# DPP - Daily Practice Problems

**Date :** | **Start Time :** | **End Time :**

# CHEMISTRY CC13

**SYLLABUS :** Hydrocarbons

**Max. Marks : 120** **Marking Scheme :** + 4 for correct & (–1) for incorrect **Time : 60 min.**

INSTRUCTIONS : This Daily Practice Problem Sheet contains 30 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

**1.** In the given reaction

$$CH_3CH_2CH = CHCH_3 \xrightarrow{X} CH_3CH_2COOH + CH_3COOH$$

The X is

(a) $C_2H_5ONa$

(b) Conc. HCl + Anhy.$ZnCl_2$

(c) Anh. $AlCl_3$

(d) $KMnO_4/OH^-$

**2.** Ethyl hydrogen sulphate is obtained by reaction of $H_2SO_4$ on

(a) Ethylene (b) Ethane

(c) Ethyl chloride (d) Ethanol

**3.** One mole of a symmetrical alkene on ozonolysis gives two moles of an aldehyde having a molecular mass of 44 u. The alkene is

(a) propene

(b) 1-butene

(c) 2-butene

(d) ethene

**4.** Benzene on reaction with ozone forms _____.

(a) 2 molecules of aldehyde and 1 molecule of ketone

(b) 2 molecules of ketone and 1 molecule of aldehyde

(c) triozonide

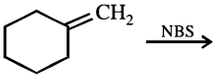
(d) hexaozonide

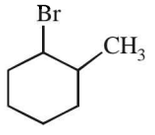
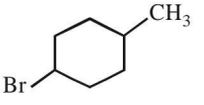
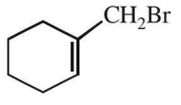
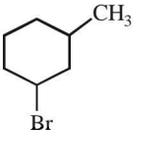
| RESPONSE GRID | 1. ⓐⓑⓒⓓ | 2. ⓐⓑⓒⓓ | 3. ⓐⓑⓒⓓ | 4. ⓐⓑⓒⓓ |
|---|---|---|---|---|

5. When neo-pentyl bromide is subjected to Wurtz reaction, the product formed is
   (a) 2,2,4,4-tetramethylhexane
   (b) 2,2,4,4-tetramethylpentane
   (c) 2,2,5,5-tetramethylhexane
   (d) 2,2,3,3-tetramethylhexane

6. Which one of the following reactions is expected to readily give a hydrocarbon product in good yields ?
   (a) $RCOOK \xrightarrow[\text{oxidation}]{\text{Electrolytic}}$
   (b) $RCOO^-Ag^+ \xrightarrow{Br_2}$
   (c) $CH_3CH_3 \xrightarrow[h\upsilon]{Cl_2}$
   (d) $(CH_3)_3CCl \xrightarrow{C_2H_5OH}$

7. What will be the product in the following reaction?



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

8. A hydrocarbon contains 10.5 g carbon and 1 g hydrogen. Its 0.36 g has 1 L volume at 1 atm and 127°C, hydrocarbon is :
   (a) $C_6H_7$ (b) $C_7H_8$
   (c) $C_5H_6$ (d) None of these

9. The conversion of 2, 3-dibromobutane to 2-butene with Zn and alcohol is
   (a) redox reaction (b) α-elimination
   (c) β-elimination (d) Both (a) and (b)

10. 1, 2-Dibromocyclohexane on dehydrobromination gives :
   (a)  (b) 
   (c)  (d) None of these

11. $C_6H_5CH_3 \xrightarrow{CrO_2Cl_2} Z$
   In the given sequence Z is:
   (a) benzaldehyde
   (b) toluic acid
   (c) phenyl acetic acid
   (d) benzoic acid

12. 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

13. Which of the following organic compounds has same hybridization as its combustion product ($CO_2$)?
   (a) Ethane
   (b) Ethyne
   (c) Ethene
   (d) Ethanol

