Organic Chemistry - Some Basic Principles and Techniques

EXERCISE-I (MHT CET LEVEL)

GOC

Q.1 (2)

$$H-\overset{\overset{\displaystyle O}{\|}}{C}-\overset{\ominus}{O} \longleftrightarrow H-\overset{\overset{\displaystyle O^{\ominus}}{|}}{C}-O$$

Q.2 (1)

Q.3 (2)

Q.4 **(1)**

Q.5 (4)

$-NO_2$ group, being strong electron withdrawing, disperses the -ve charge hence stabi lizes the concerned carbanion

Q.6 (3)

More the electron density on N, higher will be the basicity, Density on N is influenced by the (i) nature of the group (+I or – I) present in alkyl group or benzene nucleus and (ii) resonance (delocalization of the electron present on N). In $(C_6H_5)_3$ N: electron pair is delocalized to the maximum exten due to three benzene rings and hence least available for protonation, thus it will be least basic.

Q.7 (1)

The greater the (negative value) of heat of neutralisation, the more is the strength of the acid, Hence,
$HCOOH > CH_3COOH > H_2S > HCN$

Q.8 **(2)**

In compound (2), the lone pair of nitrogen is not involved in resonance therefore it its the strongest base.

Q.9 (2)

Q.10 (2)

Q.11 (3)

Q.12 (1)

Q.13 (3)

Q.14 **(3)**

Q.15 **(3)**

Q.16 **(3)**

Q.17 **(3)**

Q.18 **(3)**

Q.19 (4)

Q.20 (1)

Q.21 (4)

Q.22 (1)

Q.23 (4)

Q.24 (1)

Q.25 (4)

Q.26 (4)

IUPAC

Q.27 (1)

Gammexane is $C_6H_6Cl_6$ or (6,6,6). it is a saturated compound so no double bond is there in it.

Q.28 (3)

C_1 and C_5 are $1°$, C_3 is $2°$, C_4 is $3°$, and C_2 is $4°$

Q.29 (2)

It contains isopropyl group.

Q.30 (4)

$$H_2C = \overset{\overset{\displaystyle CH_3}{|}}{C} - CH_2 - CH_2 - CH_3$$
$$\quad\ 1 \quad 2 \quad\ \ 3 \quad\ \ 4 \quad\ 5$$
$$2 – Methylpent – 1 – ene$$

Q.31 (1)

IUPAC name –3, 3-Dimethyl-1-cyclohexano

Q.32 **(1)**

trans-2-Chloro-3-iodo-2-pentene

Q.33 (4)

Q.34 (3)

Q.35 **(1)**

Q.36 (4)

Q.37 **(2)**

Q.38 (4)

Q.39 (3)

Isomerism

Q.40 (2)
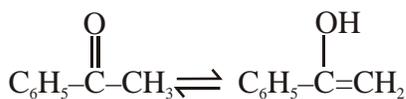
Q.41 (3)

Q.42 (3)

Q.43 **(1)**

Q.44 **(2)**

Q.45 **(1)**

Q.46 (2)

Q.47 (1)

The given two structures are optical isomers but as these are mirror image of each other, hence they represent enantiomers of each other.

Q.48 (1)

A chiral object or structure has four different groups attached to the carbon.

Q.49 (1)

None of the carbon atoms in $DCH_2CH_2CH_2Cl$ is chiral i.e., each carbon atom is achiral (symmetric).

Q.50 (4)

The structure $CH_3 \overset{*}{C}HBr \overset{*}{C}HBrCOOH$ has two different chiral carbon atoms, hend actirit number of enantiomers (optically forins) is $2^n = 2^2 = 4$

Q.51 (3)

Meso compounds are characterized by an internal plane of symmetry that renders them achiral.

Q.52 (4)

Q.53 (2)

Q.54 (4)

The given structure has three double bonds whose each carbon atom is differently substituted hence number of geometrical isomers will be $2^n = 2^3 = 8$, where n is the number of double bonds whose each carbon atom is differently substituted.

Q.55 (2)

Q.56 (1)

Q.57 (4)

EXERCISE-II (NEET LEVEL)

Q.1 (2)

Q.2 (3)

sp and sp^2

$$N \equiv \overset{sp}{\underset{1}{C}} - \overset{sp^2}{\underset{2}{CH}} = \underset{3}{CH_2} \ .$$

Q.3 (2)

Q.4 (3)

Q.5 (3)

Q.6 (1)

Q.7 (3)

Q.8 (2)

$$\underset{\text{Benzyl carbanion}}{C_6H_5 - CH_2} > \underset{\text{Ethyl carbanion}}{CH_3CH_2} \quad \underset{\text{Isopropyl carbanion}}{(CH_3)_2CH} > \underset{\substack{\text{Tert-butyl}\\ \text{Carbanion}}}{(CH_3)_3C}$$
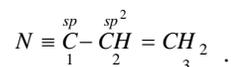
Q.9 (3)

Q.10 (3)

Q.11 (4)

Resonance structure of molecule does not have identical bonding.

Q.12 (4)

Q.13 (1)

Triphenyl methyl cation has three benzene resonating ring so it is most stable compound.

Q.14 (3)

The octet of all atoms are complete in structures (a) and (b). In structure (d) electron deficiency of positively charged carbon is duly compensated by lone pair electrons of adjacent oxygen atom while such neighbour group support is not available in structure (c).

Q.15 (1)

It is hyperconjugation process.

Q.16 (2)

$$CH_3 - \overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C^+}} \qquad \text{Due to } (+I) \text{ effect of three methyl group}$$
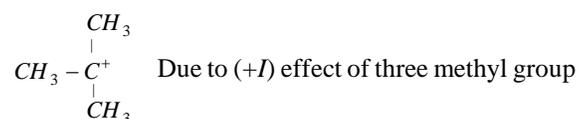
3° carbocation is more stable.

Q.17 (4)

Q.18 **(1)**
Stability of carbocation $\propto$ no. of α-H present on carbocation.

Q.19 (2)
$C-C$ bond length in benzene is 1.39Å which is in between $C-C$ (1.54 Å) and $C=C$ (1.34 Å) because of resonance.

Q.20 (2)
Acidic strength :
$R-COOH > H_2O > R-OH > CH \equiv CH$

Q.21 (1)
Due to stronger-I-effect of F than that of Cl, CHF_3 should be more acidic than $CHCl_3$. But actually reverse is true. This is due to : CCl_3^- left after the removal of a proton from $CHCl_3$ is stabilised due to presence of d-orbitals in Cl than: CF_3^- left after the removal of a from CHF_3 which is not stabilised proton due to the absence of d-orbitals on F.

Q.22 (1)
Electron withdrawing group (-NO$_2$) increases the acidity while electron releasing group (-CH$_3$, -H) decreases acidity. also effect will ne more if functial group is present at para position than ortho and meta position.

Q.23 **(4)**

Q.24 (4)
When methane gas is treated with chlorine in the presence of sunlight, one hydrogen of methane replaced by the chlorine atom and forms methyl chloride. The mechanism involved in this reaction is free radical mechanism. So it is an example of free radical substitution reaction.

Q.25 (3)
Characterstic reaction of aromatic hydrocarbon is ESR.

Q.26 (2)
Due to mesomeric effect (+) of $-OH$ group the electron density on benzene ring increase. So the electrophile easily attacked on these electron rich center.

Q.27 (4)
Q.28 (1)
Q.29 (3)
Q.30 (2)
Q.31 (3)
Q.32 (3)
Q.33 (1)
Q.34 (2)
Q.35 (1)
Q.36 (1)

Q.37 (2)
Q.38 (2)
Q.39 (4)
Q.40 (1)
Q.41 (2)
Q.42 (2)
Q.43 (1)
Q.44 (2)
Q.45 (4)
Q.46 (1)
Q.47 (3)
Q.48 (3)

$$CH_3-CH_2-\underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}}-COOH$$ is highly ionised in water as formed conjugate anion is stabilised due to e$^-$ attracting group Cl.

Q.49 (3)

Isomerism

Q.50 (4)
Both have same molecular formula but different functional group.

Q.51 (2)
Q.52 (1)
Q.53 (2)
Q.54 (2)
In II option tautomerismis not possible.

Q.55 (1)
Non superimpossible mirror image –Enantiomers.

Q.56 (2)
A rapid umbrella type inversion rapidly converts the structure III to its enantiomer, hence the two enantionmers are not separable.

Q.57 (2)
$$H-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-COOH$$ shows optical isomerism due to presence of asymmetric carbon atom.

