

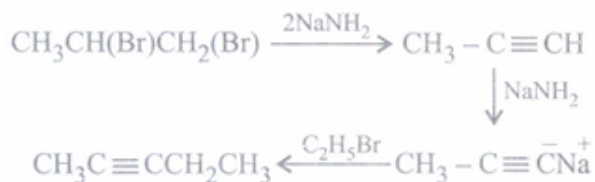


## Hydrocarbons Important Questions With Answers

### NEET Chemistry 2023

1. One mole of 1, 2-dibromopropane on treatment with X moles of  $\text{NaNH}_2$  followed by treatment with ethyl bromide gave a 2-pentyne. The value of X is:  
 a) one    b) two    **c) three**    d) four

**Solution : -**



Total number of moles of  $\text{NaNH}_2 = 2 + 1 = 3$

2. Assertion: Boiling point of pentane is higher than 2,2-dimethylpropane.  
 Reason : There is steady increase in boiling point with increase in molecular mass.  
 a) If both assertion and reason are true and reason is the correct explanation of assertion.  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion  
 c) If assertion is true but reason is false.    **d) If both assertion and reason are false**

**Solution : -**

Pentane and 2, 2-dimethylpropane are isomers having same molecular formula. Pentane has high boiling point because it is straight chain isomer whereas 2, 2-dimethylpropane is branched chain due to which the molecule attains the shape of a sphere. Thus, results in smaller area of contact and therefore weak intermolecular forces.

3. Nitration of benzene is carried out with conc.  $\text{HNO}_3$  in presence of cone.  $\text{H}_2\text{SO}_4$ , The role of cone,  $\text{H}_2\text{SO}_4$  is to provide:  
 a) nucleophile during the reaction    b) free radical during the reaction    **c) electrophile during the reaction**  
 d) catalyst during the reaction.

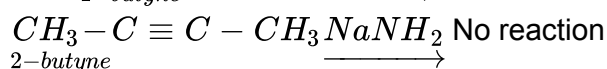
**Solution : -**

Electrophile  $\text{NO}_2^+$  is generated by the help of  $\text{H}_2\text{SO}_4$ . In absence of  $\text{H}_2\text{SO}_4$  a nucleophile  $\text{NO}_3^-$  will be formed which will not helpful in electrophilic substitution.

4. Which of the following reagents will be able to distinguish between 1-butyne and 2-butyne?  
**a)  $\text{NaNH}_2$**     b)  $\text{HCl}$     c)  $\text{O}_2$     d)  $\text{Br}_2$

**Solution : -**

$\text{NaNH}_2$  is used to distinguish between 1-butyne and 2-butyne.



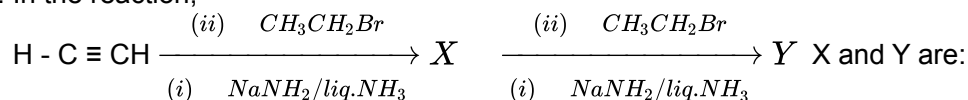
5. In halogenation of aromatic hydrocarbon, a halogen carrier is used which is generally a Lewis acid. The main function of this reagent is to generate the species

a) X b) X<sup>-</sup> c) X<sup>+</sup> d) X<sup>·</sup>

6. Arrange the following hydrogen halides in order of their decreasing reactivity with propene.

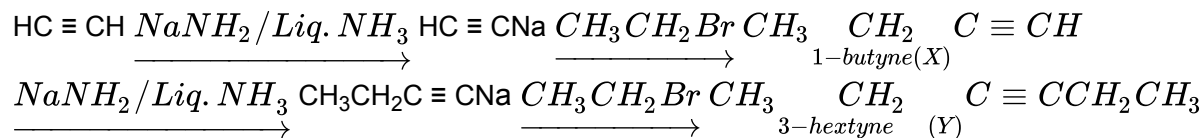
a) HCl > HBr > HI b) HBr > HI > HCl c) **HI > HBr > HCl** d) HCl > HI > HBr

