HYDROCARBONS
I & II
PHENOLS
ALCOHOLS &
ETHERS

1. During electrophilic substitution of benzene, the intermediate species involved is

a) Carbanion
b) Carbocation
c) Free radical
d) none of these

Carbocation, since benzene is electron rich

ANSWER: b

2. In the reaction

$$C_6H_6 + Cl_2 \xrightarrow{FeCl_3} C_6H_5Cl + HCl$$

(chlorobenzene)

The attacking reagent is

a) Cl_2 **b)** Cl^+ **c)** Cl^- **d)** $FeCl_4^-$

Chorination of benzene takes place through the attack by Cl^+ (chloronium ion)

ANSWER: b

3. Methyl bromide when heated with zinc in a closed tube produces

a) methane b) ethane

c) ethyne d) methanol

This is a Wurtz type reaction. Instead of sodium, other metals such as Ag, Cu, Zn can also be used in finely divided state.

ANSWER: b

4. During the preparation of ethane by Kolbe's electrolytic method using inert electrodes the pH of the electrolyte

a) increases progressively as the reaction proceeds

b) decreases progressively as the reaction proceeds

c) remains constant throughout the reaction

d) may decrease if the concentration of the electrolyte is not very high

During the preparation of ethane by Kolbe's electrolytic method using inert electrodes the pH of the electrolyte

$$2CH_3COONa + 2H_2O \xrightarrow{\text{Electrolysis}} CH_3 - CH_3 + 2CO_2 + H_2 + 2NaOH$$

Since NaOH is formed, the pH increases As the proceeds.

ANSWER: a

5. Nitrobenzene can be prepared from benzene by using a mixture of conc. HNO_3 and conc. H_2SO_4 In the nitrating mixture, HNO_3 acts as a

a) base b) acid

c) reducing agent d) catalyst.

HNO_3 acts as base as it provides $-OH^-$

$$H_2SO_4 \longrightarrow H^+ + HSO_4^-$$

$$O_2N - OH + H^+ \longrightarrow NO_2^+ + H_2O$$

ANSWER: a

6. When a mixture of methane and oxygen is passed through heated molybdenum oxide, the main product formed is

a) methanoic acid b) ethanal

c) methanol d) methanal

$$CH_4 + O_2 \xrightarrow[550K]{MoO} HCHO + H_2O$$

ANSWER: d

7. which of the following can't be used in Friedal-Crafts reactions?

a) $FeCl_3$ b) BF_3

c) $AlCl_3$ d) NaCl

Friedal-Crafts alkylation reaction require Lewis acid catalysts and but NaCl is not a Lewis acid.

ANSWER: d

8. Which one of the following has the minimum boiling point?

a) n-Butane **b) Isobutane**

c) 1-Butene **d) 1- Butyne**

Boiling points follow the order alkyne > alkene > n-alkane > branched alkane.

ANSWER: b

9. On mixing certain alkane with chlorine and irradiating it with ultraviolet light, it forms only one monochloroalkane. The alkane is:

a) isopentane b) neopentane

c) propane d) pentane

Neopentane $(CH_3)_4C$ is a symmetrical alkane and gives only one monoalkane derivative.

ANSWER: b

10. Pure methane can be produced by

a) Wurtz reaction

b) Kolbe's electrolytic method

c) Soda-lime decarboxylation

d) reducetion with H_2

$$CH_3COONa + NaOH \xrightarrow[\Delta]{\text{sodalime}} CH_4 + Na_2CO_3$$

ANSWER: C

11. Which of the following species participate in sulphonation of benzene ring?

a) H_2SO_4 **b)** HSO_3^-

c) SO_3 **d)** SO_2^-

In sulphonation of benzene, the species which attack benzene ring is SO_3

ANSWER : c

12. A gas decolourises alkaline $KMnO_4$ solution but does not give precipitate with $AgNO_3$. It is

a) CH_4

b) C_2H_4

c) C_2H_2

d) C_2H_6

ANSWER: b

As C_2H_4 (alkene) is not acidic in nature, therefore, it does not give any precipitate with $AgNO_3$. However, it is oxidized with dilute alkaline $KMnO_4$ (Baeyer's reagent) to glycol

$$\begin{array}{l} CH_2 \\ \| \\ CH_2 \end{array} + H_2O + O \xrightarrow{\text{Alk.}KMnO_4} \begin{array}{l} CH_2OH \\ | \\ CH_2OH \end{array}$$