Q.58 (1)
Meso isomer have two achiral carbon with opposite spin so it becomes optically inactive
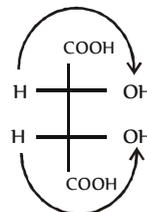
Meso tartaric acid

Q.59 (1,3)
A compound is said to exhibit optical isomerism if it atleast contains one chiral carbon atom, which is an

atom bonded to 4 different atoms or groups.

$$(CH_3)_2CH \overset{\overset{\displaystyle CH_3}{|}}{\underset{\overset{\displaystyle |}{H}}{C^*}} - CH_2CH_3$$
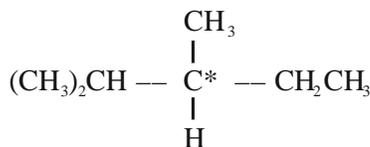
Q.60 (4)

Rotation of B through 180° within the plane of the paper gives D which is an enantiomer of A, hence A and B are enantiomers
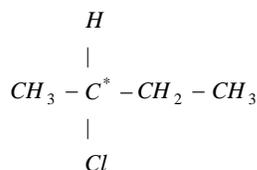

(B)

$\xrightarrow{\text{Rotate through } 180° \\ \text{with the plane of the paper}}$

(D) | (A)
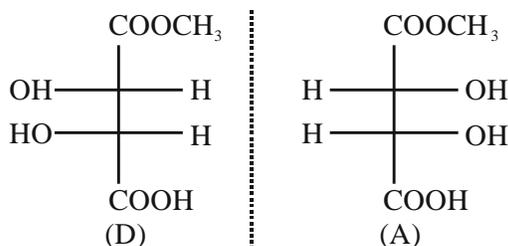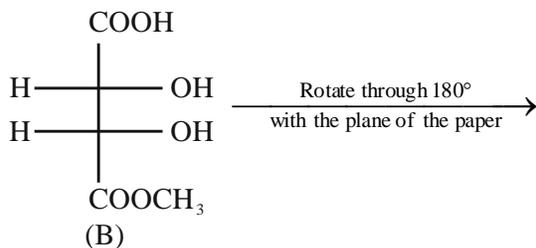
Q.61 (2)

THe compound has two similar assymmetric C-atoms. It has plane of symmetry and exists in meso form.
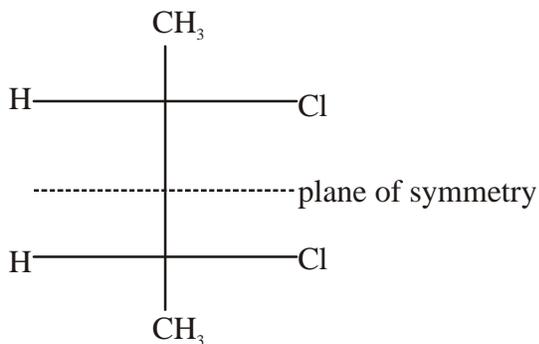
Meso -2, 3 dichlorobutane

Q.62 (2)

Q.63 (3)

Q.64 (1)

$$CH_3 - \overset{\overset{\displaystyle H}{|}}{\underset{\overset{\displaystyle |}{Cl}}{C^*}} - CH_2 - CH_3$$

Q.65 (1)

Geometrical isomerism is not possible in propene.

Q.66 (1)

Q.67 (2)

Optical isomerism because chiral centre is present

$$(CH_3)_2 - C = CH - \overset{\overset{\displaystyle H}{|}}{\underset{\overset{\displaystyle |}{CH_3}}{C^*}} - COOH \ .$$
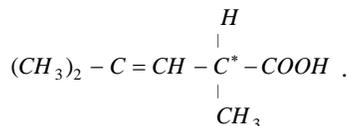
Q.68 (1)

Q.69 (2)

Q.70 (2)

If bulky groups are present at anti position then it will be more stable.

Q.71 (3)

Note that in structures 1 and 2, every two adjacent hydrogen atoms are at maximum possible distance from each other (staggered conformation).

Q.72 (1)

Q.73 (4)

Q.74 (2)

Same molecular formula but different position.

Q.75 (3)

Glucose has 4 chiral carbon.

No of stereoisomers $= 2^n = 2^4 = 16$

Q.76 (4)

Total number of stereoisomers $= 2^n$.

$n = 3 \therefore 2^3 = 8$

Q.77 (1)

Both are not conformers. Both are position isomers.

Q.78 (4)

EXERCISE-III (JEE MAIN LEVEL)

Q.1 (2)

Partial displacement of σ-electrons.

Q.2 (2)

effect is distance dependent.

Q.3 (4)

 show –I effect, $CH_3 \rightarrow C \leftarrow CH_2 \leftarrow CH_3$

Q.4 (2)

Due to presence of conjugated system.

Q.5 (2)
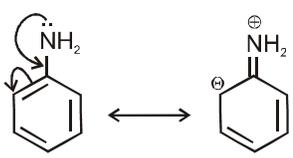
Q.6 (4)

(1), (2) and (3) all are conjugated.

Q.7 (3)

Nitrogen does not have vacant d-orbital, so cannot form five bonds.

Q.8 (2)
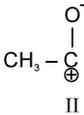
$$CH_3 - \overset{\overset{O^-}{|}}{\underset{\|}{\overset{\oplus}{C}}} - OCH_3$$ least stable resonating structure due to incomplete octet.

Q.9 (3)

Equivalent resonating structures contribute equally to the resonance hybrid.

Q.10 (2)

(I) $CH_3-CH=\overset{\curvearrowleft}{O}$ (II) $CH_2=CH-OH$

(III) $CH_3-\underset{\oplus}{CH}-\underset{\ominus}{O}$

B → (I) & (III) are canonical structures.

Q.11 (4)

(I) $CH_2=CH-CH=CH_2$

I, II, III are canonical structures to each other.

(II) $\overset{\ominus}{C}H_2-CH=CH-\overset{\oplus}{C}H_2$
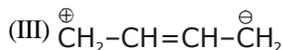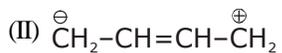
(III) $\overset{\oplus}{C}H_2-CH=CH-\overset{\ominus}{C}H_2$

All

Q.12 (1)

(I) $CH_2=CH-CH=CH-CH_3$

$\longleftrightarrow \overset{\ominus}{C}H_2-CH=CH-\overset{\oplus}{C}H-CH_3$

(II) $CH_3-CH=C=CH-CH_3$
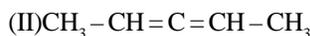
Here in str. (I) Resonance occurs But not in IInd.

Q.13 (3)

(I) $CH_3-O-CH=CH-CH=CH_2$

Neutral

(II) $CH_3-O-\overset{\oplus}{C}H-CH=CH-\overset{\ominus}{C}H_2$

2-covalent Bond

(III) $CH_3-\overset{\oplus}{O}=CH-CH=CH-\overset{\ominus}{C}H_2$

3-covalent Bond

(3) I > III > II

Q.14 (3)
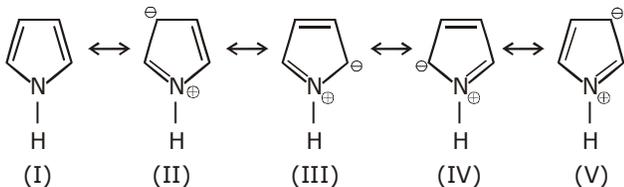
(I)   (II)   (III)   (IV)   (V)

(I) > III = IV > II = V

Opposite
opposite charge

charge near

have more distance

Q.15 (4)
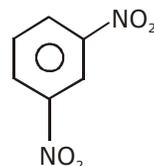
NO_2 (–I effect) occur at two places

So π e$^-$ density is minimum.

Q.16 (4)

Q.17 (1)

Q.18 (2)

 $-CH_3$ 3º Carbocation is more stable.

Q.19 (3)

 hyperconjugation and delocalisation with +I effect.
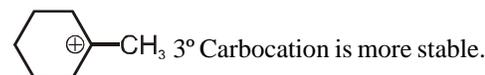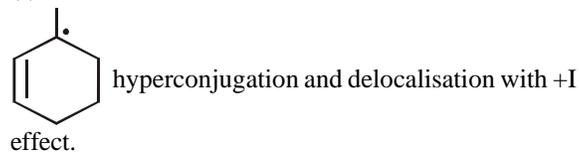
Q.20 (4)

Conjugate base of (4) has negative charge on oxygen.

Q.21 (1)

On the basis of I effect.

Q.22 (1)

Due to electronegativity

Q.23 (1)

Basic character of Bases :-

$NH_3 < CH_3NH_2 < (CH_3)_2NH$

due to +I effect of CH_3 so more electron availability on $(CH_3)_2$ NH.

Q.24 (1)

Nucleophilicity $\propto \dfrac{1}{electronegativity}$ (in a period).

Q.25 (1)

Nucleophilicity $\propto$ size (in a group).

Q.26 (4)

As increases delocalisation of negative charge nucleophilicity decreases.

Q.27 (3)

Carbocation Stability
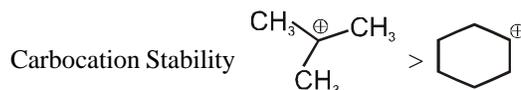
leaving group ability is $Br^{\ominus} > Cl^{\ominus}$

over all reaction order $r_1 > r_3 > r_2$

Q.28 (3)

On the basis of carbocation stability.

Q.29 (1)

 This is aromatic compound.

Q.30 (2)

$HC{\equiv}C{-}C{\equiv}CH$ all carbon atoms are sp hybridized.

IUPAC

Q.31 (1)

Acetonitrile

Q.32 (1)

1 and 4

Q.33 (3)

Q.34 (2)
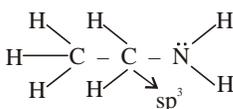
Q.35 (3)

3-Methyl-1-butene
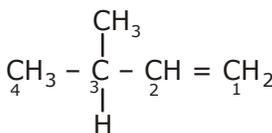
Q.36 (3)

Q.37 (2)
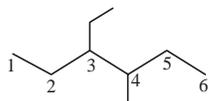
3-ethyl-4-methylhexane

Q.38 (1)
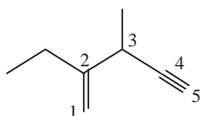
2-ethyl-3-methyl-1-pentene-4-yne

Q.39 (3)

Q.40 (4)

Q.41 (2)

N-Ethyl N-methyl propane 1-amine

Q.42 (3)

2-methyl-2,4-pentane diol

Q.43 (3)

3-phenyl prop-2-enoic acid

Q.44 (3)

Ethyl-2-methyl propanoate

Q.45 (3)

2-phenyl ethanamine

Q.46 (1)

3-Methyl pentamoylchloride
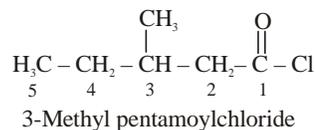
Q.47 (3)

Q.48 (3)

1-ethynylcyclohexanol

Q.49 (3)

Q.50 (1)

Isomerism

Q.51 (3)

Q.52 (2)

Q.53 (2)

Q.54 (1)

$CH_3{-}CH_2{-}CH{=}C{=}CH_2$

$CH_3{-}CH_2{-}CH_2{-}C{\equiv}CH$
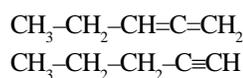
Q.55 (4)

Q.56 (3)

Q.57 (4)

Q.58 (3)

Q.59 (1)

Q.60 (1)

Q.61 (1)

$CH_3{-}CH_2{-}\overset{*}{C}H{-}CH_3{-}CH_2{-}OH$

Q.62 (4)

Q.63 (1)

$C_6H_5{-}CH{-}HC{=}CH{-}CH_3$

Q.64 (3)

Q.65 (3)

Restricted rotation about the double bond

Q.66 (4)

Q.67 (3)

Q.68 (3)

Q.69 (2)

1-Propanol (Molecuylar formula is not same)

Q.70 (1)

They will have identical physical properties.

