ORGANIC CHEMISTRY

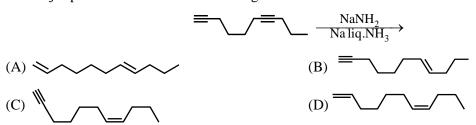
HYDROCARBON

- 1. The reaction of 4-methyloct-ene (\mathbf{P} , 2.52 g) with HBr in the presence of ($C_6H_5CO)_2O_2$ gives two isomeric bromides in a 9: 1 ratio, with combined yield of 50%. Of these, the entire amount of the primary alkyl bromide was reacted with an appropriate amount of diethylamine followed by treatment with eq. K_2CO_3 to given a non-ionic product \mathbf{S} in 100% yield. The mass (in mg) of \mathbf{S} obtained is _____. [Use molar mass (in g mol⁻¹): H = 1, C = 12, N = 14, Br = 80] [JEE(Advanced) 2023]
- 2. The number of isomeric tetraenes (**NOT** containing *sp*-hybridized carbon atoms) that can be formed from the following reaction sequence is ______. [**JEE**(**Advanced**) 2022]

3. The number of $-CH_2$ - (methylene) groups in the product formed from the following reaction sequence is ______. [JEE(Advanced) 2022]

4. The major product formed in the following reaction is

[JEE(Advanced) 2021]



Question Stem for Q.5 and Q.6

For the following reaction scheme, percentage yields are given along the arrow:

x g and **y** g are mass of **R** and **U**, respectively.

(Use: Molar mass (in g mol⁻¹) of H, C and O as 1, 12 and 16, respectively)

5. The value of \mathbf{x} is _____.

[JEE(Advanced) 2021]

6. The value of **y** is_____.

- [JEE(Advanced) 2021]
- 7. In the reaction given below, the total number of atoms having sp^2 hybridization in the major product **P** is _____. [JEE(Advanced) 2021]

$$\frac{1. O_3 \text{ (excess)}}{\text{then Zn/H}_2O} \rightarrow \mathbf{P}$$

$$\frac{1. O_3 \text{ (excess)}}{2. \text{ NH}_2\text{OH (excess)}} \rightarrow \mathbf{P}$$

8. Which of the following reactions produce(s) propane as a major product?

[JEE(Advanced) 2019]

(A)
$$H_3C$$
 COONa + H_2O electrolysis

(B)
$$H_3C$$
 COONa NaOH, CaO, Δ

(D)
$$H_{\circ}C$$
 Br Zn

9. Total number of hydroxyl groups present in a molecule of the major product P is _____

[JEE(Advanced) 2019]

10. The major product U in the following reactions is :

[JEE(Advanced) 2015]

$$\frac{\text{CH}_2 = \text{CH} - \text{CH}_3, \text{H}^+}{\text{high pressure, heat}} \text{T} \xrightarrow{\text{radical initiator, O}_2} \text{U}$$
H

$$(A) \bigcirc CH_3$$

$$H_3C$$
 CH_3 O O

$$CH_2$$

$$(D) \bigcirc CH_2 \\ O O H$$

SOLUTIONS

1. Ans. (1791)

Sol.

$$H_{2}C = CH - CH_{2} - CH - CH_{2} - CH_{2} - CH_{2} - CH_{3} \quad (P)$$

$$CH_{3} \qquad CH_{3} \qquad CH_{3} \qquad CH_{2} - CH_{3}$$

$$Br \qquad CH_{3} \qquad Br \qquad CH_{3}$$

$$P = CH_{3} \qquad P = CH_{3}$$

2. Ans. (2)

3. Ans. (0)

Sol.
$$\begin{array}{c}
1. O_{3}, Zn/H_{2}O \\
\hline
C \\
OH \\
NaOH \\
Electrolysis
\end{array}$$

$$\begin{array}{c}
Cr_{2}O_{3} \\
\hline
770 K \\
20 \text{ atm}
\end{array}$$

4. Ans. (B)

Sol.
$$\longrightarrow$$
 $NaNH_2$ \longrightarrow $Naliq.NH_3$

(B) is answer

5. Ans. (1.62)

Sol.
$$Mg_2C_3 + 4H_2O \rightarrow 2Mg(OH)_2 + CH_3C \equiv CH$$

$$CH_{3}C \equiv CH \xrightarrow{NaMe_{2}} CH_{3} - C \equiv C^{-}Na^{+}$$

$$\downarrow MeI$$

$$CH_{3} - C \equiv C - CH_{3}(0.075mmol)$$

$$(Q)$$

$$3CH_3 - C \equiv C - CH_3 \xrightarrow{\text{red hot}}$$
0.75 mole
$$0.75 \text{ mole}$$