7. In the reaction,



a) X = 2-butyne, Y = 2-hexyne b) X = 1-butyne, Y = 2-hexyne c) **X = 1-butyne, Y = 3-hexyne**  
 d) X = 2-butyne, Y = 3-hexyne

**Solution :** -

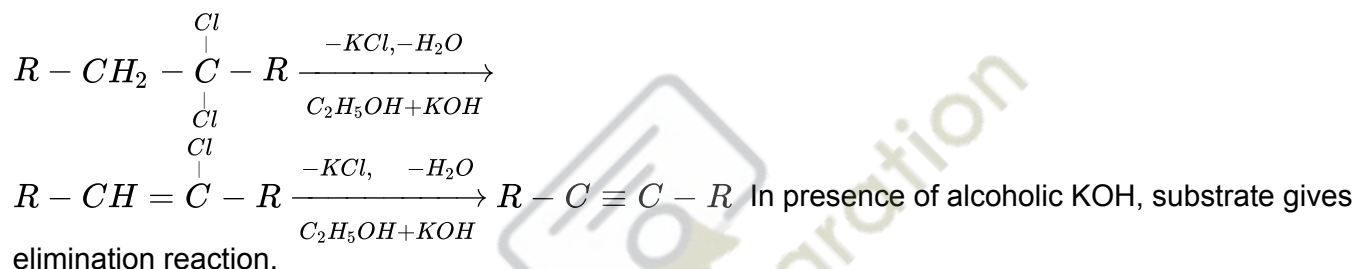


8. R - CH<sub>2</sub> - CCl<sub>2</sub> - R *Reagent*

R - C ≡ C - R. The reagent is:

a) Na b) HCl in H<sub>2</sub>O c) **KOH in C<sub>2</sub>H<sub>5</sub>OH** d) Zn in alcohol

**Solution :** -



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

a) n-Butane b) n-Hexane c) 2, 3-Dimethylbutane d) **n-Heptane**

**Solution :** -

n-Heptane can not be made in good yield using Wurtz reaction since it is unsymmetrical alkane.

10. **Assertion:** Cyclopentadienyl anion is aromatic in nature.

**Reason:** Cyclopentadienyl anion has six π electrons.

a) **If both assertion and reason are true and reason is the correct explanation of assertion.**

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

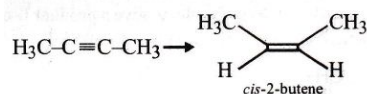
**Solution :** -

A compound is aromatic if it is planar, having complete delocalisation of the π electrons in the ring and has (4n + 2)π electrons in the ring where n is an integer.



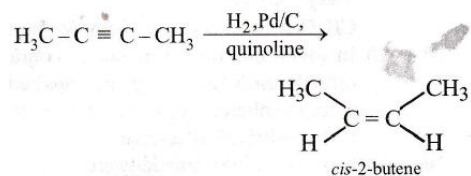
Cyclopentadienyl anion

11. The most suitable reagent for the following conversion is:



a) **H<sub>2</sub>, Pd/C, quinoline** b) Zn/HCl c) Hg<sup>2+</sup>/H<sup>+</sup>, H<sub>2</sub>O d) Na/liquidNH<sub>3</sub>

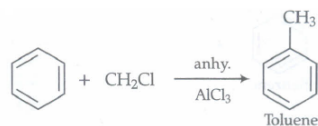
**Solution : -**



12. Benzene reacts with  $\text{CH}_3\text{Cl}$  in the presence of anhydrous  $\text{AlCl}_3$  to form:

- a) toluene    b) chlorobenzene    c) benzylchloride    d) xylene

**Solution : -**



This reaction is called as Friedel-Craft's alkylation of benzene.

13. **Assertion:** *cis*-form of alkene is found to be more polar than the *trans*-form.

