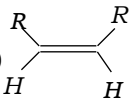
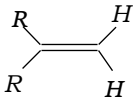
Hydrocarbon

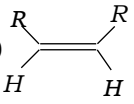
SET Self Evaluation Test - 24

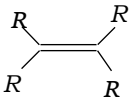
1. Which one of the following alkenes will react fastest with H_2 under catalytic hydro-genation condition

[IIT-JEE (Screening) 2000; CBSE PMT 2005]

(a) 

(b) 

(c) 

(d) 

2. On cracking petrol, we get **[CPMT 1980]**

(a) CH_4

(b) C_3H_6

(c) Both (a) and (b)

(d) $CH_3 + CH_4 + C_2H_6 +$ alcohols

3. Cetane is a compound which has very good ignition property. Chemically it is

(a) $CH_3(CH_2)_{14}CH_3$

(b) $(CH_3)_3C(CH_2)_{11}CH_3$

(c) $C_{17}H_{34}$

(d) None of these

4. Which one of these is not compatible with arenes **[CBSE PMT 1998]**

(a) Greater stability

(b) Delocalisation of $\pi-$ electrons

(c) Electrophilic additions

(d) Resonance

5. Which of the following is an electrophile **[BHU 1998]**

(a) H_2O (b) NH_3

(c) $AlCl_3$ (d) $C_2H_5NH_2$

6. The reaction,

$$\underset{\text{Ethylene}}{H_2C=CH_2} + \underset{\text{water}}{H_2O} \xrightarrow[300\,^\circ C/60\,atm..]{H_3PO_4} \underset{\text{Ethyl alcohol}}{C_2H_5OH}$$

is called : **[Pb. CET 2001]**

(a) Hydration (b) Sublimation

(c) Dehydration (d) Substitution

7. In reaction

$$C_6H_5CH_3 \xrightarrow[\text{Oxidation}]{} A \xrightarrow[NaOH]{} B \xrightarrow{\text{Sodalime}} C$$

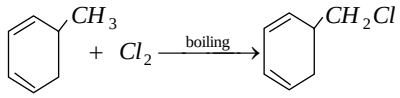
Then C is **[MP PET 2004]**

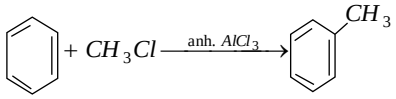
(a) C_6H_6 (b) C_6H_5OH

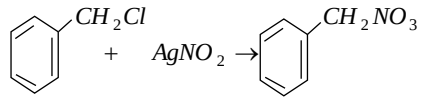
(c) $C_6H_5COON\overset{+}{a}$ (d) C_6H_5ONa

8. Which one of the following is a free-radical substitution reaction **[CBSE PMT 2003]**

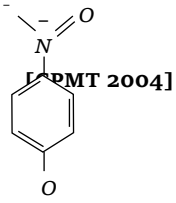
(a) $CH_3CHO + HCN \rightarrow CH_3CH(OH)CN$

(b) 

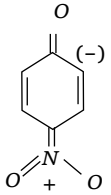
(c) 

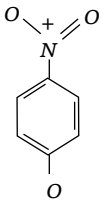
(d) 

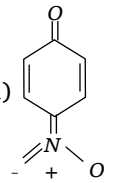
9. The most unlikely representation of resonance structures of *p*-nitrophenoxide ion is **[IIT-JEE 1999]**

(a) 

[CPMT 2004]

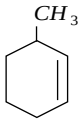
(b) 

(c) 

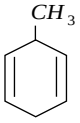
(d) 

10. Which one of the following on ozonolysis followed by oxidation will give adipic acid **[AMU 2002]**

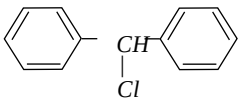
(a) 

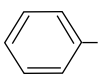
(b) 

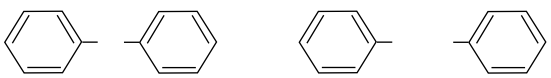
(c) 

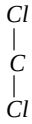
(d) 

11. Which of the following structures correspond to the product expected, when excess of C_6H_6 reacts with CH_2Cl_2 in presence of anhydrous $AlCl_3$ **[CBSE PMT 198**