EXERCISE-IV

Q.1 [2]

2nd part - electron withdrawing group increases acidic strength

Q.2 (7)

MHT CET COMPENDIUM

a   b

$H_3C - \overset{\oplus}{\underset{C}{\bullet}} - CH_2CH_3$
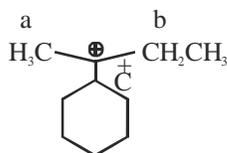
No, of hyperoconjugating structures = No. of $\alpha_H + 1$

$\Rightarrow$ Structures = 6 +1 = 7

a = 3 Hyperconjugative H's

b = 2 Hyperconjugative H's

c = 1 Hyperconjugative H's

Q.3   (6)

(6 – α – H)
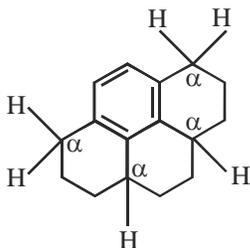
Q.4   [10]

 π electrons = 10.

π bonds = 5

hence electrons are double.

Q.5   [3]

$$\overset{1}{CH_2} = \overset{2}{CH} - \overset{3}{C} \equiv \overset{4}{C} - \overset{5}{CH_2} - \overset{6}{CH_3}$$
3-hexyne -1-ene

Three π bonds.

Q.6   [6]

Q.7   [2]

Q.8   [1]

Q.9   (6)
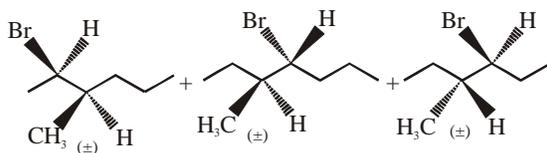
Q.10   (3)
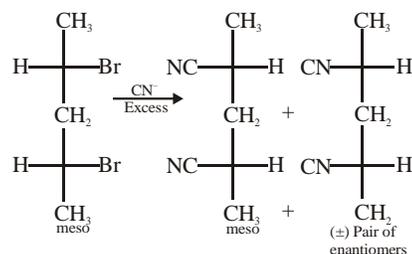
Q.11 (4)

Q.12 (4)

Q.13 (4)

Q.14 (4)

Q.15 (3)

Q.16 (1)

PREVIOUS YEAR'S

MHT CET

Q.1   (1)

Q.2   (3)

Q.3   (2)

Q.4   (4)

Q.5   (2)

Q.6   (2)

Q.7   (3)

Q.8   (1)

Q.9   (1)

Q.10   (1)

Q.11   (2)

Q.12   (3)

Q.13   (4)

Q.14   (4)

Q.15   (3)

Q.16   (1)

Q.17   (1)

Q.18   (3)

Rate of nitration is faster when subsitiuent acitvatates the ring (+/-effect of + R - effect, ortho/ para directing) and rate is slower whne substituent deactivates the ring (+/- effect or – R- effect, meta directing group).

Q.19   (1)

An electron withdrawing group (EWG) is a group that reduces electron density in a molecule through the carbon atom is bonded to. Here — COOH is one such example of electron withdrawing group.

Q.20   (2)

Q.21   (4)

Q.22   (4)

Q.23   (1)

Q.24   (1)

Q.25   (3)

Q.26 (3)
Q.27 (2)
Q.28 (2)
Q.29 (3)
Q.30 (3)

Q.31 (4)

Q.32 (2)

Q.33 (1)

Q.34 (1)

Q.35 (4)
Q.36 (4)
Q.37 (2)

Q.38 (3)
Q.39 (2)
Q.40 (3)
Q.41 (3)
Q.42 (2)
Q.43 (3)
Q.44 (4)
Q.45 (4)
Q.46 (2)
Q.47 (3)

The correct IUPAC name of the given compound is 3-methylcyclopentanol
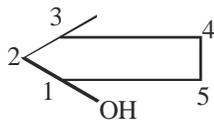
Q.48 (1)
Q.49 (2)
Q.50 (3)
Q.51 (3)
Q.52 (3)
Q.53 (3)
Q.54 (3)
Q.55 (1)
Q.56 (2)

Q.57 (1)

Q.58 (3)
Q.59 (4)

Q.60 (3)

Q.61 (2)
Q.62 (3)
Q.63 (1)
Q.64 (4)

Q.65 (2)
Q.66 (3)
Q.67 (2)
Q.68 (3)

NEET/AIPMT

Q.1 (1,2)

Q.2 **(2)**
Q.3 **(3)**
Q.4 **(4)**
Q.5 **(2)**
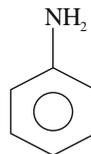
Kjeldahi's method is not applicable to the compounds containing nitrogen having nitro and azo group and nitrogen present in the ring (pyridine), as nitrogen of these compounds does not change to ammonimum sulphate under these conditions.

Q.6 (4)

Q.7 (4)
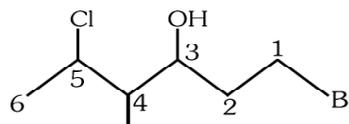
1– Brome – 5 – chloro – 4 – methylhexan – 3– ol

Q.8 (3)

Q.9 (3)

JEE MAIN

Q.1 **(3)**
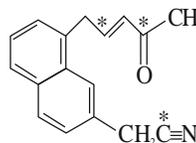
Q.2 **(Bonus)**
Correct Answer $B > A > C$

Q.3 (D)

$$C_6H_5-\overset{O}{\overset{\|}{C}}-\overset{..}{\underset{..}{O}}-\overset{..}{\underset{..}{O}}-\overset{O}{\overset{\|}{C}}-C_6H_5 \xrightarrow{h\nu} C_6H_5-\overset{O}{\overset{\|}{C}}-\overset{..}{\underset{..}{O}}\bullet \rightarrow 2C_6H_5+2CO_2$$

Benzoyl peroxide $(C_7H_5O_2)_2$ [x]
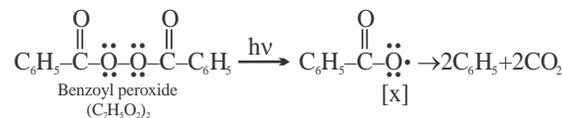
Q.4 (4)
Negative charge nucleophiles are more nucleophilic than neutral.

Q.5 **(B)**
(Only A and B)

MHT CET COMPENDIUM

Aromatic compound must contain $(4n + 2) \pi e^-$ and planarity in structure

6 π e$^{\ominus}$
(Aromatic)

6 π e$^{\ominus}$
(Aromatic)

sp^3

(Not-Aromatic)

8 π e$^{\ominus}$
(Anti-Aromatic)

Q.6 **(A)**

Cyclic

conjugated

planar

2 π e$^-$

Aromatic (more stable)

Q.7 **(D)**

H$_3$CÖ

Extended conjugation most stable ⊕

Q.8 (3)

is non polar due to repulsion between hydrogen atom.

Q.9 **(4)**

Aromatic
6π e$^-$, planar

Tab-shop.
Non-planar
Aromatic

H

Not-Aromatic
steric hindrance due to internal H
(Non-planar)

Non-planar
Hence-non-aromatic

Q.10 (1 and 2)

Tub shape

Q.11 (3)

Stablized ka ↑   Stablized Pka ↓
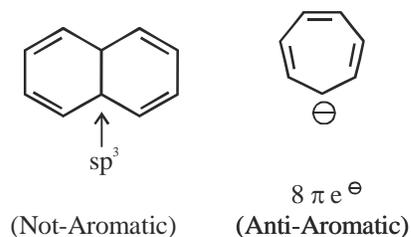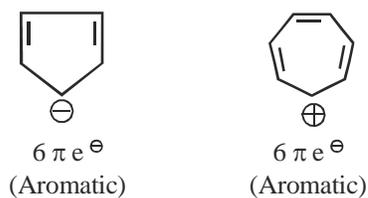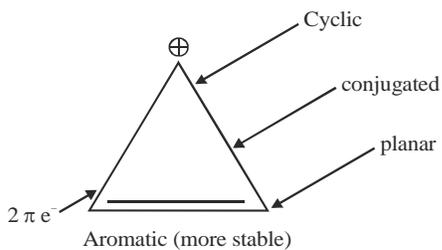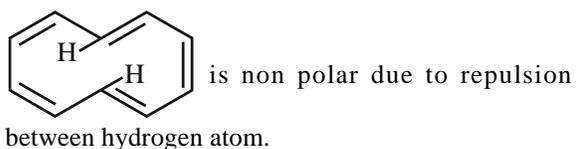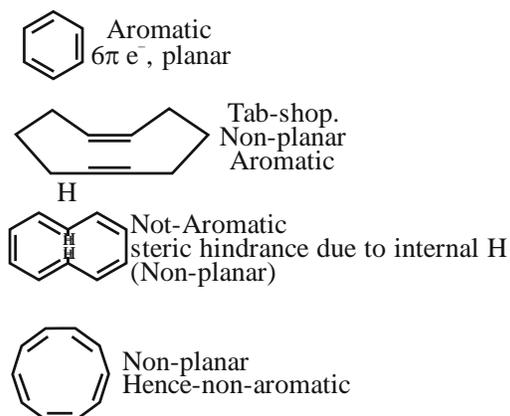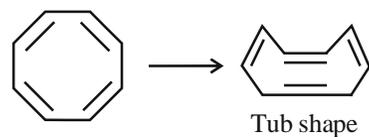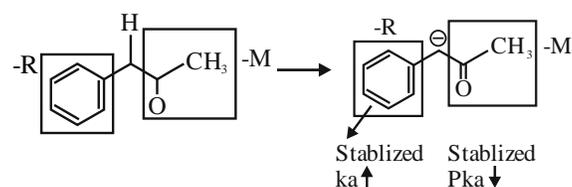
So given compound have maximum acedic hydrogen so lowest Pk$_a$.