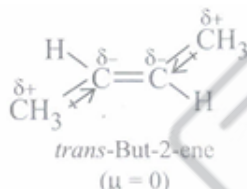
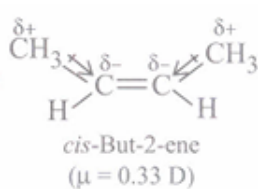
**Reason :** Since the groups are in opposite directions in the *trans*-form, the dipole moments of bonds cancel each other making *trans*-form almost non-polar.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.    d) If both assertion and reason are false.

**Solution : -**

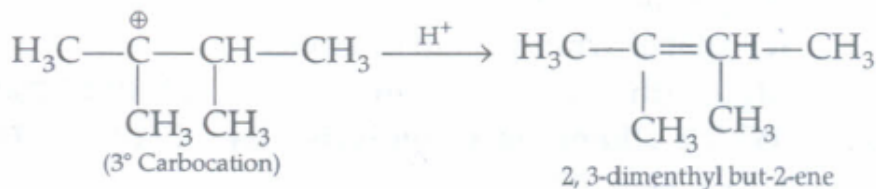
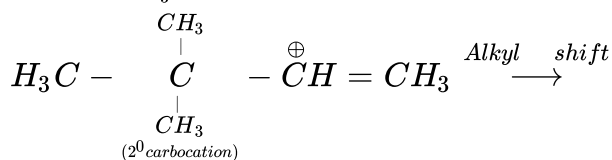
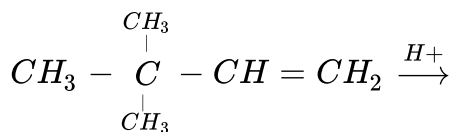


14. 2, 3-Dimethyl-2-butene can be prepared by heating which of the following compounds with a strong acid?

- a)  $(\text{CH}_3)_3\text{CCH}=\text{CH}_2$     b)  $(\text{CH}_3)_2\text{C}=\text{CHCH}_2\text{CH}_3$     c)  $(\text{CH}_3)_2\text{CHCH}_2\text{CH}=\text{CH}_2$

- d)  $(\text{CH}_3)_2\text{CH}-\underset{\text{CH}_3}{\text{C}}\text{H}-\text{CH}=\text{CH}_2$

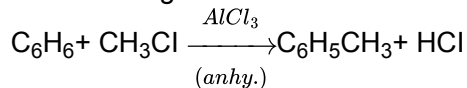
**Solution : -**



15. Coal tar is the main source of:

- a) aromatic compounds    b) alicyclic compounds    c) aliphatic compounds    d) nitro compounds.

16. The following reaction is known as



- a) Wurtz-Fittig reaction    **b) Friedel-Crafts reaction**    c) Rosenmund reaction    d) Sandmeyer reaction.

**Solution : -**

Alkylation and acylation of benzene in the presence of anhydrous aluminium chloride are known as Friedel-Crafts reaction.

17. **Assertion:** Decolourisation of  $\text{KMnO}_4$  solution is used as a test for unsaturation.

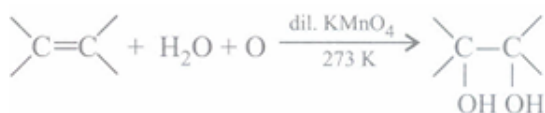
**Reason :** Alkenes on reaction with cold, dilute aqueous solution of potassium permanganate produce vicinal glycols.

**a) If both assertion and reason are true and reason is the correct explanation of assertion.**

b) If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.    d) If both assertion and reason are false.

