## **CHEMISTRY**

TARGET: JEE Advanced - 2023

### **CAPS - 11**

# **Hydrocarbons**

1. 
$$\begin{array}{c} \text{CH}_3 \\ \text{CH}_3 - \text{C} - \text{CH} = \text{CH}_2 & \xrightarrow{\text{dil. H}_2 \text{SO}_4} \\ \text{CH}_3 \end{array}$$

$$\begin{array}{c|c} \text{CH}_3 & \text{CH}_3 \\ \downarrow & \downarrow \\ \text{CH}_3 - \text{CH} - \text{C} = \text{CH}_2 \end{array} \xrightarrow{ \begin{array}{c} \text{(i) (AcO)}_2\text{Hg, THF, H}_2\text{O} \\ \text{(ii) NaBH}_4 \end{array} } \begin{array}{c} \\ \\ \\ \\ \\ \end{array}$$

$$\begin{array}{c|c} CH_3 & CH_3 & \xrightarrow{\quad (i) B_2H_6/THF \quad} \\ CH_3 - C & = C - CH_3 & \xrightarrow{\quad (ii) H_2O_2/OH^- \quad} \end{array}$$

- (A) All three products (X, Y, Z) are different.
- (B) X and Y are identical but Z is different.
- (C) Y and Z are identical but X is different.
- (D) All three products (X, Y, Z) are identical.

$$CH = CH_2$$

$$V$$

$$OH$$

$$Z$$

$$OH$$

$$Z$$

2.

- X, Y, Z reaction are:
- (A) Simple hydration reaction
- (B) Hydroboration oxidation, hydration and oxymercuration demercuration
- (C) Hydroboration oxidation, oxymercuration demercuration and hydration
- (D) Oxymercuration demercuration, hydroboration oxidation and hydration
- **3.** The following reaction is ..... reaction

$$\begin{array}{c|c} OH & OH \\ \hline \\ OH & CH_2CI \\ \hline \\ NO_2 & NO_2 \end{array}$$

(A) Nucleophilic substitution

(B) Electrophilic substitution

(C) Both (A) and (B)

(D) Addition

**4.** The final product in the following reaction is

5. Identify the 'X' and 'Y' respectively

(A) 
$$SO_3H$$
  $NO_2$   $NO_2$   $NO_2$   $NO_2$   $NO_2$ 

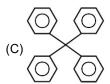
$$(B) \begin{array}{c|c} O_2N & SO_3H & NH_2 \\ \hline \\ NO_2 & NO_2 \\ \hline \\ CI & \\ \end{array}$$

$$(C) \bigvee_{\mathsf{NO}_2} \mathsf{NO}_2 \ , \ \mathsf{SO}_3 \mathsf{H} \bigvee_{\mathsf{NO}_2} \mathsf{NO}_2$$

**6.** The end product of following sequence of reactions is

$$\begin{array}{c}
CH_3 \\
\hline
CI_2, \Delta \\
\hline
(1)
\end{array}
\xrightarrow{PhH, AlCI_3}
\xrightarrow{Br_2, \Delta}
\xrightarrow{Na/Et_2O}$$

$$\begin{array}{c}
(3)
\end{array}
\xrightarrow{Na/Et_2O}$$



7. Find the final product of following sequence of reactions:

The compound (S) is:

$$(A) \bigcirc_{CH_3} \qquad \qquad (B) \bigcirc_{CH_3} \qquad (C) \bigcirc_{COCH_3} \qquad \qquad (D) \bigcirc_{COCH_3}$$

**9.** The end product of following reaction is :

$$\overbrace{\left(\begin{array}{c} -CH_3Cl \\ AlCl_3 \end{array}\right)}^{CH_3Cl} P \xrightarrow{NBS} Q \xrightarrow{HO^\Theta} R \xrightarrow{MnO_2} S$$

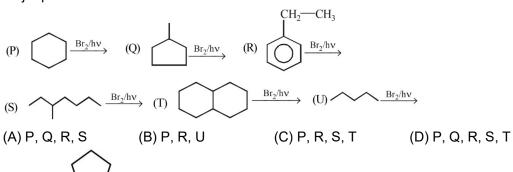
(A) Benzyl alcohol

(B) Benzene carbaldehyde

(C) Benzoic acid

(D) Benzophenone

**10.** Among the following free radical bromination reactions, select those in which 2° halide is the major product-



11.

