I and Statement-II both are correct.
- (2) Statement-I and II both are incorrect.
- (3) Statement-I is correct but Statement-II is incorrect.
- (4) Statement-I is incorrect but Statement-II is correct.

72. Given below are two statements:

Statement-I : Hydrogenation of alkenes and alkynes with platinum and palladium catalyse the reaction at room temperature but nickel catalyst requires high temperature and pressure.

Statement-II : Alkyl halides on reduction with zinc and dilute HCl give alkene.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement-I and II both are incorrect.
- (2) Statement-I and Statement-II both are correct.
- (3) Statement-I is correct but Statement-II is incorrect.
- (4) Statement-I is incorrect but Statement-II is correct.

73. Given below are two statements:

Statement-I : Alkyl halides on treatment with sodium metal in moist ether gives higher alkane.

Statement-II : Wurtz reaction is used for the preparation of higher alkanes containing even number of carbon atoms.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement-I and Statement-II both are correct.
- (2) Statement-I and II both are incorrect.
- (3) Statement-I is correct but Statement-II is incorrect.
- (4) Statement-I is incorrect but Statement-II is correct.

74. Given below are two statements:

Statement-I :  is aromatic compound

Statement-II : There are 12 πe^- having complete delocalisation.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement-I is incorrect but Statement-II is correct.
- (2) Statement-I is correct but Statement-II is incorrect.
- (3) Statement-I and Statement-II are correct.
- (4) Both Statement-I and II are incorrect.

75. Given below are two statements:

Statement-I : Naphthalene balls are used in toilets and for preservation of clothes.

Statement-II : Naphthalene balls are immiscible with water but are readily miscible with organic solvents.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement-I is correct but Statement-II is incorrect.
- (2) Statement-I is incorrect but Statement-II is correct.
- (3) Statement-I and Statement-II are correct.
- (4) Statement-I and Statement-II are incorrect.

76. Given below are two statements:

Statement-I : $P-H_3C-C_6H_5-NO_2$ is more reactive than $P-O_2N-C_6H_5-NO_2$ towards electrophile.

Statement-II : $-CH_3$ is ortho/para directing group while $-NO_2$ is meta directing group.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Both Statement-I and Statement-II are correct.
- (2) Statement-I and Statement-II are incorrect.
- (3) Statement-I is incorrect but Statement-II is correct.
- (4) Statement-I is correct but Statement-II is incorrect.

77. Given below are two statements:

Statement-I : Ozonolysis of o-xylene (1,2-dimethyl benzene) gives three products. The result supports Kekulé structure of benzene.

Statement-II : Benzene has $6\pi e^-$ in cycle and has cyclic delocalisation.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement-I is correct but Statement-II is incorrect.
- (2) Statement-I is incorrect but Statement-II is correct.
- (3) Statement-I and Statement-II are incorrect.
- (4) Both Statement-I and Statement-II are correct.

78. In given statements which is/are correct :-

- (A) Cis & Trans isomers have same structure but have different configuration (arrangement of atoms or groups)
- (B) Cis-2-butene has more boiling point than trans-2-butene.
- (C) Trans-2-butene has more dipole moment than cis-2-butene.
- (D) Geometrical isomerism is also shown by alkenes of the types $XY C = C XZ$ and $XY C = C ZW$.

- (1) A, B, C & D
- (2) Only A, B
- (3) Only A, B & C
- (4) Only A, B & D

79. Which of the following statements is/are incorrect :-

- (A) In alkenes first three members are gases, the next 14 are liquid & the higher ones are solids.
- (B) Except ethene all other alkenes are colourless & odourless.
- (C) Straight chain alkenes have higher boiling point than isomeric branched chain compounds.
- (D) Generally alkenes are soluble in water & insoluble in non polar solvents.

- (1) A, B & C only
- (2) Only D
- (3) B & D only
- (4) B, C & D only

80. Given below are two statements; one is labelled as **Assertion (A)** and the other is labelled as **Reason(R)**.

Assertion: If benzene is treated with 1-chloropropane in presence of anhydrous AlCl_3 , Isopropyl benzene is major product not n-propyl benzene.

Reason : Reaction occurs via rearrangement of carbocation.

In the light of the above statements, choose the **most appropriate** answer from the options given below :

- (1) Both (A) and (R) are correct but (R) is not the correct explanation of (A).
- (2) Both (A) and (R) are correct and (R) is the correct explanation of (A).
- (3) (A) is correct but (R) is not correct.
- (4) (A) is not correct but (R) is correct.

EXERCISE-III (Analytical Questions)

ANSWER KEY

| | | | | | | | | | | | | | | | |
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Answer | 4 | 4 | 4 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 4 | 3 | 1 | 2 | 4 |
| Question | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| Answer | 1 | 4 | 2 | 3 | 1 | 4 | 1 | 2 | 1 | 2 | 4 | 2 | 1 | 3 | 3 |
| Question | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| Answer | 3 | 1 | 3 | 2 | 4 | 2 | 2 | 4 | 1 | 4 | 3 | 1 | 4 | 2 | 1 |
| Question | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| Answer | 4 | 2 | 2 | 3 | 4 | 3 | 3 | 2 | 4 | 3 | 2 | 3 | 2 | 3 | 1 |
| Question | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 |
| Answer | 3 | 1 | 2 | 2 | 3 | 1 | 1 | 4 | 1 | 1 | 3 | 3 | 4 | 2 | 3 |
| Question | 76 | 77 | 78 | 79 | 80 | | | | | | | | | | |
| Answer | 1 | 4 | 4 | 2 | 2 | | | | | | | | | | |