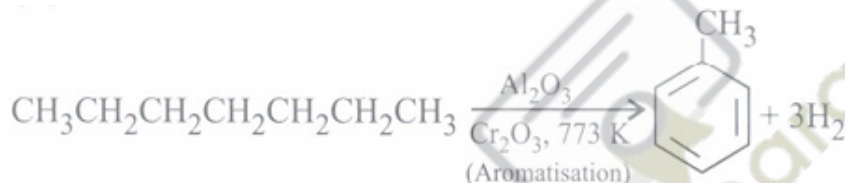
**Solution : -**



18. Which of the following products is formed when n-heptane is passed over  $(\text{Al}_2\text{O}_3 + \text{Cr}_2\text{O}_3)$  catalyst at 773 K?

- a) Benzene    **b) Toluene**    c) Polyheptane    d) Cycloheptane

**Solution : -**

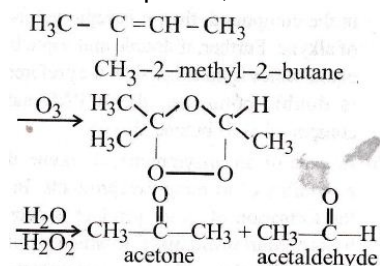


19. Which of the compounds with molecular formula  $\text{C}_5\text{H}_{10}$  yields acetone on ozonolysis?

- a) 3-methane-1-butene    b) cyclopentane    c) 2-methyl-1-butene    **d) 2-methyl-2-butene**

**Solution : -**

Given compound;



20. Which of the following reactions of methane is incomplete combustion?

- a)  $2\text{C}_4 + \text{O}_2 \xrightarrow{523\text{ K} / 100\text{ atm}} 2\text{CH}_3\text{OH}$     b)  $\text{CH}_4 + \text{O}_2 \xrightarrow{\text{Mo}_2\text{O}_3} \text{HCHO} + \text{H}_2\text{O}$     **c)  $\text{CH}_4 + \text{O}_2 \rightarrow \text{C}_{(s)} + 2\text{H}_2\text{O}_{(l)}$**

d)  $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_{2(g)} + 2\text{H}_2\text{O}_{(l)}$

**Solution : -**

$\text{CH}_4 + \text{O}_2 \rightarrow \text{C}_{(s)} + 2\text{H}_2\text{O}_{(l)}$  is incomplete combustion. In complete combustion, hydrocarbons release  $\text{CO}_2$  and  $\text{H}_2\text{O}$  whereas in this reaction, C and  $\text{H}_2\text{O}$  are released.

21. The correct statement regarding the comparison of staggered and eclipsed conformations of ethane is:

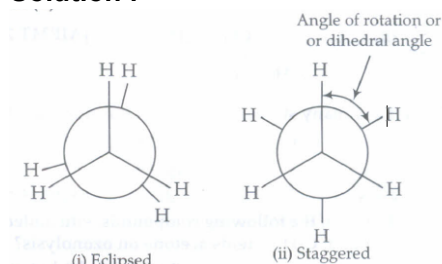
a)  
the eclipsed conformation of ethane is more stable than staggered conformation even though the eclipsed conformation has torsional strain

b)  
**the staggered conformation of ethane is more stable than eclipsed conformation, because staggered conformation has no torsional strain**

c)  
the staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain

d)  
the eclipsed conformation of ethane is more stable than staggered conformation, because eclipsed conformation has no torsional strain.

**Solution : -**



Magnitude of torsional strain depends upon the angle of rotation about the C - C bond. The staggered form has the least torsional strain and the eclipsed form has the maximum torsional strain. So, the staggered conformation of ethane is more stable than the eclipsed conformation.

22. Chlorination of alkanes is a photochemical process. It is initiated by the process of

a) heterolysis    **b) homolysis**    c) pyrolysis    d) hydrolysis.

**Solution : -**

Photochemical chlorination of alkanes is a free radical process and the reaction is initiated by homolysis of halogens to form free radicals.

23. Although benzene is highly unsaturated it does not undergo addition reactions. The explanation of this can be suggested as

**a)  $\pi$ -electrons of benzene ring are delocalised**

b) since  $\pi$ -electrons are present inside the ring, addition cannot take place

c) cyclic structures do not show addition reactions    d) benzene is not a reactive compound.