14. In reaction sequence

$$CH_2 = CH_2 \xrightarrow[\text{acid}]{\text{Hypochlorous}} M \xrightarrow{R} \begin{matrix} CH_2OH \\ | \\ CH_2OH \end{matrix}$$

   molecule 'M' and reagent 'R' respectively are
   (a) $CH_3CH_2Cl$ and NaOH
   (b) $CH_3CH_2OH$ and $H_2SO_4$
   (c) $CH_2Cl$ . $CH_2OH$ and aqueous $NaHCO_3$
   (d) $CH_2 - CH_2$ (O) and heat

| RESPONSE GRID | | | | | |
|---|---|---|---|---|---|
| | 5. (a)(b)(c)(d) | 6. (a)(b)(c)(d) | 7. (a)(b)(c)(d) | 8. (a)(b)(c)(d) | 9. (a)(b)(c)(d) |
| | 10. (a)(b)(c)(d) | 11. (a)(b)(c)(d) | 12. (a)(b)(c)(d) | 13. (a)(b)(c)(d) | 14. (a)(b)(c)(d) |

**15.** Predict the correct intermediate and product in the following reaction :

$$H_3C-C\equiv CH \xrightarrow[HgSO_4]{H_2O,\,H_2SO_2} \underset{(A)}{\text{Intermediate}} \rightarrow \underset{(B)}{\text{product}}$$

(a) A : $H_3C-\underset{\underset{OH}{|}}{C}=CH$ B : $H_3C-\underset{\underset{SO_4}{|}}{C}=CH_2$

(b) A : $H_3C-\underset{\underset{O}{\|}}{C}=CH_3$ B : $H_3C-C\equiv CH$

(c) A : $H_3C-\underset{\underset{OH}{|}}{C}=CH_2$ B : $H_3C-\underset{\underset{O}{\|}}{C}=CH_3$

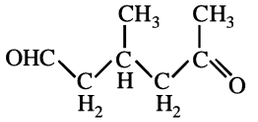
(d) A : $H_3C-\underset{\underset{SO_4}{|}}{C}=CH_2$ B : $H_3C-\underset{\underset{O}{\|}}{C}-CH_3$

**16.** The treatment of $CH_3MgX$ with $CH_3C\equiv C-H$ produces

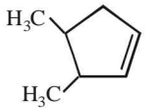
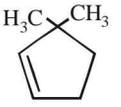
(a) $CH_3-CH=CH_2$ (b) $CH_3C\equiv C-CH_3$

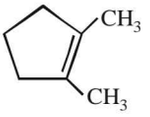
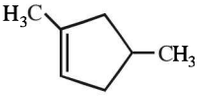
(c) $CH_3-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}=\underset{\underset{H}{|}}{C}-CH_3$ (d) $CH_4$

**17.** A single compound of the structure :



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

(a)  (b) 

(c)  (d) 

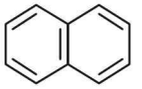
**18.** Which of the following reagents convert propene to 1-propanol?

(a) $H_2O, H_2SO_4$ (b) Aqueous KOH

(c) $MgSO_4, NaBH_4/H_2O$ (d) $B_2H_6, H_2O_2, OH^-$

**19.** Which of the following chemical system is non aromatic?

(a)  (b) 

(c)  (d) 

**20.** A group which deactivates the benzene ring towards electrophilic substitution but which directs the incoming group principally to the o- and p-positions is

(a) $-NH_2$ (b) $-Cl$

(c) $-NO_2$ (d) $-C_2H_5$

**21.** In the reaction

$$H-C\equiv CH \xrightarrow[(2)CH_3CH_2Br]{(1)NaNH_2\,/\,liq.NH_3} X \xrightarrow[(2)CH_3CH_2Br]{(1)NaNH_2\,/\,liq.NH_3} Y$$

X and Y are

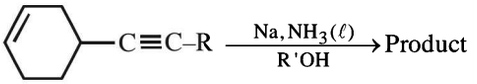
(a) X = 1-Butyne ; Y = 3-Hexyne

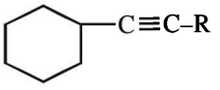
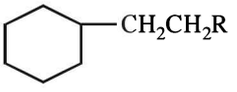
(b) X = 2-Butyne ; Y = 3-Hexyne