Q.12 (4)
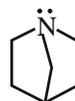
This is bridged alkyl amine. It is also 3°, hence lone pair is more available.
Amine inversion is also not possible.

Q.13 (3)

O$_2$N

4-methyl-6-nitro-3-oxohept-4-enal

Q.14 [1]
C$_4$H$_5$N
$CH_3-CH=CH-C=N$
DOU = 3

Q.15 (2)

$-So_3H > -\overset{O}{\underset{\|}{C}}-Cl > \overset{O}{\underset{\|}{C}}-NH_2 > -C\equiv N$

Q.16 (3)

Non- planer
(1) Heterocyclic compound

Bicyclo compound
(2)

Spiro
(3) compound

6πe$^{\ominus}$
Aromatic
(4) compound
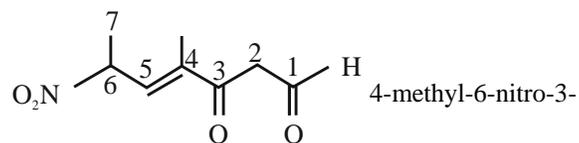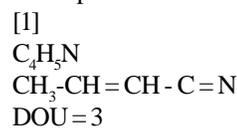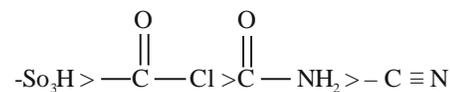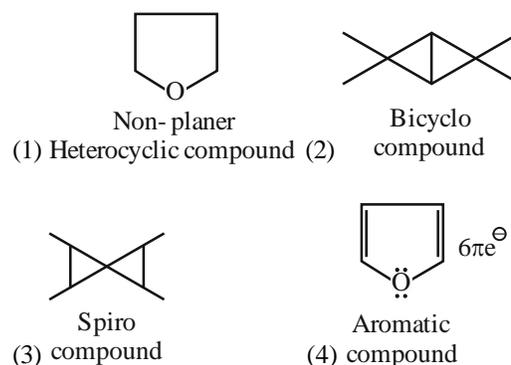
Q.17 (3)

Given below are two statements
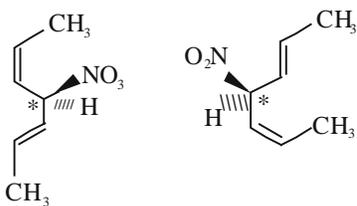
Statement -1, is correct because '*' marked carbon is attached to 4 different group, $-NO_2$, $-H$, Cis–alkene, trans alkene. Hence molecule is chiral and opticaly active.

Statement - 2, is incorrect compound II is not mirror image of compound A.

Q.18 [42]

Optical activity enantiomeric mixture $= +12.6°$

Specific rotation of $(+)$ isomer $= +30°C$

$$\% \text{ optical purity} = \frac{\text{rotation of mixture}}{\text{rotation of pure enantiomer}} \times 100$$

$$= \frac{+12.6°}{+30°} \times 100 \qquad = 42$$

Q.19 (3)

Q.20 (3)

(Aromatic)
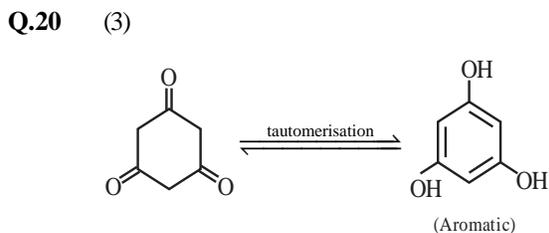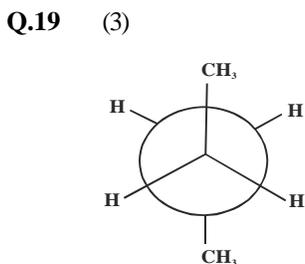
Q.21 (3)

Only 3 compounds have a symmetric carbon
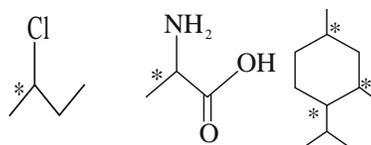
So answer will be 3.

Q.22 (2)

$C_4H_{10}O$

Degree of unsaturation

$$= (C+1) - \frac{H + X \times N}{2}$$

$$= 5 - \frac{10}{2} = 0$$

Alcohols

Total (2) stereoisomers

(1) Chiral alcohol
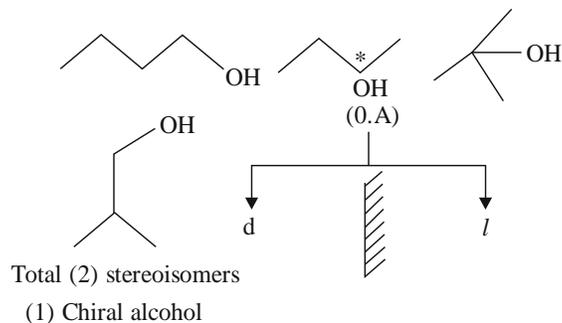
Q.23 (6)

Hydrocarbons

EXERCISE-I (MHT CET LEVEL)

Q.1 (1)

$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - Cl + 2Na + Cl - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3$$

t-Butyl chloride

Wurtz Rxn ↓

$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2Cl \xleftarrow[\text{Chlorination}]{\text{Mono}} CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3$$
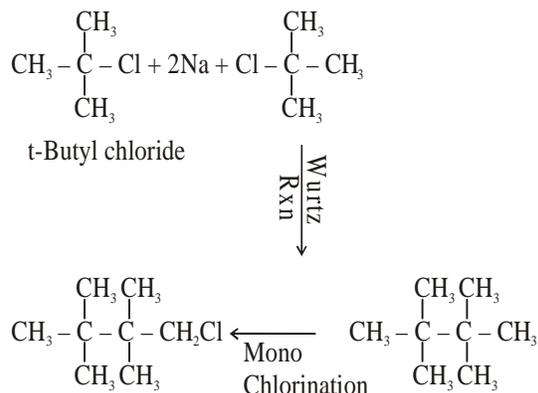
Q.2 (2)

Q.3 (4)

Q.4 (3)

Q.5 (4)

Q.6 (1)

Q.7 (2)

Q.8 (1)

Q.9 (3)

Q.10 (2)

The addition of HCl to propene proceeds by ionic mechanism and not by free radical mechanism. Hence it forms intermediate carbonium ion.

Q.11 (3)
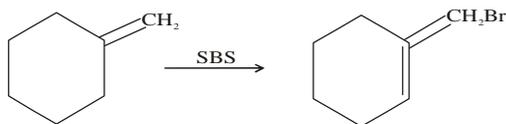
Q.12 (1)
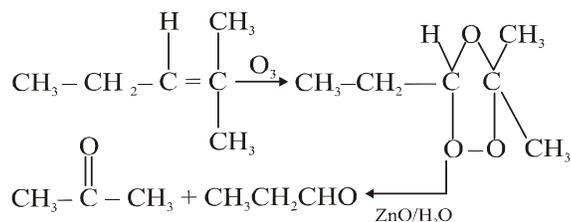
Q.13 (1)

Only Lindlar's catalyst converts alkene (*cis addition*) and alkenes with Baeyer' reagent give cis glycols.

Q.14 (2)

Q.15 (4)

Q.16 (4)

Q.17 (3)

$$CH \equiv CH + HO^- - Cl^+ \longrightarrow \underset{\underset{CH = CH}{|}}{\overset{\overset{OH \quad Cl}{|}}{\quad}}$$

$$\xrightarrow{HO^- \pm Cl} \underset{\underset{OH \quad Cl}{|}}{\overset{\overset{OH \quad Cl}{|}}{CH-CH}} \xrightarrow{-H_2O}$$

Unstable

$$\underset{Cl}{\overset{Cl}{\diagdown}} CH - CHO$$

2, 2-Dichloro -acetaldehyde
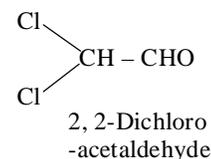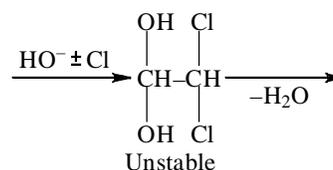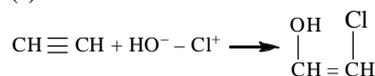
Q.18 (3)

Catalytic hydrogenation of alkynes gives cis-alkene which in tun adds deuterium atoms in presence of H_2 again in cis-manner forming meso-2,3-dideuterobutane.

Q.19 (2)

Q.20 (2)

Q.21 (1)

Q.22 (1)

$HC \equiv CH$ one sigma and two π bond

Q.23 (3)

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

Q.24 (2)

Given reaction shows that the selectivity of different catalysts for some reactants is different

Q.25 (2)

EXERCISE-II (NEET LEVEL)

Q.1 (3)

Unsymmetrical alkane.

Q.2 (4)

C_7H_{16} (C_nH_{2n+2})

Q.3 (3)

(R+S)   (R+S)
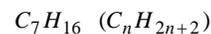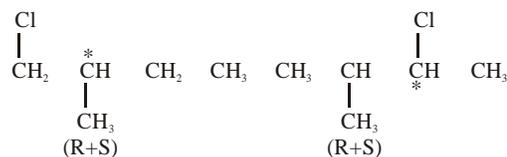
Four monochloro derivatives are chiral.