**Solution : -**

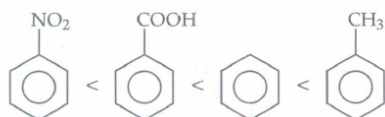
$\pi$ -electrons of benzene ring are delocalised throughout the molecule. This makes the molecule very stable. The stability resists breaking of double bonds for addition.

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

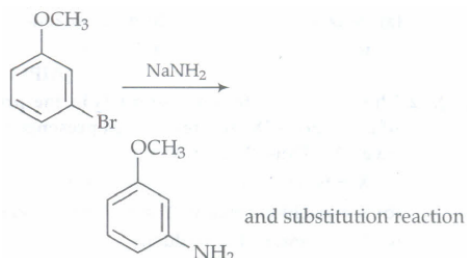
a) benzoic acid    b) nitrobenzene    **c) toluene**    d) benzene

**Solution : -**

The presence of electron releasing groups like -R, -OH, etc. increases the electron density at ortho and para position and thus makes the benzene ring more reactive towards electrophile. On the other hand, electron-withdrawing groups like -COOH, -NO<sub>2</sub>, etc. reduces electron density and thus reduces the reactivity of benzene towards electrophile. Thus, the order of the given compounds towards electrophilic nitration is:







Product formed from route 'b' is more stable due to -ve charge is closer to electron with drawing group (-OCH<sub>3</sub>) as compared to the product forced from the route 'b'. Thus, the direct substitution product (nucleophile occupies same position of the leaving group) is formed instead of cine substitution product (nucleophile occupies adjacent position of the leaving group).

31. Assertion: Sodium salt of butanoic acid on heating with soda lime gives butane.  
Reason : Decarboxylation reaction yields alkanes having same number of carbon atoms as the parent acid
- a) If both assertion and reason are true and reason is the correct explanation of assertion.  
b) If both assertion and reason are true but reason is not the correct explanation of assertion  
c) If assertion is true but reason is false.    **d) If assertion is true but reason is false.**

**Solution : -**

Decarboxylation reaction gives alkanes having one carbon atom less than the carboxylic acid. Therefore, sodium salt of butanoic acid on heating with soda lime gives propane.

32. In the commercial gasolines, the type of hydrocarbons which is more desirable is :  
a) **branched hydrocarbon**    b) straight chain hydrocarbon    c) linear, unsaturated hydrocarbon    d) toluene

**Solution : -**

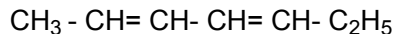
On increasing the number of branches, knocking is decreased and octane number is increased. So, branched chain hydrocarbons have less knocking and are more desirable.

33. Match the column I with column II and mark the appropriate choice.

Column-I	Column-II
A Alkyl halide + Sodium in presence of dry ether	(i) Sulphonation
B Arene + Acid halide in presence of AlCl <sub>3</sub>	(ii) Wurtz reaction
C Arene + Fuming sulphuric acid	(iii) Catalytic hydrogenation
D Arene + Hydrogen in presence of Ni	(iv) Friedel-crafts reaction

- a) (A) → (i), (B) → (iii), (C) → (ii), (D) → (iv)    b) (A) → (iv), (B) → (ii), (C) → (iii), (D) → (i)  
c) (A) → (iii), (B) → (i), (C) → (iv), (D) → (ii)    **d) (A) → (ii), (B) → (iv), (C) → (i), (D) → (iii)**

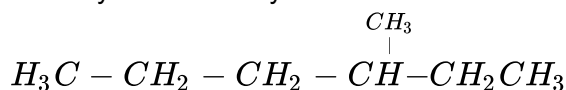
34. How many geometrical isomers are possible for the given compound?