13. In its reaction with silver nitrate acetylene shows

a) Oxidising property
b) Reducing property
c) Basic proerty
d) Acidic property

The reaction of silver nitrate with acetylene shows its acidic nature

$$\begin{array}{l} CH \\ \vert\vert\vert \\ CH \end{array} + 2AgNO_3 + 2NH_4OH \longrightarrow \begin{array}{l} C.Ag \\ \vert\vert\vert \\ C.Ag \end{array} + 2NH_4NO_3 + 2H_2O$$

Silver acetylide

ANSWER: d

14. Benzene is obtained by fractional distillation of

a) Heavy oil
b) Anthracene oil
c) Middle oil
d) Light oil

Benzene is obtained by the Fractional distillation of light oil.

Answer: d

15. The function of $AlCl_3$ in Friedal Craft's reaction is

a) to absorb water

b) to absorb HCl

c) to produce electrophile

d) to produce nucleophile

$AlCl_3$ produces attacking electophile as follows $AlCl_3 + Cl\text{-}Cl \longrightarrow AlCl_4^- + Cl^+$

ANSWER: c

16. Benzene does not undergo addition reaction easily because

a) It has a cyclic structure

b) Double bonds in it are very strong

c) Resonance stabilised system is to be preserved

d) It has six hydrogen atoms

Benzene is resonance stabilised and as such resistant to addition reactions.

ANSWER: C

17. The presence of unsaturation in organic compounds can be tested with

a) Schiff's reagent

b) Tollen's reagent

c) Fehling's reagent

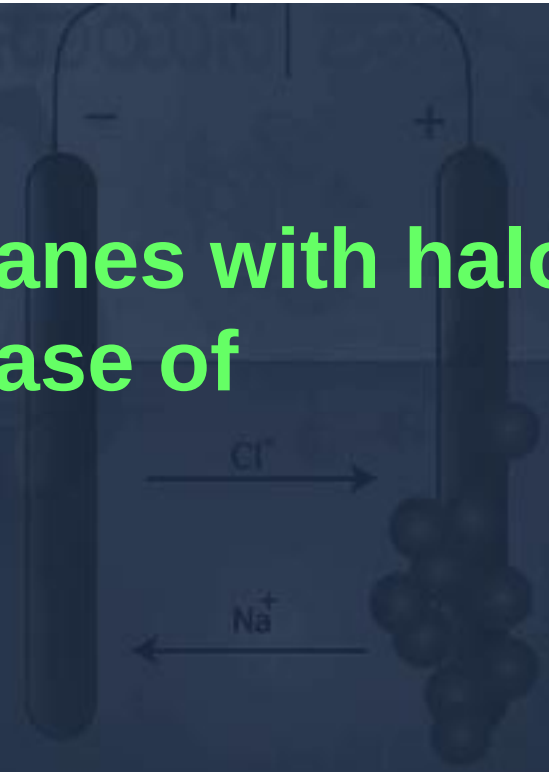
d) Baeyer's reagent.

Presence of unsaturation in organic compounds can be tested with Baeyer's reagent.

ANSWER: d

18. Reactions of alkanes with halogens is explosive in case of

a) F_2
b) Cl_2
c) Br_2
d) I_2



Reaction of alkanes with F_2 is explosive.

ANSWER: a

19. Most common reactions of benzene and its derivatives are

a) Elecrophilic addition reactions
b) Electrophilic stustitution reactions
c) Nucleophilic addition reactions
d) Nucleophilic substitution reactions.

Benzene give electrophilic substitution reactions.