Q.4 (1)

Q.5 (1)

Q.6 (1)

Q.7 (1)

Q.8 (3)

Q.9 (3)

Q.10 **(3)**

$$CH_3CH_2COONa + NaOH \xrightarrow{CaO} C_2H_6 + Na_2CO_3$$
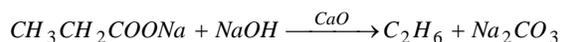
Q.11 **(3)**

Acetylene reacts with ammonical cuprous chloride to form red ppt. of copper acetylide while methane and ethylene do not react (since they do not have acidic hydrogen) They come out from the bottle
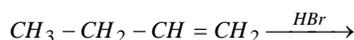
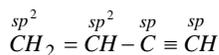$$CH \equiv CH + 2[Cu(NH_3)_2]OH \rightarrow Cu - C \equiv C - Cu + 4NH_3 + 2H_2O$$

$$CH_4 + \text{Ammonical } Cu_2Cl_2 \rightarrow \text{No reaction}$$

$$C_2H_4 + \text{Ammonical } Cu_2Cl_2 \rightarrow \text{No reaction}$$

Q.12 **(3)**

Q.13 **(4)**

Alkene gives anti addition reactions with bromine trans alkane gives meso in tramaddition.

Q.14 **(3)**

Q.15 **(2)**

$$CH_3 - CH_2 - CH = CH_2 \xrightarrow{HBr}$$

$$CH_3 - CH_2 - \underset{\underset{Br}{|}}{CH} - CH_3$$

2−Bromo butane

Q.16 **(1)**

$$\overset{sp^2}{CH_2} = \overset{sp^2}{CH} - \overset{sp}{C} \equiv \overset{sp}{CH}$$

Q.17 (3)

$$CH_2 = CH - C(CH_3) = CH - CH_3$$

$$\xrightarrow[ZnO/H_2O]{O_3}$$

$$HCHO + CH_3CHO + CH_3COCHO$$
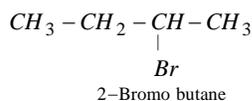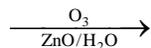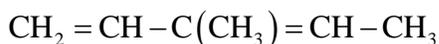
Q.18 (1)

Electrolysis of a concentrated aqueols solution of either sodium or potassiums of satu   rated carboxylic acids yields bigher alkane at anode.

$$2RCOOK \xrightarrow[\text{Oxidation}]{\text{Electrolytic}} \underset{\text{Anode}}{2RCOO^-} + \underset{\text{Cathode}}{2K^+}$$

At anode $2RCOO^- \rightarrow 2RCOO + 2e^- \rightarrow$

$$R - R + 2CO_2$$

At Cathode $2K^+ + 2e^- \rightarrow 2K$

$$\underset{(Kolbe's Method)}{2K + H_2O \rightarrow 2KOH + H_2 \uparrow}$$
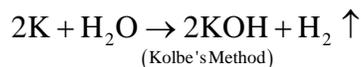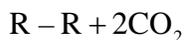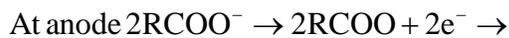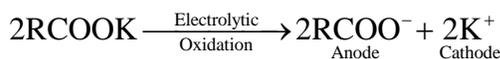
Q.19 (1)
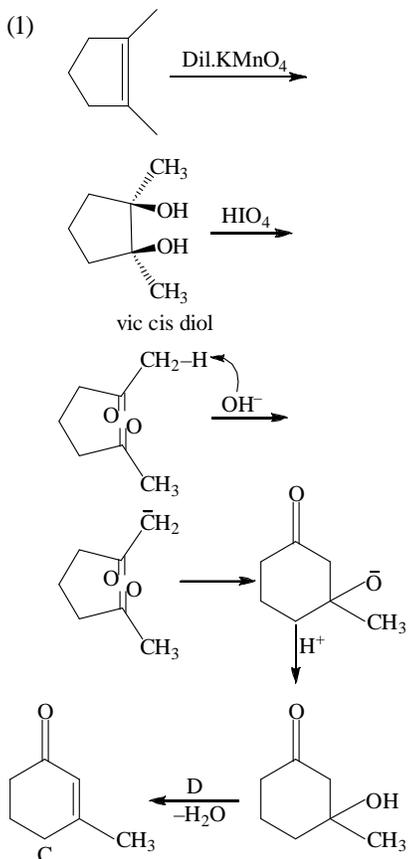
Q.20 (2)

Q.21 (4)

Q.22 (1)

Q.23 (2)

Markownikoff's rule can not be applied for symmetrical alkene.

Q.24 (3)

With acetylene it gives dichloroacetaldehyde.

Q.25 (3)

$$2CH \equiv CH + 5O_2 \rightarrow 4CO_2 + 2H_2O \ \Delta H = -1300 \ KJ$$
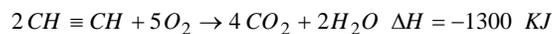
The combustion of acetylene is highly exothermic and the heat produced during the combustion can be used for welding purposes in the form of oxy acetylene flame.
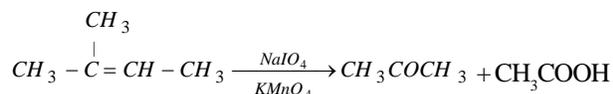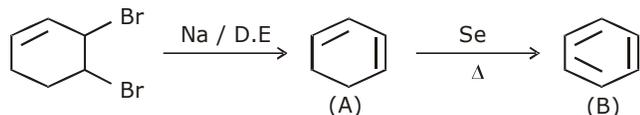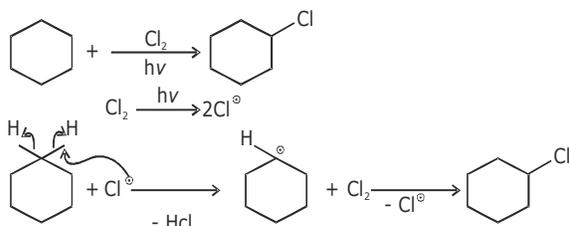
Q.26 (1)

$$3CH \equiv CH \xrightarrow[\text{Fe tube}]{\text{Red hot}} \text{Benzene}$$

Q.27 **(1)**

$$CH_3 - CH_2 - C \equiv CH \xrightarrow[H_2SO_4]{HgSO_4, 60^o C} CH_3 - CH_2 - \overset{\overset{O}{||}}{C} - CH_3$$

Q.28 **(2)**
Q.29 **(2)**
Q.30 **(4)**
Q.31 **(1)**
Q.32 **(3)**

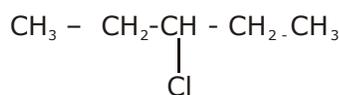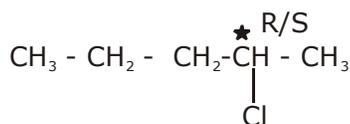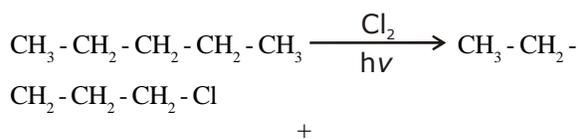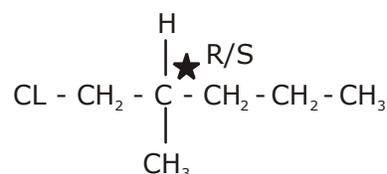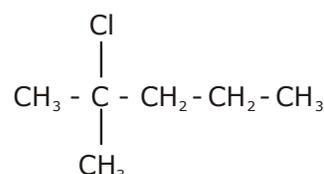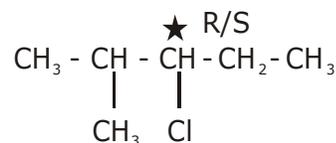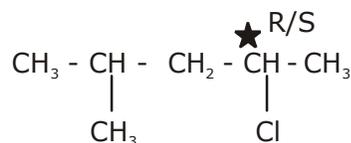$$CH_3 - \overset{\overset{CH_3}{|}}{C} = CH - CH_3 \xrightarrow[KMnO_4]{NaIO_4} CH_3COCH_3 + CH_3COOH$$
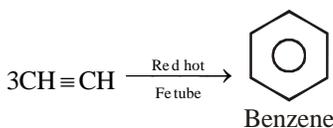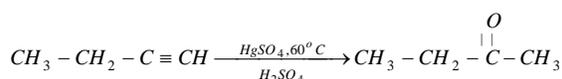
EXERCISE-III (JEE MAIN LEVEL)

Q.1 **(2)**

Q.2 **(1)**
Mech

Q.3 **(3)**

$$CH_3 - CH_2 - CH_2 - CH_2 - CH_3 \xrightarrow[hv]{Cl_2} CH_3 - CH_2 -$$
$$CH_2 - CH_2 - CH_2 - Cl$$

+

★ R/S
$$CH_3 - CH_2 - CH_2 - \overset{\star}{C}H - CH_3$$
$$\overset{|}{Cl}$$

+

$$CH_3 - CH_2 - CH - CH_2 - CH_3$$
$$\overset{|}{Cl}$$

Q.4 **(3)**

$$CH_3 - \overset{\overset{|}{CH}}{} - CH_2 - CH_2 - CH_3 \xrightarrow[F.R.S]{Cl_2/hv} CH_3 - CH - CH_2 - CH_2 - CH_2 - Cl$$
$$\overset{|}{CH_3} \qquad\qquad\qquad \overset{|}{CH_3}$$

+

★ R/S
$$CH_3 - CH - CH_2 - \overset{\star}{C}H - CH_3$$
$$\overset{|}{CH_3} \qquad\qquad \overset{|}{Cl}$$

+

★ R/S
$$CH_3 - CH - \overset{\star}{C}H - CH_2 - CH_3$$
$$\overset{|}{CH_3} \quad \overset{|}{Cl}$$

+

$$CH_3 - \overset{\overset{Cl}{|}}{C} - CH_2 - CH_2 - CH_3$$
$$\overset{|}{CH_3}$$