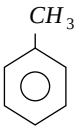
(a) 

(b) 



(c)  (d) CH_2

12. Which of the following will be easily nitrated **[DCE 2001]**

(a)  (b) 

(c) CH_3NO_2 (d) $C_6H_5NO_2$

13. Chlorination of benzene is not possible in the following reaction **[UPSEAT 2004]**

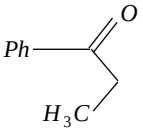
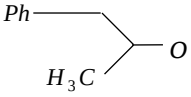
(a) $C_6H_6 + Cl_2 \xrightarrow{FeCl_3}$

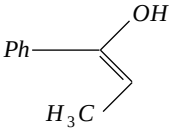
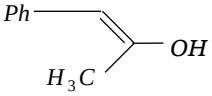
(b) $C_6H_6 + HOCl \xrightarrow{H^+}$

(c) $C_6H_6 + I - Cl \xrightarrow{ZnCl_2}$

(d) $C_6H_6 + Cl_2 \xrightarrow{AlCl_3}$

14. $Ph - C \equiv C - CH_3 \xrightarrow{Hg^{2+}/H^+} A$. A is **[IIT-JEE Screening 2002]**

(a)  (b) 

(c)  (d) 

15. In order to complete the reaction

$1 - \text{Pentyne} \xrightarrow{a} 4 - \text{Octyne} \xrightarrow{b} cis\ 4\text{Octene}$ a and b will be

(1) $NaNH_2; \overset{a}{C}H_3CH_2Br$: $H_2, (\text{one } \overset{b}{\text{mole}})$ Pd or Ni

(2) $NaNH_2; CH_3CH_2CH_2Br$: H_2 (two moles) Pd or Ni

(3) $NaNH_2; CH_3CH_2CH_2Br$: H_2, (one mole) Pd or Ni

(4) $NaNH_2; CH_3CH_2CH_2Br$: BH_3, H_2O_2, OH^-

[MP PET 1994]

(a) 1 (b) 2

(c) 3 (d) 4

16. The number of secondary hydrogens in 2, 2-dimethyl butane is **[UPSEAT 2004]**

(a) 8 (b) 6

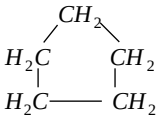
(c) 4 (d) 2

17. An alkane (molecular weight 72) forms only one monochlorinated product. Its formula is **[BHU 1981]**

(a) $(CH_3)_4C$

(b) $CH_3(CH_2)_3CH_3$

(c) $(CH_3)_2CHCH_2CH_3$

(d) 

18. The poisonous gas that comes out with petrol burning in a car is **[CPMT 1997]**

(a) CH_4 (b) C_2H_6

(c) CO_2 (d) CO

19. The reagent X in the reactions $(CH_3)_3CCH = CH_2 \xrightarrow{X} Y \xrightarrow[NaOH]{NaBH_4}$ $(CH_3)_3 - \underset{OH}{\underset{|}{C}} - CH - CH_3$ **[Roorkee 2000]**

(a) H_3O^+

(b) $Hg(CH_3COO)_2$

(c) OH^-

(d) $HCOOH$

20. $CH_2 = CH_2 \xrightarrow{Br_2/H_2O} A$,

In the above reaction the compound A is **[DPMT 2004]**

(a) Ethylene bromohydrin

(b) 1, 2-dibromo ethane

(c) Ethanol

(d) None of these

Answers and Solutions

(SET -24)

1. (a) According to saytzeff rule order of stability is

$$\begin{matrix} R_2C=CR_2 & > & R_2C=CHR & > & RHC=CHR \\ R_2C=CH_2 & > & RHC=CH_2 & > & H_2C=CH_2 \end{matrix}$$

2. (c) On cracking petrol gives smaller hydrocarbons like CH_4, C_3H_6.

3. (a) Cetane is chemically hexadecane i.e, $CH_3(CH_2)_{14}CH_3$.

4. (c) In arenes electrophillic substitution reaction takes place and it does not gives electrophillic addition reactions. We also know that benzene is a resonance hybrid of two structure's and greater stability of benzene is due to delocalization of π electron.