ANSWER: b

20. The most reactive hydrocarbon is

a) Ethene
b) Ethyne
c) Ethane
d) Methane

Alkynes are less reactive than alkenes.

ANSWER: a

21. To a mixture of fuming HNO_3 and conc. H_2SO_4, benzene was added. This mixture was heated for long time at 100°C. The main product is

a) $C_6H_5NO_2$
b) $C_6H_5SO_3H$
c) 1,3,5-trinitrobenzene
d) m-Dinitrobenezene

ANSWER: c

22. Vulcanized rubber resists

a) Jerking motion

b) cold temperature

c) chemical corrosion

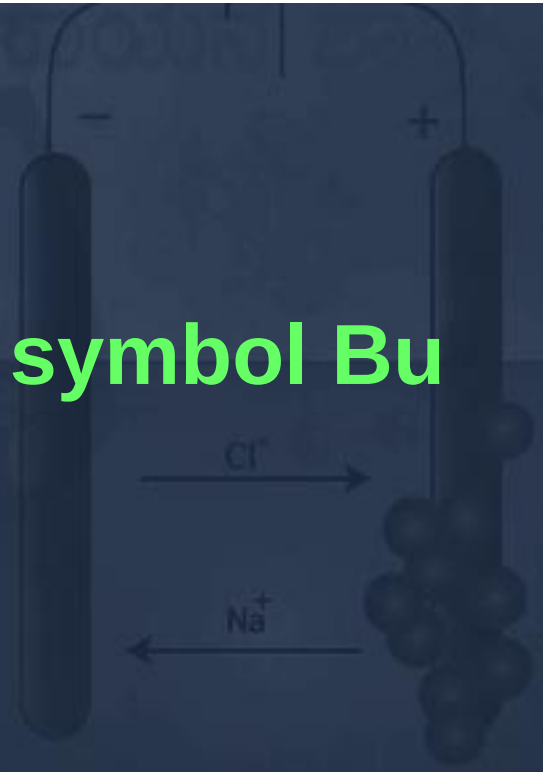
d) wear and tear due to friction.

Vulcanized rubber has lot of cross bonding between polymer chains by sulphur cross links. Hence it becomes strong and resistant to wear and tear.

ANSWER: d

23. In Buna-S, the symbol Bu stands for

a) 1-Butene
b) n-Butane
c) 2-Butene
d) Butadiene



In Buna-s, Bu stands for butadiene and S stands for styrene.

ANSWER: d

24. The catalyst used in the manufacture of polyethene by Zeigler method is

a) Titanium tetrachloride and triphenyl aluminium

b) Titanium tetrachloride and triethyl aluminium

c) Titanium dioxide

d) Titanium isoperoxide

ANSWER: b

25. Which is most strained cycloalkane?

a) Cyclohexane

b) Cyclopropane

c) Cyclobutane

d) Cycloctane

ANSWER: b

26. Most stable conformation of cyclohexane is

a) Planar chair conformation

b) Non planar chair conformation

c) Planar boar conformation

d) Non planar board conformation.

To minimize the angle strain cyclohexane assumes two non planar structures-Boat and Chair forms. In chair form there is least repulstion. Hence most preferred conformation of cyclohexane is chair conformation which is non planer.

ANSWER: b

27. According to Baeyer's strain theory which among the following is highly stable?

a) Cyclohexane
b) Cycloheptane
c) Cyclopentane
d) None of these

Angle stain in cyclopentane is minimum and hence is highly stable.