- a) **Four**    b) Three    c) Two    d) Five
35. Which of the following isomeric heptanes can yield seven different monochlorinated products upon free radical chlorination?  
a) 2,2- Dimethylpentane    b) 2- Methylhexane    **c) 3-Methylhexane**    d) 2,4-Dimethylpentane

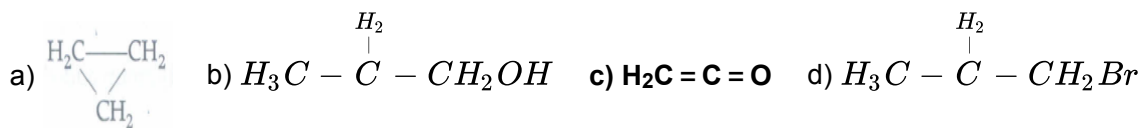
**Solution : -**

3-Methylhexane can yield seven different mono chlorinated products on chlorination.

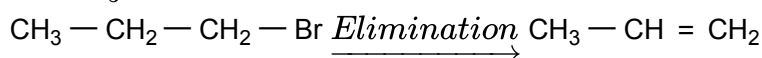
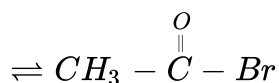
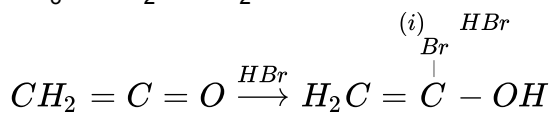
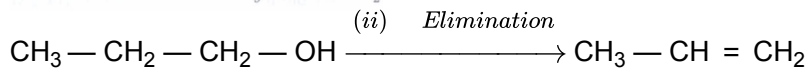
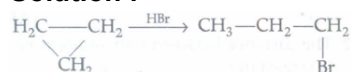


Each carbon atom on chlorination gives a different product.

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



**Solution : -**



37. Which of the following reactions does not show the acidic nature of ethyne?

- a) Acetylene reacts with sodamide to form sodium acetylides  
 b) When passed through ammoniacal cuprous chloride solution, a red precipitate is formed  
 c) **Acetylene reacts with chlorine in the dark to form di or tetrachlorides**  
 d) Acetylene when passed through ammoniacal silver nitrate gives a white precipitate.

**Solution : -**

It is an addition reaction, so it does not show the acidic nature of ethyne.

38. Match the column I with column II to identify the products of oxidation of alkanes and mark the appropriate choice

Column-I	Column-II
(A) $(CH_3)_3CH + 2O_2 \xrightarrow[\text{[O]}]{KMnO_4}$	(i) $HCOOH + H_2O$
(B) $2CH_4 + O_2 \xrightarrow[100atm]{Cu/523K}$	(ii) $(CH_3)_3COH$
(C) $CH_4 + O_2 \xrightarrow[MnO_2, O_3]{\Delta}$	(iii) $2CH_3OH$
(D) $CH_4 + \frac{3}{2}O_2 \xrightarrow{(CH_3COO)_2Mn}$	(iv) $HCHO + H_2O$

- a) (A) → (i), (B) → (ii), (C) → (iii), (D) → (iv)    b) (A) → (ii), (B) → (iii), (C) → (iv), (D) → (i)  
 c) (A) → (iv), (B) → (ii), (C) → (iii), (D) → (i)    d) (A) → (iii), (B) → (i), (C) → (ii), (D) → (iv)

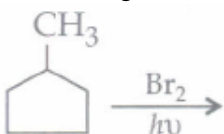
39. Geometrical isomerism is caused

- a) **by restricted rotation around C = C bond**    b) by the presence of one asymmetric carbon atom  
 c) due to the different groups attached to the same functional group  
 d) by swing of hydrogen atom between two divalent atoms.