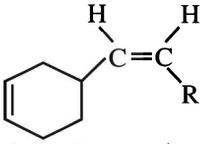
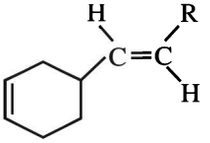
(c) X = 2-Butyne ; Y = 2-Hexyne

(d) X = 1-Butyne ; Y = 2-Hexyne

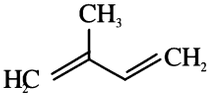
**22.** The main product of the reaction is :

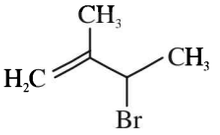
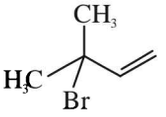


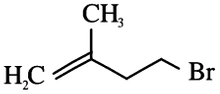
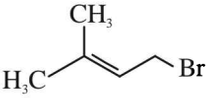
(a)  (b) 

(c)  (d) 

**23.** In the following reaction, the major product is



(a)  (b) 

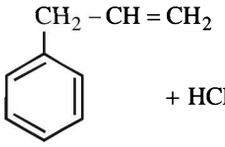
(c)  (d) 

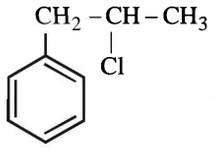
**24.** Which of these will not react with acetylene?

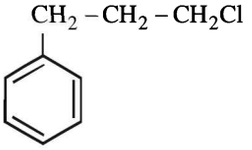
(a) NaOH (b) ammonical $AgNO_3$

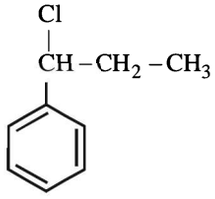
(c) Na (d) HCl

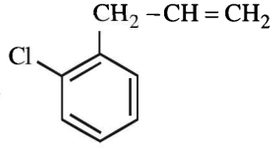
| RESPONSE GRID | | | | | |
|---|---|---|---|---|---|
| | **15.** ⓐⓑⓒⓓ | **16.** ⓐⓑⓒⓓ | **17.** ⓐⓑⓒⓓ | **18.** ⓐⓑⓒⓓ | **19.** ⓐⓑⓒⓓ |
| | **20.** ⓐⓑⓒⓓ | **21.** ⓐⓑⓒⓓ | **22.** ⓐⓑⓒⓓ | **23.** ⓐⓑⓒⓓ | **24.** ⓐⓑⓒⓓ |

**25.**  + HCl ⟶ X, X is :

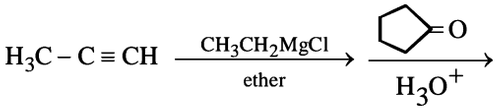
(a) 

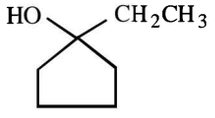
(b) 

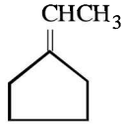
(c) 

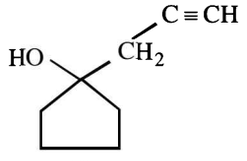
(d) 

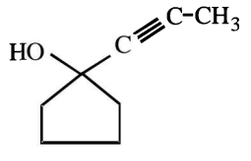
**26.** The major product of the following reaction



(a) 

(b) 

(c) 

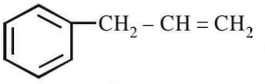
(d) 

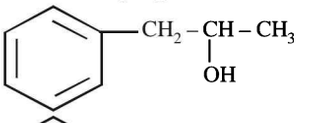
**27.** The gas liberated by the electrolysis of Dipotassium succinate solution is:

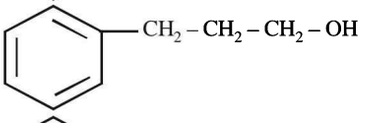
(a) Ethane (b) Ethyne
(c) Ethene (d) Propene

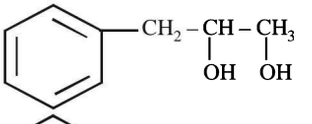
**28.** 1, 3-Butadiene when treated with $Br_2$ gives