5. (c) $AlCl_3$ is an electron deficient compound. Hence, act as an electrophile.

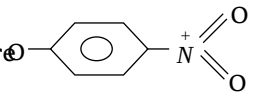
6. (a) Alkenes react with water in the presence of acid and form alcohols. This reaction is called as hydration.

$$\underset{\text{Ethylene}}{H_2C=CH_2} + H_2O \xrightarrow[300\,^\circ C/60\,atm]{H_3PO_4} \underset{\text{Ethyl alcohol}}{H_3C-CH_2-OH}$$

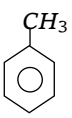
7. (a) $C_6H_5CH_3 \xrightarrow{[O]} \underset{[A]}{C_6H_5COOH} \xrightarrow{NaOH}$

$$\underset{[B]}{C_6H_5COONa} \xrightarrow{NaOH/CaO} \underset{[C]}{C_6H_6}$$

8. (b) Halogenation of alkyl group proceed via free radical mechanism.

9. (c) The structure  is most unlikely

as N containing 5 valence electrons should not carry positive charge.

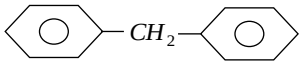
10. (b) 

$$\xrightarrow{O_3} OHC-(CH_2)_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CHO \xrightarrow{[O]}$$

$$HOOC-(CH_2)_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH$$

Substitute d adipic acid

11. (d)  $+CH_2Cl_2+$  $\xrightarrow{Anhydrous\ AlCl_3}$



Diphenylmethane

12. (a) The presence of an electron-releasing groups (+I group) e.g., $-CH_3$,$-OH$,$-NH_2$ etc makes the process of nitration easier. So $C_6H_3CH_3$ will be easily nitrated. ***

13. (b) Reaction is called Gattermann-Koch synthesis, which is carried by catalyst $AlCl_3$.

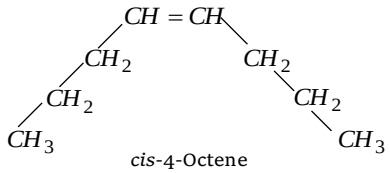
14. (a)

$$C_6H_5-C\equiv C-CH_3 \xrightarrow[H_2SO_4]{HgSO_4} C_6H_5-\overset{\displaystyle O}{\overset{\|}{C}}-CH_2-CH_3$$

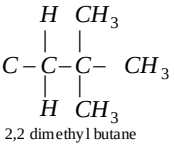
15. (c) $CH_3-CH_2-CH_2-C\equiv CH \xrightarrow{NaNH_2}$

$$CH_3-CH_2-CH_2-C\equiv C-Na \xrightarrow{CH_3CH_2CH_2Br}$$

$$\underset{\text{4–Octyne}}{CH_3-CH_2-CH_2-C\equiv C-CH_2-CH_2-CH_3} \xrightarrow[Pd]{H_2}$$



cis-4-Octene

16. (d) 

2,2 dimethyl butane

17. (a) The alkane forms only one mono substituted product, it must have only one type of hydrogen atoms. there fore the alkane is 2, 2-dimethyl propane.

18. (d) On petrol burning CO comes out which is so much poisonous gas.

19. (b) Oxy mereuration-demercuration : with mercuricacetate (in THF) followed by reduction with $NaBH_4/NaOH$ is an example of hydration of alkene according to markowni koff's rule.

$$(CH_3)_3C-CH=CH_2 \xrightarrow[THF]{(CH_3COO)_2Hg} (CH_3)_3C-\underset{\displaystyle OOCCH_3}{\underset{|}{CH}}-CH_2-HgOOCCH_3$$

$$\xrightarrow{NaBH_4 / NaOH} (CH_3)_3C-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$$

3, 3-Dimethyl-2-butanol

20. (a) $CH_2=CH_2 \xrightarrow{Br_2,H_2O} \underset{\displaystyle Br}{\underset{|}{CH_2}}-\underset{\displaystyle OH}{\underset{|}{CH_2}}$

Ethylenebromohydr in

Hence compound *A* is Ethylene bromohydrin.