$$\begin{array}{c|c} CH_3 & CH_3 \\ \hline O & O \\ \hline O & Mannitol/Water \end{array} \land A$$

Cyclic osmate ester complexed with pyridine

Product (A) is:

12. 
$$Br \xrightarrow{82}Br \xrightarrow{82}Br \xrightarrow{CCl_4}$$

Major product of the reaction is:

13. 
$$CO_2H \xrightarrow{I_2} (A)$$

Major product of the reaction is:

14. What is the product, C, of the following reaction sequence?

15. Compound

$$(X) \xrightarrow{SH_2} CH_2 - CH_2 - CH_2 - CH_3$$

$$AgNO_3 \rightarrow Precipitate$$

Compound (X) will be:

(A) 
$$CH = CH - C \equiv CH$$
 (B)  $CH - CH_2 - C \equiv CH$  (C)  $CH - CH_2 - C \equiv CH$ 

16.

Predict the major product:

#### **MULTIPLE CHOICE QUESTIONS**

17. In which of the following reaction reactants and products are correctly matched?

$$(A) F_3C-CH=CH_2+HCI \longrightarrow CI$$

(B) 
$$CH_3-CH = CH-C-OCH_3 + ICI \longrightarrow CH_3-CH-CH-C-OCH_3$$

(C) 
$$C_6H_5CH = CHCH_3 + HBr \xrightarrow{ROOR} C_6H_5CH_2-CH-CH_3$$
Br

**18.** Which statement is /are correct.

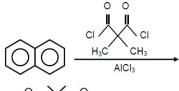
(A) No primary kinetic isotope effect is observed during nitration of benzene

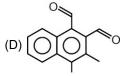
(B)  $K_H/K_D = 1$  for halogenation of benzene

(C)  $K_H / K_D = 1$  for sulphonation of benzene

(D)  $K_H/K_D$  is > 1 for alkylation of benzene

19. Which of the following product/s can be obtained in the following reaction –





### **Integer Type Question**

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

$$(i) \stackrel{\textstyle \bigwedge}{ } \xrightarrow{ \ \ \, NBS \ \ }$$

(ii) 
$$\xrightarrow{\text{HCI}} \underset{R_2O_2}{\longrightarrow}$$

(iii) 
$$CH_3$$
-C=CH-CH $_3 \xrightarrow{\text{HBr}} h_v \rightarrow CH_3$ 

(iv) 
$$CH_3-C\equiv C-CH_2-CH_3 \xrightarrow{HI}_{R_2O_2}$$
 (v)  $CH_3-CH=CH_2 \xrightarrow{HBr}_{R_2O_2}$ 

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

(i) 
$$CH_2CH_3$$

$$\xrightarrow{\text{(1) } Hg(OAC)_2, H_2O} M$$
(ii)  $H$ 

22. Column-l

- (A) 1-Phenylbut -1-yne  $\xrightarrow{\text{DiH}_2SO_4}$   $\xrightarrow{\text{Hg}^{-2}}$
- (p) 1-phenylbutan-1-one
- (B) 1-Phenylbut -1-yne  $\xrightarrow{(1)BH_3+THF}$   $\xrightarrow{(2)H_2O_2+OH}$
- (q) 1-Phenylbutan-2-one
- (C) But-2-ene (cis)  $\xrightarrow{Br_2+CCl_4}$
- (r) Syn addition
- (D) But-2-ene (trans)  $\xrightarrow{Br_2+CCl_4}$
- (s) Anti addition
- (t) Optically inactive

#### SUBJECTIVE CHOICE QUESTIONS

23. (a) Write structures for A, B and C in the following reaction:

$$C_6H_6 + CH_2 = CHCH_2CI \xrightarrow{\quad AICI_3\quad } A \xrightarrow{\quad 1.8H_3/THF\quad } B \xrightarrow{\quad HF\quad \quad \Delta} C(C_9H_{10})$$

24. 2-Butyne undergoes following reactions in steps as indicated. Identify A to H.

$$CH_3C = CCH_3 \xrightarrow{H_2} A \xrightarrow{D_2/Pt} B$$

$$Na/EtOH \rightarrow C \xrightarrow{D_2/Pt} D$$

$$H_2 \rightarrow E \xrightarrow{Br_2} F$$

$$Br_2 \rightarrow G \xrightarrow{Ni} H$$