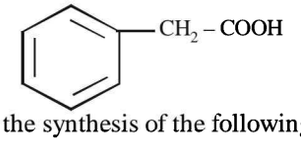
(a) 1, 4-dibromo-2-butene (b) 1, 3-dibromo-2-butene
(c) 3, 4-dibromo-1-butene (d) 2, 3-dibromo-2-butene

**29.**  on mercuration-demercuration produces the major product:

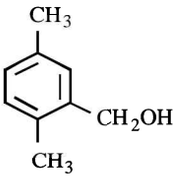
(a) 

(b) 

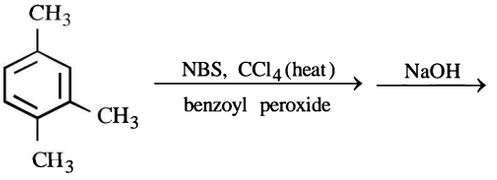
(c) 

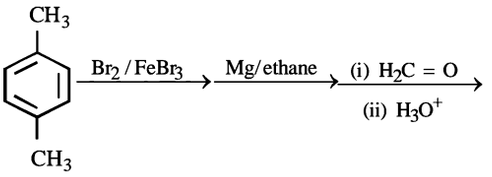
(d) 

**30.** For the synthesis of the following compound :



Which method is best ?

**Method I :** 

**Method II :** 

(a) Method I (b) Method II
(c) Both (I) and (II) are equally good (d) Neither (I) nor (II)

| RESPONSE GRID | 25. ⓐⓑⓒⓓ 26. ⓐⓑⓒⓓ 27. ⓐⓑⓒⓓ 28. ⓐⓑⓒⓓ 26. ⓐⓑⓒⓓ 30. ⓐⓑⓒⓓ |
|---|---|

| DAILY PRACTICE PROBLEM DPP CHAPTERWISE 13 - CHEMISTRY | | | |
|---|---|---|---|
| Total Questions | 30 | Total Marks | 120 |
| Attempted | | Correct | |
| Incorrect | | Net Score | |
| Cut-off Score | 35 | Qualifying Score | 50 |
| Success Gap = Net Score – Qualifying Score | | | |
| Net Score = (Correct × 4) – (Incorrect × 1) | | | |

**1.** **(d)** A doubly bonded carbon atom having an alkyl group is oxidised to aldehyde which is further oxidised to carboxylic acid.

$$CH_3CH_2CH=CHCH_3 \xrightarrow[(ii)\,H^+]{(i)\,KMnO_4,OH^-} CH_3CHO + CH_3CH_2CHO$$

$$CH_3CHO \rightarrow CH_3COOH \qquad CH_3CH_2CHO \rightarrow CH_3CH_2COOH$$

**2.** **(a)** $CH_2=CH_2 + H-O-SO_2OH \xrightarrow[H_2SO_4]{}$

$$CH_3\overset{\oplus}{C}H_2 + OSO_2OH \longrightarrow CH_3CH_2OSO_2OH$$

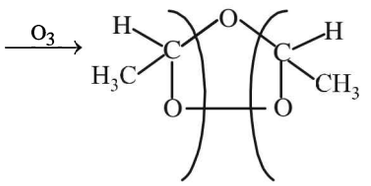
Ethyl hydrogen sulphate

Addition of sulphuric acid takes place according to Markownikoff's rule. Alkanes do not absorb cold conc. $H_2SO_4$.

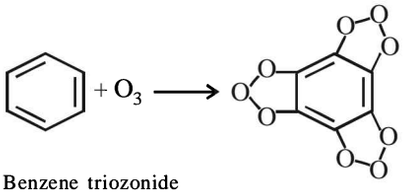
**3.** **(c)** The given molecular formula suggests that the aldehyde formed will be acetaldehyde hence the alkene will be

$CH_3CH=CHCH_3$

2–butene




$$\xrightarrow{Zn/H_2O} 2CH_3CHO$$

**4.** **(c)** 

Benzene triozonide

**5.** **(c)** $H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2Br + 2Na + Br-CH_2-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3 \xrightarrow[-2NaBr]{ether}$