ANSWER: c

28. Which of the following reagents can react with phenol to produce phenolphthalein ?

a) phthalic anhydride / H_2SO_4
b) ethanoic anhydride / H_2SO_4
c) CO_2, CCl_4
d) Potassium phthalimide

Phthalian fusion test

ANSWER: a

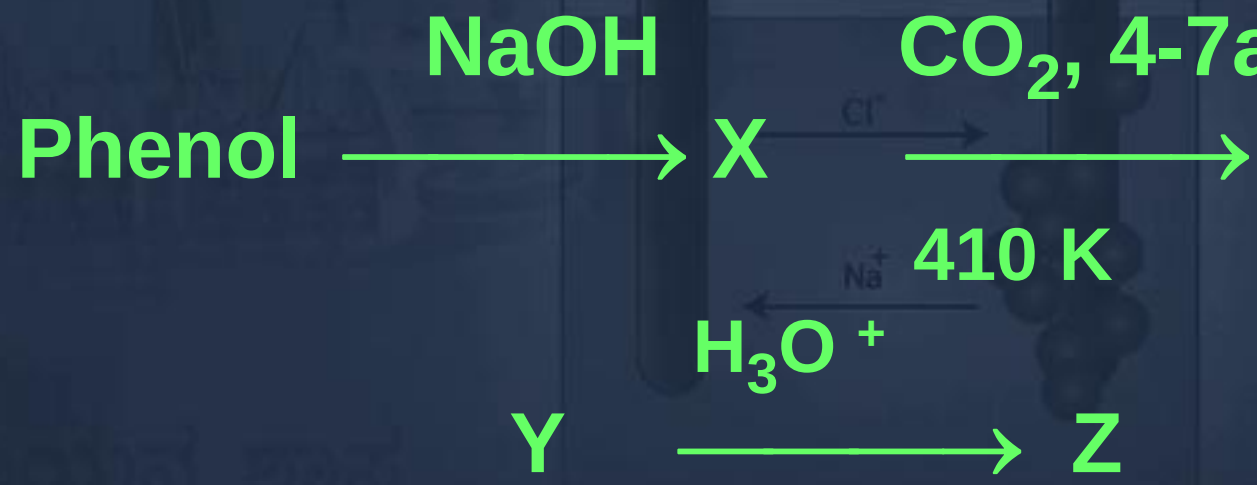
29. The most acidic compound among the following is

a) phenol
b) m-cresol
c) p-Nitrophenol
d) Picric acid

Picric acid

ANSWER: d

30. Identify the product Z in the following sequence of reaction



a) aspirin **b) salicylaldehyde**

c) benzoic acid **d) salicylic acid.**

Kolbe's Schmidt reaction.

ANSWER: d

31. Phenol, p-Methyphenol, m-Nitrophenol and p-Nitrophenol follows order of increasing acidic strength

a) Phenol, p-Methylphenol, p-Nitrophenol, m-Nitrophenol

b) p-Methylphenol, Phenol, m-Nitrophenol, p-Nitrophenol,

c) p-Methylphenol, m-Nitrophenol,Phenol, p-Nitrophenol,

d) m-Nitrophenol p-Nitrophenol, Phenol, p-Methylphenol,

ANSWER: b.

32. Inorder to get Bakelite from phenol which of the following reagent is required?

a) HCHO
b) $CHCl_3$ / NaOH
c) CCl_4 / NaOH
d) HCHO / H^+ or OH^-

HCHO / H^+ or OH^-

ANSWER: d

33. Phenol is more readily soluble in

a) dil. HCl
b) Both NaOH and HCl
c) NaOH sol
d) Sodium bicarbonate solution.

since it is very weak acid is soluble in NaOH solution.

ANSWER: c

34. Carbolic acid is

a) aqueous solution of phenol
b) phenyl benzene
c) phenyl acetate
d) Salol

aqueous solution of phenol

ANSWER: a

35. Organic acid without a carboxylic group is

a) ascorbic acid
b) vinegar
c) oxalic acid
d) picric acid

Picric acid is 2,4,6-Trinitrophenol.

ANSWER: d

36. Salicylaldehyde can be prepared from

a) Phenol and chloroform
b) Phenol, chloroform and sodium hydroxide
c) Phenol, carbon tetrachloride and NaOH
d) None

Phenol, chloroform and sodium hydroxide , Reimer – Tiemann's reaction.