$$0.075 \times 0.4) \times$$

= 0.01 mole

The value of $x = 162 \times 0.01 = 1.62 \text{ gm}$

6. Ans. (3.20 OR 3.90 TO 3.91)

Sol. (P)
$$\xrightarrow{\text{Hg}^{2+}/\text{H}^{+}}$$
 $\xrightarrow{333\text{K}, 100\%}$ CH₃-C-CH₃ (0.01) mole $\xrightarrow{\text{Kucherov reaction.}}$ $\xrightarrow{\text{Ha}(\text{OH})_{2}/\Delta}$ $\xrightarrow{\text{Ha}(\text{OH})_{2}/\Delta}$ $\xrightarrow{\text{Ha}(\text{OH})_{2}/\Delta}$ $\xrightarrow{\text{Ha}(\text{OH})_{2}/\Delta}$ $\xrightarrow{\text{Ha}(\text{OH})_{2}/\Delta}$ 0.04 mole $\xrightarrow{\text{Ha}(\text{OH})_{2}/\Delta}$ $\xrightarrow{\text{Ha}($

$$60 + 32 + 8 = 100$$

The value of Y = $0.032 \times 100 = 3.2$

7. Ans. (8 or 12)

Sol.

$$\frac{O_3 \text{ (excess)}}{\text{then Zn/H}_2O} \xrightarrow{O \text{ O}} \frac{\text{NH}_2OH}{\text{O}} \xrightarrow{\text{NH}_2OH} \xrightarrow{\text{NN}} \frac{\text{NN}}{\text{NN}}$$

Total 12 atoms are sp² hybridised

8. Ans. (B, C)

Sol.
$$CH_3 - CH_2 - CH_2 - CO_2Na + H_2O \xrightarrow{electrolysis} n$$
-hexane
$$CH_3 - CH_2 - CH_2 - CO_2Na \xrightarrow{NaOH + CaO} CH_3 - CH_2 - CH_3$$

$$CH_3 - CH_2 - CH_2 - CI + Zn \longrightarrow CH_3 - CH_2 - CH_2 - ZnCl \xrightarrow{dil. \ HCl} CH_3CH_2CH_3$$

$$Br \longrightarrow Br \longrightarrow CH_3 - CH_2 - CH_3 - CH_2 - CH_3 - CH_2 - CH_2 - CH_2 - CH_3 - CH_2 - CH_3 - CH_2 - CH_2 - CH_2 - CH_3 - CH_2 - CH_2 - CH_3 - CH_2 - CH_2 - CH_3 - CH_2 - CH_2 - CH_2 - CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_3 - CH_2 - CH_2 - CH_3 - CH_2 - CH_2 - CH_2 - CH_3 - CH_2 - CH_3 - CH_2 - CH_3 - CH_2 - CH_2 - CH_2 - CH_3 - CH_3 - CH_2 - CH_3 - CH_3 - CH_3 - CH_2 - CH_3 - CH_3$$

(Cumene)

9. Ans. (6.00)

Sol.
$$\begin{array}{c} H_2/\text{Pd} - \text{BaSO}_4 \\ \text{Quinoline} \end{array}$$

$$\begin{array}{c} \text{CH}_2 \\ \text{CH}_2 \\ \text{CH}_2 \end{array}$$

$$\begin{array}{c} \text{CH}_2 \\ \text{H} \end{array}$$

$$\begin{array}{c} \text{CH}_2 \\ \text{OH} \end{array}$$

$$\begin{array}{c} \text{CH}_2 \\ \text{CH}_2 \end{array}$$

$$\begin{array}{c} \text{OH} \\ \text{OH} \end{array}$$

$$\begin{array}{c} \text{OH} \\ \text{OH} \end{array}$$

total 6 -OH group present in a molecule of the major product.

10. Ans. (B)

Sol.
$$\bigcirc$$
 CH_2 =CH-CH₃,H⁺ \rightarrow T radical, initiater \rightarrow U

$$CH_2$$
=CH-CH₃ + H⁺ \rightarrow CH₃-CH⁻ CH₃

$$CH_3$$

$$CH_4$$

$$CH_3$$

$$CH_4$$

$$CH_3$$

$$CH_4$$

resonance stabilized σ complex

$$\begin{array}{c|c} CH_3 \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\ CH_3 \\ \hline \\ CH_3 \\$$