*neo*-pentyl bromide

$$H_3C-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2-CH_2-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$$

2,2,5,5-tetramethylhexane

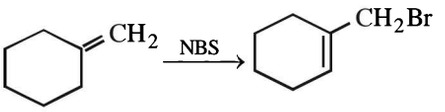
**6.** **(a)** Electrolysis of a concentrated aqueous solution of either sodium or potassium salts of saturated mono-carboxylic acids yields higher alkane at anode.

$$2RCOOK \xrightarrow[\text{Oxidation}]{\text{Electrolyt ic}} \underset{\text{Anode}}{2RCOO^-} + \underset{\text{Cathode}}{2K^+}$$

At anode $2RCOO^- \rightarrow 2RCOO + 2e^- \longrightarrow R-R + 2CO_2$

At Cathode $2K^+ + 2e^- \rightarrow 2K$

$2K + H_2O \rightarrow 2KOH + H_2\uparrow$

**7.** **(c)** 


(Kolbe's Method)

**8.** **(b)** Sum of masses of C and H = 10.5 + 1.0 = 11.5

$$\%\ \text{of C} = \frac{10.5}{11.5}\times 100 = 91.3\%$$

$$\%\ \text{of H} = \frac{1.0}{11.5}\times 100 = 8.7\%$$

| Element | % | Ratio of atoms | Simplest ratio |
|---|---|---|---|
| C | 91.3 | 91.3/12 = 7.61 | 7.61/7.61 = 1 × 7 = 7 |
| H | 8.7 | 8.7/1 = 8.7 | 8.7/7.61 = 1.14 × 7 = 8 |

$\therefore$ Empirical formula = $C_7H_8$

We know that $n = \frac{PV}{RT}$

$$\frac{\text{mass}}{\text{molar mass}} = \frac{PV}{RT}$$

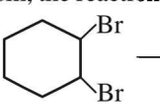
$$\frac{2.81}{M} = \frac{1\times 1}{0.082\times 400};\ M = 92.168 \approx 92$$

$$\therefore\ n = \frac{84+8}{92} = 1$$

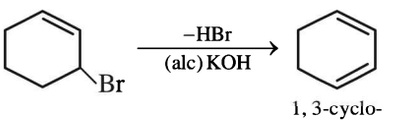
$\therefore$ Molecular formula = $(C_7H_8)\times 1 = C_7H_8$

**9.** **(c)** $CH_3CHBrCHBrCH_3 \xrightarrow{Zn/\text{alcohol}} CH_3CH=CHCH_3$

Since two bromine atoms are lost from different carbon atom, the reaction is known as β-elimination.

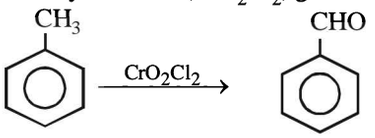
**10.** **(b)** 


1, 2-dibromo-cyclohexane




1, 3-cyclo-hexadiene

**11.** **(a)** Toluene on oxidation with mild oxidising agent like chromyl chloride ($CrO_2Cl_2$) gives benzaldehyde.



toluene benzaldehyde

**12.** **(c)** $CH_3-CH=CH_2+H_2O \xrightarrow{H_2SO_4} CH_3-\underset{\underset{OH}{|}}{CH}-CH_3$ (2° alcohol)

$$CH_3-\underset{\underset{CH_3}{|}}{C}=CH_2+H_2O \xrightarrow{H_2SO_4} CH_3-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$$ (3° alcohol)

Addition follows Markownikoff's rule.

**13.** **(b)** The combustion reaction of ethylene is

$$C_2H_2+\frac{5}{2}O_2 \rightarrow 2CO_2+H_2O$$

Both $HC\equiv CH$ and $CO_2$ have *sp* hybridization.