**Solution : -**

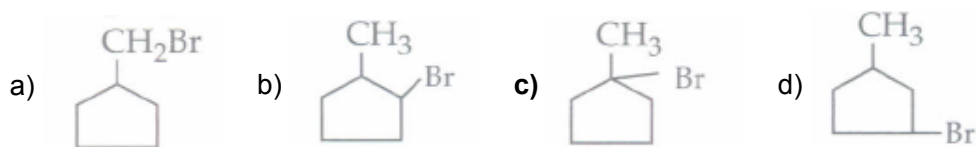
Geometrical isomerism arises due to restricted rotation around C = C bond.

40. In the following reaction,



the major product obtained is





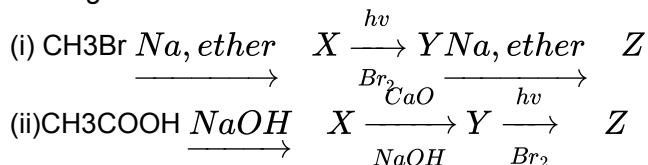
**Solution :** -

More the number of  $\beta$ -substituents, more stable alkene it will give on  $\beta$ -elimination. Since (i) has two, (iii) has one  $\beta$ -methyl substituent while (ii) has no  $\beta$ -methyl substituent, therefore, reactivity towards  $\beta$ -elimination decreases in the order: (i) > (iii) > (ii).

41. Which of the following alkynes is most acidic?

- a)  $\text{CH}_3\text{C} \equiv \text{CH}$    b)  $\text{CH}_3\text{C} \equiv \text{CCH}_3$    c)  $\text{CH}_3\text{CH}_2\text{C} \equiv \text{CH}$    d)  **$\text{CH} \equiv \text{CH}$**

42. in the given reactions:



a)

	X	Y	Z
(i)	$\text{CH}_4$	$\text{CH}_3\text{Br}$	$\text{CH}_3\text{CH}_3$
(ii)	$\text{CH}_3\text{COONa}$	$\text{CH}_3\text{CH}_3$	$\text{CH}_3\text{CH}_2\text{Br}$

b)

	X	Y	Z
(i)	$\text{CH}_3\text{CH}_3$	$\text{CH}_4$	$\text{CH}_3\text{Br}$
(ii)	$\text{CH}_3\text{COONa}$	$\text{CH}_4$	$\text{CH}_3\text{CH}_2\text{CH}_3$

c)

	X	Y	Z
(i)	$\text{CH}_3\text{CH}_2\text{Br}$	$\text{CH}_3\text{CH}_3$	$\text{CH}_3\text{CH}_2\text{CH}_3$
(ii)	$\text{CH}_3\text{COONa}$	$\text{CH}_4$	$\text{CH}_3\text{Br}$

d)

	X	Y	Z
(i)	$\text{CH}_3\text{CH}_3$	$\text{CH}_3\text{CH}_2\text{Br}$	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
(ii)	$\text{CH}_3\text{COONa}$	$\text{CH}_4$	$\text{CH}_3\text{Br}$

43. Consider the nitration of benzene using mixed concentrated  $\text{H}_2\text{SO}_4$  and  $\text{HNO}_3$ . If a large amount of  $\text{KHSO}_4$  is added to the mixture, the rate of nitration will be:

- a) unchanged   b) doubled   c) faster   d) **slower**

**Solution :** -

Mechanism of nitration is:



If a large amount of  $\text{KHSO}_4$  is added then concentration of  $\text{HSO}_4^-$  ions increases and the reaction will be shifted in backward direction hence the rate of nitration of benzene will be slower.

44. The IUPAC name of the compound  $\text{CH}_3\text{CH} = \text{CHC} \equiv \text{CH}$  is \_\_\_\_\_.

- a) Pent-1-yn-3-ene   b) Pent-4-yn-2-ene   c) **Pent-3-en-1-yne**   d) Pent-2-en-4-yne

**Solution :** -

If both double and triple bonds are present, then triple bond is considered as the principal group. So, the compound name is pentene-3-en-1-yne.