+

★ R/S
$$CL - CH_2 - \overset{\overset{H}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH_2 - CH_2 - CH_3$$

Total no of monochloro product = 8

Q.5 **(4)**

$$CH_3 - Cl + CH_3 - CH_2 - Cl \xrightarrow[D.E]{Na} CH_3 - CH_3 + CH_3 - CH_2 - CH_2 - CH_3$$
$$+ CH_3 - CH_2 - CH_3$$
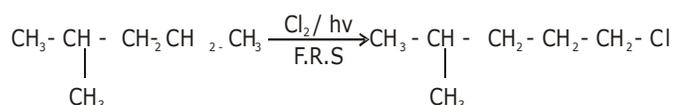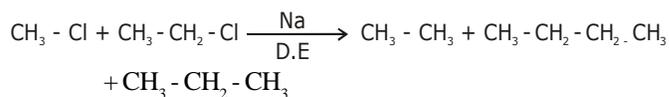
Q.6 **(3)**
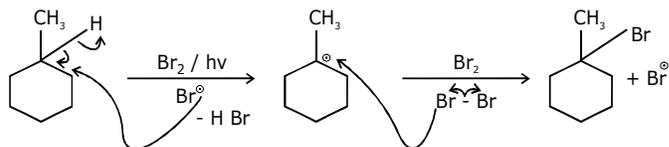
Q.7 **(3)**
Reactivity of Alkyl Halide for Wurtz Rxn
R - I > R - Br > R - Cl > R - F

Q.8 **(1)**
in Kolbe's eledrolysis process. NaOH / KOH is
Formed at cathod so PH increases and PO^H
decrease

At cathod = $Na^{\oplus} + H_2o \longrightarrow NaOH + \frac{1}{2}H_{2}(g)$
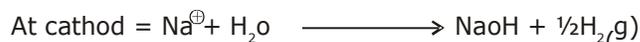
Q.9 **(3)**
Dipole moment is a vector quantity.In trans 1,2-
Dichloroethene ,all the vector cancell each other

Q.10 **(4)**

Heat of hydrogenation α

$$\frac{1}{\text{Stability of alkene or crowding across }\pi\text{ bond}}$$
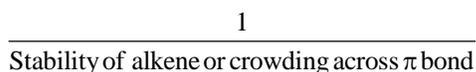
Q.11 **(4)**

Stability depends on hyperconjugation which further depends on total number of αH.

Q.12 **(1)**

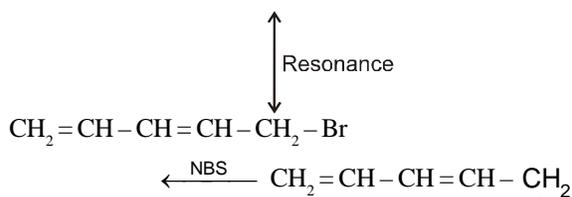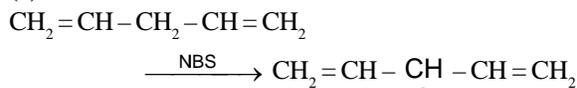Electron releasing group and stability of carbocation will decide rate of reaction in electrophilic addition reaction.

Q.13 **(1)**

Electron releasing group and stability of carbocation will decide rate of reaction in electrophilic addition reaction.

Q.14 **(4)**

No rearrangement in oxymercuration Demercuration.

Q.15 **(2)**

$CH_3 - CH = CH_2$ (Free radical substitution reaction)

Q.16 **(2)**

$CH_2 = CH - CH_2 - CH = CH_2$

$\xrightarrow{\text{NBS}} CH_2 = CH - \overset{\bullet}{C}H - CH = CH_2$

$\updownarrow$ Resonance

$CH_2 = CH - CH = CH - CH_2 - Br$

$\xleftarrow{\text{NBS}} CH_2 = CH - CH = CH - \overset{\bullet}{C}H_2$

Q.17 **(3)**

Conceptual

Q.18 **(1)**

$\underset{Br}{\overset{\oplus}{CH = CH}}$ has more strain due to sp^2 hydridised carbon.

Q.19 **(2)**

When double bond and triple bond is in the conjugation then triple bond is more reactive due to more stable carbocation.

$CH_2 = CH - \overset{\oplus}{C} = CH_2 \longleftrightarrow \overset{\oplus}{C}H_2 - CH = C = CH_2$

more stable

Q.20 **(1)**

$2CH_3COOH$

Q.21 **(3)**

$CH_3 - CH_2 - C \equiv CH \xrightarrow[\underset{H^{\oplus}}{+}]{KMnO_4} CH_3CH_2COOH +$

$CO_2 + H_2O$

Q.22 **(2)**

$$C_nH_{2n+2} + \frac{3n+1}{2} O_2 \longrightarrow nCO_2 + (n+1) H_2o$$

$$C_3H_{8(g)} + \frac{3 \times 3 + 1}{2} O_2 \longrightarrow 3Co_2 + 4 H_2o$$
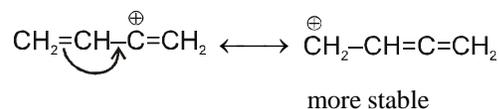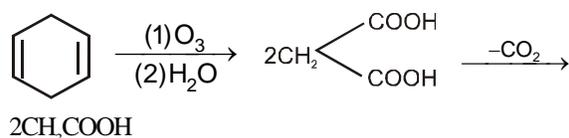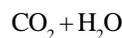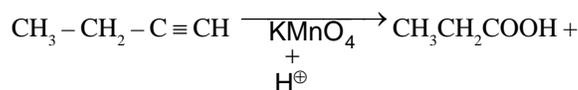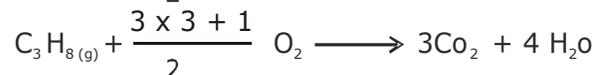
| 1 Mole | 5 Mole | 3 Mole | 4 Mole |

Q.23 **(3)**

sp Hybridisation of alkyne and also intermediate form is less stable.

Q.24 **(1)**

$CaC_2 + H_3O^+ \longrightarrow Ca(OH)_2 + C_2H_2$ (Acetylene)

Q.25 **(2)**

Conceptual

EXERCISE-IV

Q.1 **(6)**

$CH_3 - Cl + 2Na + Cl - CH_3 \rightleftharpoons CH_3 - CH_3$

$CH_3CH_2 - Cl + 2Na + Cl - CH_2CH_3 \rightleftharpoons CH_3CH_2CH_2CH_3$

$CH_3CH_2CH_2 - Cl + 2Na + Cl - CH_2CH_2CH_3 \rightleftharpoons$

$\qquad CH_3CH_2CH_2CH_2CH_2CH_3$

$CH_3 - Cl + 2Na + Cl - CH_2CH_3 \rightleftharpoons CH_3CH_2CH_3$

$CH_3CH_2 - Cl + 2Na + Cl - CH_2CH_2CH_3$

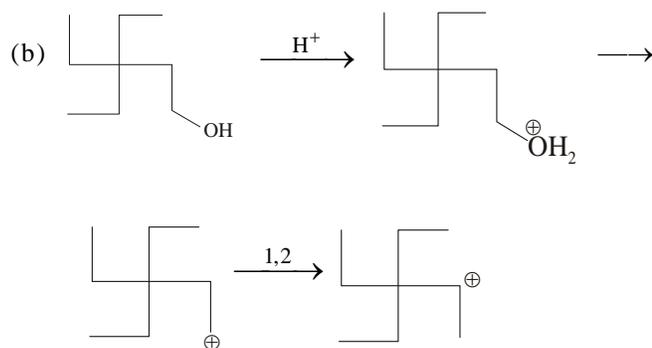$\qquad \rightleftharpoons CH_3CH_2CH_2CH_2CH_3$

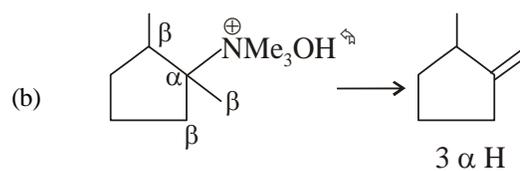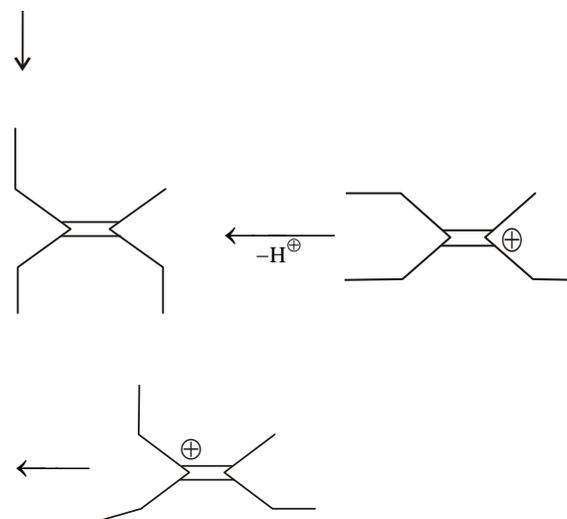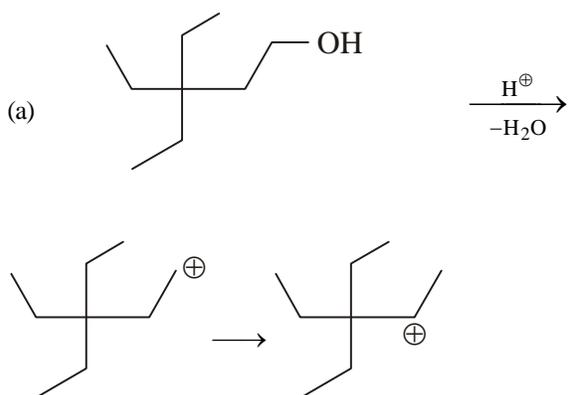$CH_3 - Cl + 2Na + Cl - CH_2CH_2CH_3 \rightleftharpoons CH_3CH_2CH_2CH_3$
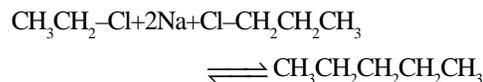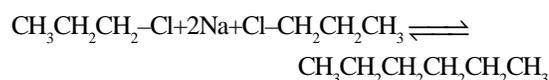
Q.2 **(4)**

On reaction with 2-chloro 3-methyl pentane gives non-identical four products.