**14.** **(c)** We know that

$$CH_2=CH_2 + HOCl \rightarrow \underset{\underset{CH_2Cl}{|}}{CH_2OH} \xrightarrow{NaHCO_3} \underset{\underset{CH_2OH}{|}}{CH_2OH}$$

$\therefore$ $M = CH_2OH-CH_2Cl$ and $R = NaHCO_3$

**15.** **(c)** Hydration of alkynes give ketones.

$$H_3C-C\equiv CH \xrightarrow[HgSO_4]{H_2O,\ H_2SO_2} H_3C-\underset{\underset{(A)}{}}{\overset{\overset{OH}{|}}{C}}=CH_2 \xrightarrow{\text{Tautomerism}} H_3C-\underset{\underset{(B)}{}}{\overset{\overset{O}{||}}{C}}-CH_3$$

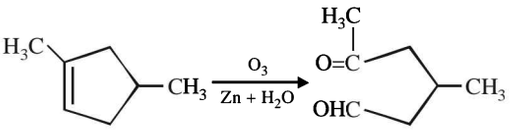
**16.** **(d)** Writing the reaction we get

$$CH_3MgX + CH_3-C\equiv C-H \longrightarrow$$

$$CH_3-C\equiv CMgX + CH_4(g)$$

So we find that $CH_4$ is produced in this reaction.

**17.** **(d)**



**18.** **(d)** $\underset{\text{1, Propene}}{6CH_3-CH=CH_2} \xrightarrow[\text{ether, 0°C}]{B_2H_6}$

$$2(CH_3CH_2CH_2)_3B \xrightarrow[OH^-]{H_2O_2}$$

$$6\underset{\text{Propanol}}{CH_3CH_2CH_2OH} + 2H_3BO_3$$

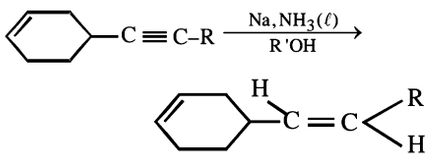
**19.** **(a)** Huckel rule is not obeyed. It has only four electrons. Further it does not have continuous conjugation.

**20.** **(b)** –Cl group is o-, p-directing due to +R effect ; however it is deactivating due to strong –I effect of Cl (difference from other o-, p-directing groups which are activating). The net result is that chlorobenzene undergoes o-, p-substitution, but with difficulty

**21.** **(a)**

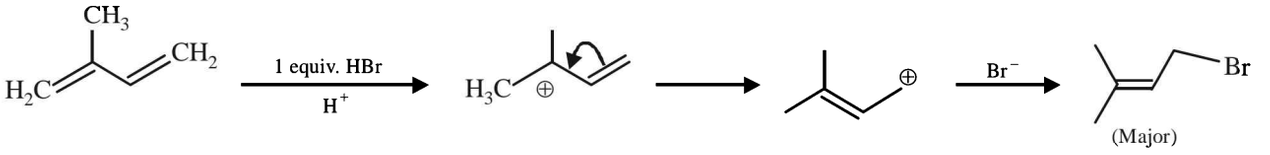
$$HC\equiv CH \xrightarrow[\text{liq. } NH_3]{NaNH_2} HC\equiv \overset{\oplus}{\overline{C}}Na \xrightarrow{H_3C-CH_2\cdot Br} \underset{\underset{\text{1-Butyne}}{(X)}}{HC\equiv C-CH_2-CH_3} \xrightarrow{NaNH_2,\ \text{liq. } NH_3} H_3C-CH_2-C\equiv \overset{\oplus}{\overline{C}}Na \xrightarrow{H_3C-CH_2-Br} \underset{\text{3-Hexyne (Y)}}{H_3C-CH_2-C\equiv C-CH_2-CH_3}$$

**22.** **(d)** It is a streoselective reaction and in it a trans product is formed.



[It is a reduction. Metal dissolved reduction $Na/C_2H_5OH$ reaction is stereo selective].