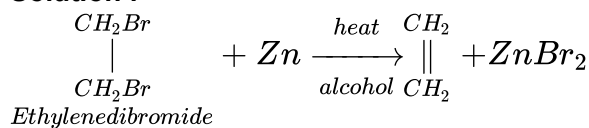
45. The correct trend of acidic nature of the following alkynes is

- a)  **$\text{CH} \equiv \text{CH} > \text{CH}_3 - \text{C} \equiv \text{CH} > \text{CH}_3\text{C} \equiv \text{CCH}_3$**    b)  $\text{CH}_3 - \text{C} \equiv \text{CH} > \text{CH} \equiv \text{CH} > \text{CH}_3\text{C} \equiv \text{CCH}_3$   
 c)  $\text{CH}_3\text{C} \equiv \text{CCH}_3 > \text{CH}_3 - \text{C} \equiv \text{CH} > \text{CH} \equiv \text{CH}$    d)  $\text{CH} \equiv \text{CH} > \text{CH}_3\text{C} \equiv \text{CCH}_3 > \text{CH}_3\text{C} \equiv \text{CH}$

46. The compound formed when alcoholic solution of ethylene dibromide is heated with granulated zinc is

- a) **ethene**   b) ethyne   c) ethane   d) bromoethane.

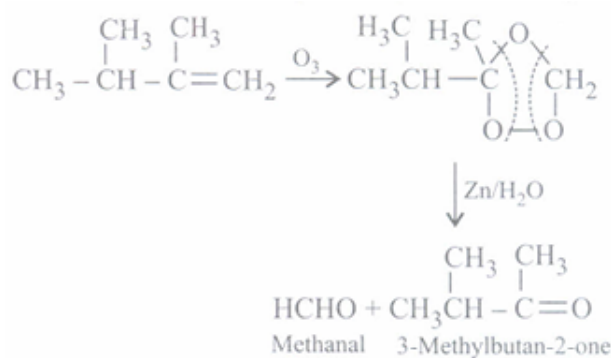
**Solution :** -



47. Ozonolysis of 2,3-dimethylbut-1-ene followed by reduction with zinc and water gives

- a) methanal and hexanoic acid    b) methanoic acid and butanone    **c) methanal and 3-methylbutan-2-one**  
 d) butanoic acid and 2,3-dimethylbutanoic acid.

**Solution : -**



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

- a) Cumene    b) Xylene    **c) Nitrobenzene**    d) Toluene

**Solution : -**

Nitro group being electron withdrawing, deactivates the benzene nucleus due to which electrophile cannot attack on benzene ring easily and it becomes incapable to give Friedel - Craft's reaction easily.

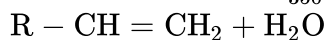
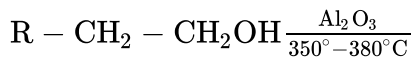
49. In preparation of alkene from alcohol using  $\text{Al}_2\text{O}_3$  which is effective factor?

- a) Temperature**    b) Concentration    c) Surface area of  $\text{Al}_2\text{O}_3$     d) Porosity of  $\text{Al}_2\text{O}_3$

**Solution : -**

Temperature is effective factor for Alcohol in preparation of Alkenes.

Reaction:



While at  $220^\circ - 250^\circ \text{C}$  it forms ether.

50. Cyclic hydrocarbon 'A' has all the carbon and hydrogen atoms in a single plane. All the carbon bonds have the same length less than  $1.54 \text{ \AA}$  but more than  $1.34 \text{ \AA}$ . The C - C - C bond angle will be:

- a)  $109^\circ 28'$     b)  $100^\circ$     c)  $180^\circ$     **d)  $120^\circ$**

**Solution : -**

In aromatic system all the carbon and hydrogen atoms are present in one plane and all C - C bond lengths are same due to resonance and all carbon atoms have  $\text{sp}^2$  hybridisation. So, the bond angle is  $120^\circ$ .