Q.3 0004

(b)

(c)

(f)

Q.4 0303

(a)

(b)

3 α H
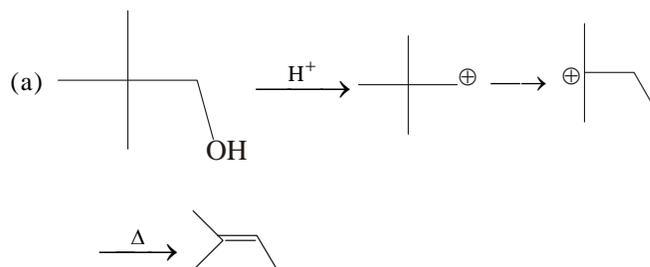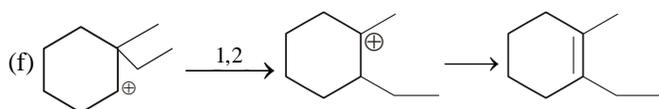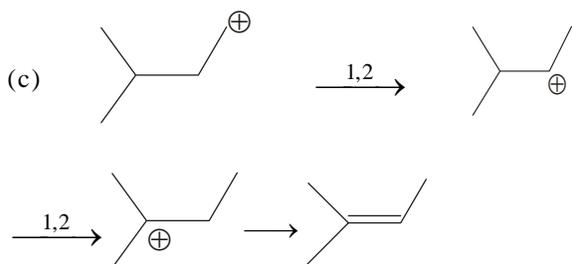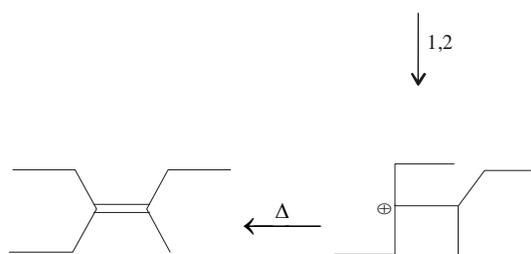
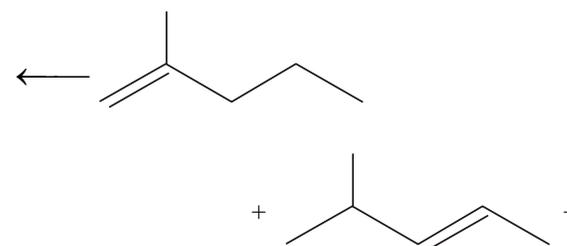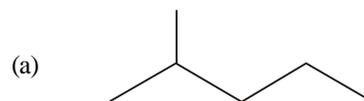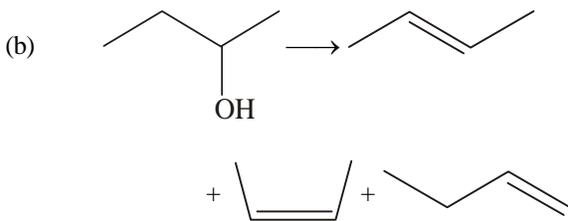**Q.5** (a) How many alkene on catalytic reduction will produce
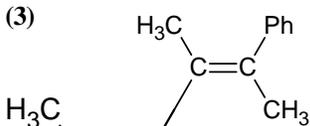

(b)

OH
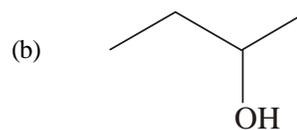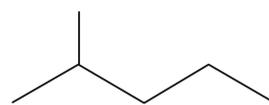
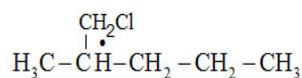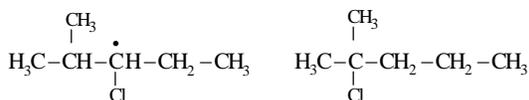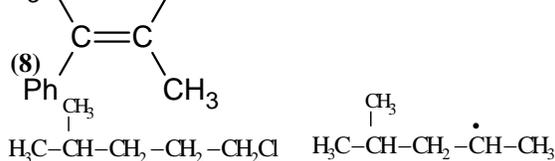$\xrightarrow[\Delta]{Al_2O_3}$ Total number of alkene produced

(a)

(b)

Q.6 (3)

More will be stability of carbocation more will be reactivity of substrate from which carbocation formed.
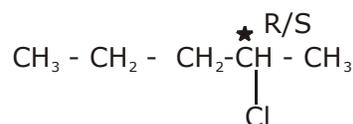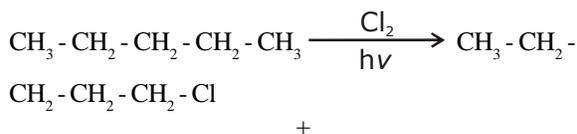
Q.7 (3)

Q.8 (8)

Compounds which chiral carbon here exist in two forms: d and 1.
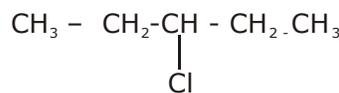
Q.9 (2)

Number of monochoro products are 6(P)
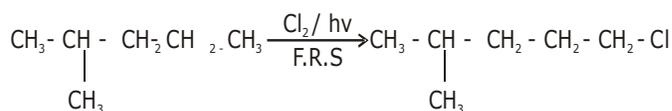
And distillation fractions are 4 (Q)

Q.10 [4]

$$CH_3 - CH_2 - CH_2 - CH_2 - CH_3 \xrightarrow[hv]{Cl_2} CH_3 - CH_2 -$$
$$CH_2 - CH_2 - CH_2 - Cl$$
$$+$$

Q.11 [8]

$$CH_3 - CH - CH_2 CH_2 . CH_3 \xrightarrow[F.R.S]{Cl_2 / hv} CH_3 - CH - CH_2 - CH_2 - CH_2 - Cl$$

$$+$$

Total no of monochloro product = 8

Q.12 [5]

$$C_nH_{2n+2} + \frac{3n+1}{2} O_2 \longrightarrow nCO_2 + (n+1) H_2O$$

$$C_3H_{8\,(g)} + \frac{3 \times 3 + 1}{2} O_2 \longrightarrow 3Co_2 + 4 H_2o$$
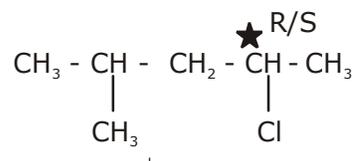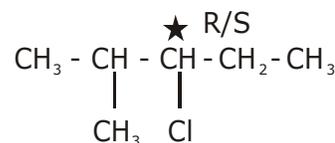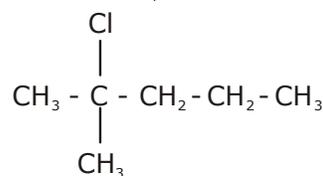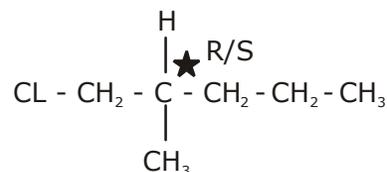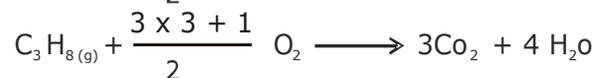
| 1 Mole | 5 Mole | 3 Mole | 4 Mole |

Q.13 (4)

Q.14 (1)

Q.15 (4)
Q.16 (1)
Q.17 (1)
Q.18 (1)

PREVIOUS YEAR'S

MHT CET

Q.1 (3)
Q.2 (3)
Q.3 (1)
Q.4 (3)
Q.5 (1)
Q.6 (4)
Q.7 (3)
Q.8 (2)
Q.9 (4)
Q.10 (1)
Q.11 (3)
Q.12 (2)
Q.13 (3)
Q.14 (2)
Q.15 (2)
Q.16 (4)
Q.17 (2)
Q.18 (1)
Q.19 (4)
Q.20 (4)
Q.21 (1)
Q.22 (4)
Q.23 (1)
Q.24 (3)
Q.25 (3)
Q.26 (3)
Q.27 (4)
Q.28 (1)
Q.29 (2)
Q.30 (1)
Q.31 (4)
Q.32 (3)

Q.33 (1)

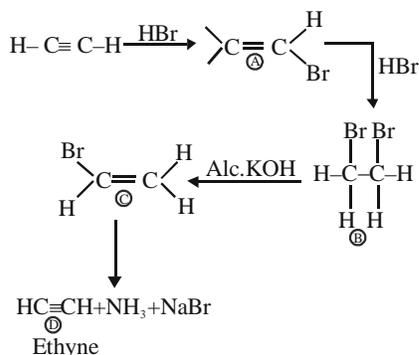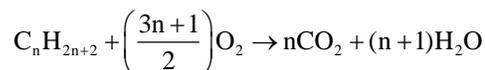The chemical reaction of complete combustion of alkane is as follows:

$$C_nH_{2n+2} + \left(\frac{3n+1}{2}\right)O_2 \rightarrow nCO_2 + (n+1)H_2O$$

Where n = number of carbon atoms

Q.34 (3)

3 - Iodo - 3 methylhexane

Here, a molecule HI added to C= C double bond. The addition follows anti-markownikoff's rule

4-methylhexane-3-ene   3-iodo -3 methylhexane
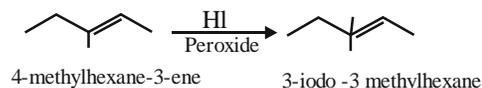
Q.35 (1)
Q.36 (1)
Q.37 (2)
Q.38 (2)