ANSWER: b

37. Phenol is treated with bromine water and shaken well to get white precipitate. The white precipitate is

a) 1-Bromophenol
b) 2,4,6-Tribromophenol
c) 2,4-Dibromophenol
d) Mixture of o- and p-bromophenol

Bromination of phenol in aqueous medium gives 2,4,6-Tribromophenol.

ANSWER: b

38. Cumene is the compound used for commercial preparation of phenol. Chemically cumene is

a) Isopropyl benzene
b) ethyl benzene
c) n-propylbenzene
d) None of above

isopropyl benzene

ANSWER: a

39. Hybrid state of central oxygen atom in ether is

a) sp^2

b) sp^3

c) sp

d) sp^3d

ANSWER : b

40. Oxygen atom in ether is :

a) very active
b) replaceable
c) active
d) comparatively inert.

The divalent oxygen is linked strongly to C–atoms on both sides and there are no active sites like OH, C=O etc. in it.

ANSWER: d

41. **Which of the following compounds is used as an anesthesia?**

a) ethyl alcohol
b) acetic acid
c) diethyl ether
d) acetic anhydride

ANSWER: c

42. When diethyl ether is treated with excess of Cl_2 in the presence of sunlight, the product formed is :

a) $CH_3CHCl–O–CH_2CH_3$

b) $CH_3CHCl–O–CHClCH_3$

c) $CCl_3CCl_2–O–CCl_2CCl_3$

d) $CH_3CCl_2 –O– CHClCH_3$.

ANSWER: c

43. An ether is more volatile than an alcohol having the same molecular formula. This is due to

a) dipole character of ethers
b) alcohols having resonance structure
c) inter-molecular hydrogen bonding in ethers
d) inter- molecular hydrogen bonding in alcohols.

Alcohols have stronger inter molecular bonding (H-bonding) and ethers have weaker intermolecular bonding (vander Waals).

ANSWER: d

44. All alcohols are

a) completely soluble in water
b) ionized in water
c) not soluble in water
d) soluble organic solvents

All alcohols are not soluble in water. Alcohols with large size of R- are almost immiscible with water.

ANSWER: c

45. Power alcohol is a mixture of petrol and alcohol in the ratio of

a) 4 : 1 **b) 1 : 4**

c) 2 : 1 **d) 1 : 2**

4 : 1 (80% petrol and 20 % alcohol)

ANSWER: a

46. Widespread deaths due to liquor poisoning is because of

a) presence of bad compound in liquor
b) presence of methyl alcohol
c) presence of ethyl alcohol
d) presence of carbonic acid.

ANSWER: b

47. The dehydration of butane–1–ol gives

a) 1 – butene as the main product
b) 2 – butene as the main product
c) equal amounts of 1 – butene and 2 – butane
d) 2 – methyl propene.

The dehydration of 1–butanol gives 2–butene as the main product because 2° carbocation is stabler than 1°

ANSWER: b

48. Rectified spirit can be converted into absolute alcohol by

a) Fractional distillation
b) steam distillation
c) cannot be converted
d) by putting rectified spirit in contact with quick lime followed by distillation.

Quick lime has stronger affinity for water.

ANSWER: d

49. Which one is primary alcohol ?

a) Buten –2–ol
b) propan–2–ol
c) Butan–1– ol
d) 2,3–Dimethylhexane–4–ol.

$H_3C–CH_2–CH_2–CH_2–OH$
Butan–1–ol.

ANSWER: c

50. In reaction of alcohols with alkali metal, which of the following alcohol will react fastest ?

a) secondary
b) tertiary
c) primary
d) all equal

Primary alcohol because the reaction Involves cleavage of strongest acidic group (O – H) of various types of alcohols. ANSWER: c

51. Primary and secondary alcohols on action of red hot copper give

a) Aldehydes and ketones respectively

b) Ketones and aldehydes respectively

c) Only aldehydes

d) Only ketones.

51. Primary and secondary alcohols on action of red hot copper give

RCH_2OH with Cu at 573K gives RCHO and R_2CHOH gives R_2CO

ANSWER: a