**23.** **(d)**



(Major)

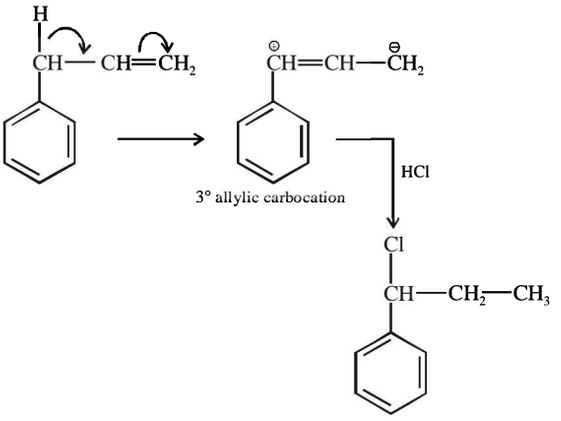
**24.** **(a)** Acetylene reacts with the other three as:

$$CH \equiv CNa \xleftarrow[\text{liq. } NH_3]{Na} CH \equiv CH \xrightarrow{+HCl} \begin{matrix} CH_2 \\ | \\ CHCl \end{matrix}$$

$$\xrightarrow{+HCl} \begin{matrix} CH_3 \\ | \\ CHCl_2 \end{matrix}$$

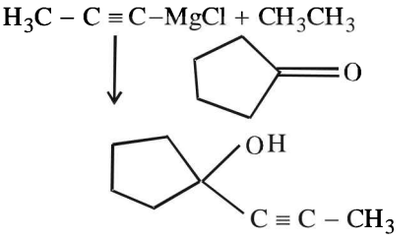
$$CH \equiv CH \xrightarrow{[AgNO_3+NH_4OH]} \underset{\text{white ppt.}}{AgC{\equiv}CAg} + NH_4NO_3$$

**25.** **(c)**




(Since tertiary carbocation is more stable)

**26.** **(d)** $H_3C - C \equiv C - \boxed{H + CH_3CH_2}MgCl \longrightarrow$




**27.** **(c)** Ethene is obtained by electrolysis of dipotassium succinate as follows

$$\begin{matrix} CH_2COOK \\ | \\ CH_2COOK \end{matrix} \xrightarrow{\text{ionization}} \begin{matrix} CH_2COO^- \\ | \\ CH_2COO^- \end{matrix} + 2K^+$$

Pot. Succinate

$$2H_2O \underset{}{\overset{\text{ionization}}{\rightleftharpoons}} 2OH^- + 2H^+$$

At anode :

$$\begin{matrix} CH_2COO^- \\ | \\ CH_2COO^- \end{matrix} - 2e^- \longrightarrow \left[\begin{matrix} CH_2COO \\ | \\ CH_2COO \end{matrix}\right] \longrightarrow \begin{matrix} CH_2 \\ \| \\ CH_2 \end{matrix} + 2CO_2$$

Unstable

At cathode :

$$2H^+ + 2e^- \longrightarrow [2H] \longrightarrow H_2$$

**28.** **(a)** The intermediate 2° carbocation shows resonance

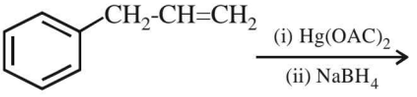
$$CH_2 = CH - CH = CH_2 \xrightarrow{Br^+} \left[CH_2Br - \overset{+}{C}H - CH = CH_2 \right.$$

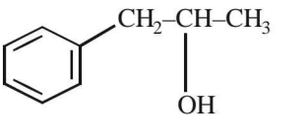
$$\left. \leftrightarrow CH_2Br - CH = CH - \overset{+}{C}H_2 \right]$$

$$\xrightarrow{Br^-} CH_2Br - CH = CH - CH_2Br$$

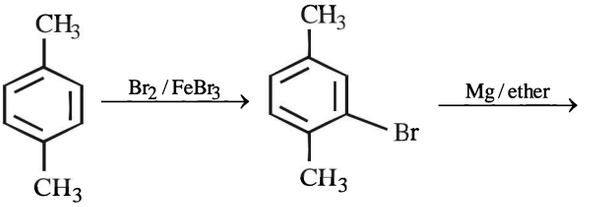
1,4–Dibromo –2–butene

**29.** **(a)**

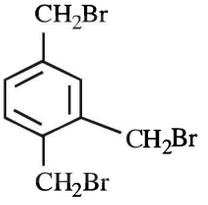



**30.** **(b)**




Method (1) will give




which is allylic bromination.