TOPIC : HADROCARBON EXERCISE # 1

SECTION (A)

- **1.** Boiling point ∞ surface area of the molecule,
- **4.** Density of Hydrocarbon is less than H_2O , so floats.

8.
$$CH_3 - CH_2 - C - O.Na + NaOH + CaO \longrightarrow CH_3 - CH_3 + Na_2 CO_3$$

ethane

- **13.** Halogenation of alkanes is an example of free radical substitution reaction
- **16.** So photochemical bromination reactivity of hydrogen atom is $3^{\circ}H > 2^{\circ}H > 1^{\circ}H$.



.: Ans. is (3)

17. Iodination of an alkane is carried out in presence of HNO₃ or HIO₃

19. By counting number of carbon atoms.

20. Number of mole of hydrogen needed is = number of double bonds = 5

SECTION (B)

2.
$$CH_2 = CH_2 + Br_2 \xrightarrow{CCl_4} \begin{array}{c} CH_2 - CH_2 \\ | \\ Br \\ Br \\ Br \end{array}$$

7. Peroxide effect is observed only with HBr

8.
$$CH_3 - CH = CH_2 + H - Br \xrightarrow{H_2O_2} CH_3 - CH_2 - CH_2 - Br$$

11.
$$CH_3 \xrightarrow{CH_3} CH_3$$

 $\downarrow \\ CH_3 \xrightarrow{-C} = CH - CH_3 \xrightarrow{-H_2/Ni} CH_3 - CH - CH_2 - CH_3$
 CH_3
 \downarrow

 $CH_3 - \dot{C}H - CH_2 - CH_3$ has four chemically different types of hydrogen atoms.

14.
$$CH_2 = C = CH - C - CH_3 \xrightarrow{O_3/Z_{D+H_2O}} 2HCHO + CO_2 + CH_3 - CO - CHO$$

 $\|CH_2 = C = CH - C - CH_3 \xrightarrow{O_3/Z_{D+H_2O}} 2HCHO + CO_2 + CH_3 - CO - CHO$

SECTION (C)

1. General fomula $C_n H_{2n-2}$ represents alkynes

2.
$$CI \quad CI \quad CI$$

 $I \quad I \quad I$
 $CH_3 - C - C - CH_3 \xrightarrow{Zndust} CH_3 - C \equiv C - CH_3 (But -2-yne)$
 $I \quad I$
 $CI \quad CI$

3.
$$2Mg^{+2} (\bar{C} \equiv C - C^{3-}) \xrightarrow{H_3O^+} Mg (OH)_2 + CH \equiv C - CH_3 (Propyne)$$

5. Most Acidic hydrogen is present in ethyne.

6.
$$CH_3 - CH_2 - C \equiv C - H \xrightarrow{HBr} \xrightarrow{CH_3 - CH_2 - C \equiv CH_2} \xrightarrow{HBr} CH_3 - CH_2 - CH_3 \xrightarrow{Br} \xrightarrow{Br} CH_3 - CH_2 - CH_3 \xrightarrow{Br} \xrightarrow{Br} CH_3 \xrightarrow{Br} C$$

7.
$$H-C=C-H + H_2O \xrightarrow{Hg^{1/2}} CH_2 = CH \xleftarrow{} CH_3CHO.$$

Ans is (1).

- 8. 1-butyne and 2-Butyne can be distinguish by ammonical silver nitrate solution.
- **10.** Terminal alkyne can react with ammonical AgNO₃.

SECTION (D)

1. Isomerization of an alkane may be carried out by using anhyd. AICl₃ at 300°C in presence of a trace of alkyl halide or alkene

SECTION (E)

- **3.** Number of π electron is 6
- 4. Azulene is exist as dipolar ion



 $\sqrt{2}$ both rings have 6π electron hence aromatic.

6. Those compounds are anti aromatic which are cyclic, planar having $4n \pi$ electrons.

 4π electron (anti aromatic)

SECTION (F)

1. The characteristic reaction of benzene is electrophilic substitution.



EXERCISE # 2

- **1.** $(CH_3)_2CH CH_2 CH_2 CH (CH_3)_2$ syntheized in good yield in wurtz reaction
- 2. $\begin{array}{c} BrCH_2 \\ BrCH_2 \\ BrCH_2 \end{array} \xrightarrow{CH_2Br} \\ \hline Na \\ \hline ether, heat \end{array} \xrightarrow{Va}$
- 4. (1) $CaC_2 + H_2O \longrightarrow HC \equiv CH + Ca(OH)_2$
 - (2) $Mg_2C_3 + H_2O \longrightarrow CH_3 C \equiv CH + Mg(OH)_2$
 - (3) $AI_4C_3 + H_2O \longrightarrow CH_3-C \equiv CH + AI(OH)_3$
 - (4) $Cu_2Cl_2 + H_2O \longrightarrow 2Cu(OH) + 2HCI$
- **6.** $CHI_3 + Ag + CHI_3 \longrightarrow HC \equiv CH + 6AgI$
- 10. Rate of nitration at benzene does not affect by H or D because H or D leave in the fast step.
- **11.** According to hyperconjugation effect.
- **12.** Electrophile attacks on that ring which has more +M effect.
- **13.** It is Friedal-Crafts reaction and is used for the preparation of diphenylmethane.
- **14.** Benzene least likely to give reaction with chlorine free radical.

15. Reactions (3) is free radical substitution reaction.

16. For
$$C_x H_y O_z X_a N_b$$
 Du = $\frac{2x + 2 - y - a + b}{2}$ \therefore for $C_{20} H_{24} N_2 O_2 Du = 10 = 6db + 4$ ring.





EXERCISE # 3

PART - I



Total 4-isomers

- $\textbf{9.} \qquad \textbf{C}_{_{\!\!6}}\textbf{H}_{_{\!\!6}} + \textbf{C}\textbf{H}_{_{\!\!3}}\textbf{C}\textbf{I} \xrightarrow{\text{AICI}_{_{\!\!3}}} \textbf{C}_{_{\!\!6}}\textbf{H}_{_{\!\!5}}\textbf{C}\textbf{H}_{_{\!\!3}} + \textbf{H}\textbf{C}\textbf{I}.$
- **10.** Electrophiles are electron deficient species. Among the given, H_3O^{\oplus} has lone pair of electrons for donation, thus it is not electron deficient and hence, does not behave like an electrophile.

11. Due to + M effect of – OH group and hyperconjugation of – CH_3 group

12. Electrophilic rate order



Toluene is most reactive.

13. $-NO_2$ group is most deactivating group due to strong -I and -M effect.

- 14. Nitrobenzene is strongly deactivated, hence will not undergo Friedal-craft's reaction.
- 15. The question is conceptually wrong. However among the given option, the closest option is "2"
- **16.** In Ethyne (CH=CH) both carbon atoms are sp hybrid as the hybridisation of combustion product, carbon atom of $O=C=O(CO_2)$.

$$CH_{3}-C \equiv CH \qquad \frac{\text{Red Hot}}{\text{Iron tube}} \qquad \begin{array}{c} CH_{3} \\ \hline \\ CH_{3} \\ CH_{3} \\ CH_{3} \\ \end{array} CH_{3} \end{array}$$

17.

Product is mesitylene total σ bonds in mesitykene = 21

✓ + /\́∕

$$18. \qquad \swarrow \xrightarrow{Cl_2} \qquad \swarrow \xrightarrow{H_2Cl_2} \qquad H_2Cl_2$$

2, 2-Dimethyl butane

Neopentone



Isopentane