NEET/AIPMT
PREVIOUS YEAR'S

Q.1 (4)
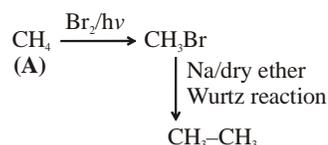
Hence the correct option is (4)

Q.2 (1)
Q.3 (3)

A = CH_3-C= CH-CH_3 B = CH_3-C - CH-CH_3
with CH_3 and Cl, CH_3 substituents
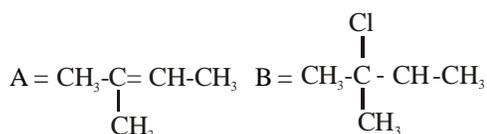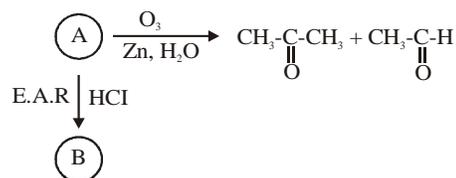
Formation of B from A is Markonikoff rule addition by E.A.R. mechanism

Q.4 (2)

(1) $Hg^{2+}/H^+, H_2O \rightarrow$ Addition of H_2O at alkene
(2) Na/liquid $NH_3 \rightarrow$ Birch reduction (Alkuyne $\rightarrow$ trans alkene)
(3) $H_2 Pd/C$, quinolone $\rightarrow$ reduce alkyne $\rightarrow$ Cis alkene
(4) $Zn/HCI \rightarrow$ Reduce alkyne $\rightarrow$ alkyl halide

Q.5 (2)
Q.6 (2)
Q.7 (3)
Q.8 (2)

Q.9   (4)

Q.10 (4)

$$CH_3-CH-CH=CH_2 \xrightarrow[\text{(ii) Zn + H}_2\text{O}]{\text{(i) O}_3} \quad CH_3\text{-}CH-CH=O$$

(with CH_3 branch below the first CH, and CH_3 below the product CH)

2-Methylpropanal
+
H–CHO
Formaldehyde
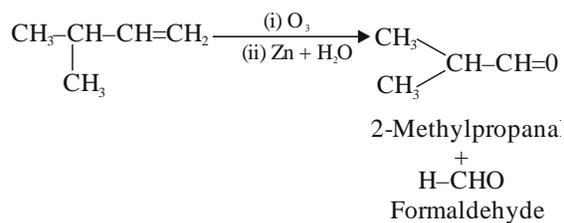
Q.11 (3)
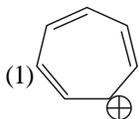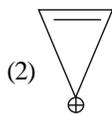
(1) Aromatic
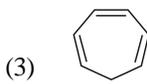
(2) Aromatic

(3) Non-Aromatic
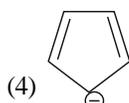
(4) Aromatic

JEEMAIN

Q.1   (2)
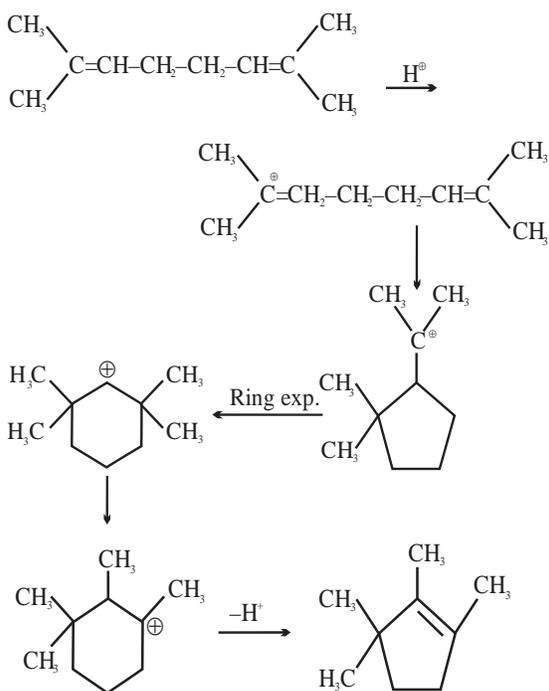
Total sp^2 hybridised C-atom are 2

Q.2   (2)

$$CH_3\text{-}C=CH_2 \xrightarrow{H^+} CH_3\text{-}\overset{\oplus}{C}\text{-}CH_3$$

(with CH_3 groups)

Q.3   (1)

C - C	C = C	C ≡ C
147 Pm	134 Pm	120 Pm
347 kJ/mol	614 kJ/mol	839 kJ/mol

Q.4   (4)

Q.5   (3)

$$\text{n-Bu-C}\equiv\text{CH} \xrightarrow{\text{n-BuLi}} \text{n} - \text{Bu–C}\equiv\text{C}^-\text{Li}^+$$

$$\xrightarrow[\text{SN2 reaction}]{\text{n–C}_5\text{H}_{11}+\text{Cl}^-} \text{n} - \text{Bu–C}\equiv\text{C–C}_5\text{H}_{11}$$

$$\xrightarrow{\text{Lindlar cat, H}_2}$$

$$\underset{\text{H}}{\overset{\text{n–Bu}}{>}}C=C\underset{\text{H}}{\overset{\text{C}_5\text{H}_{11}}{<}}$$
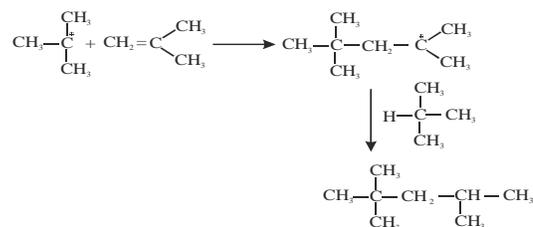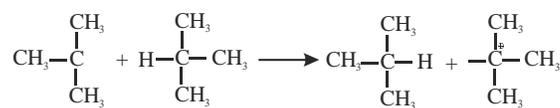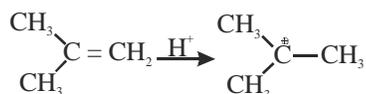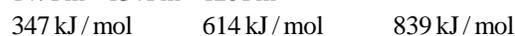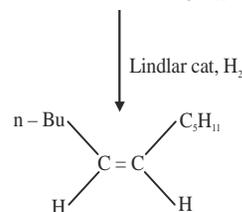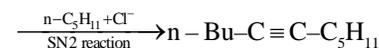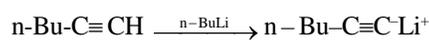
Q.6   (4)
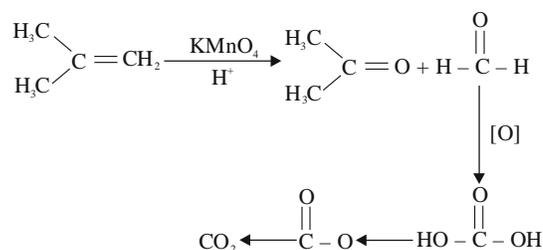
Option (D) is correct.

Q.7   (1)

$$\xrightarrow[\text{(ii) NaBH}_4]{\text{(i) Hg(OAc)}_2\text{ H}_2\text{O}}$$
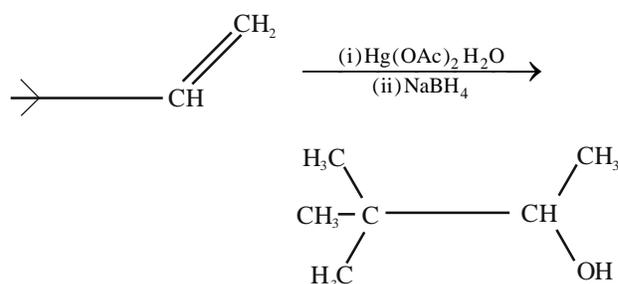
This is oxymercuration – demercuration reaction in which alcholos are formed according to markownikoff's

rule by addition of H–OH.

Q.8 (3)

Propyne + 2 Br$_2$ → 1, 1, 2, 2-tetrabromopropane

27% yield

MM = 360 g/mol
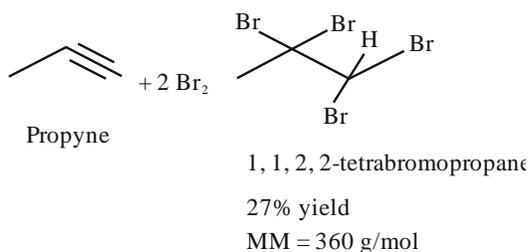
2 mol Br$_2$ produce 1 mol (1, 1, 2, 2-tetrabromopropane)
So, 1 mol Br$_2$ produce = (1/2) mole tetrabromopropane
1 g Br$_2$ is given
Mole of Br$_2$ = (1/160) mol
Amount of tetrabromopropane formed

$$= \left(\frac{1}{160}\right) \times \frac{1}{2} \times 360 \times \left(\frac{27}{100}\right)$$

$$= 0.3037 \, g$$

$$= 3.037 \times 10^{-1} \, g$$

Q.9 (2)
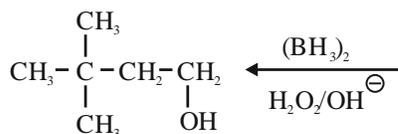
Antimarkovnikov Rule
(B)
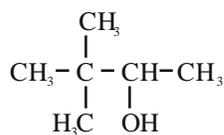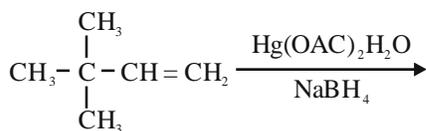
Markovnikov of Rule
(A)

So A is Markovnikov product and 'B' is anti-Markovnikov product.

Q.10 [12s]

Cis   trans

Q.11 [6]

+ 3Cl$_2$ → (BHC)

Q.12 [8]

C$_6$H$_{12}$ Dou = 0
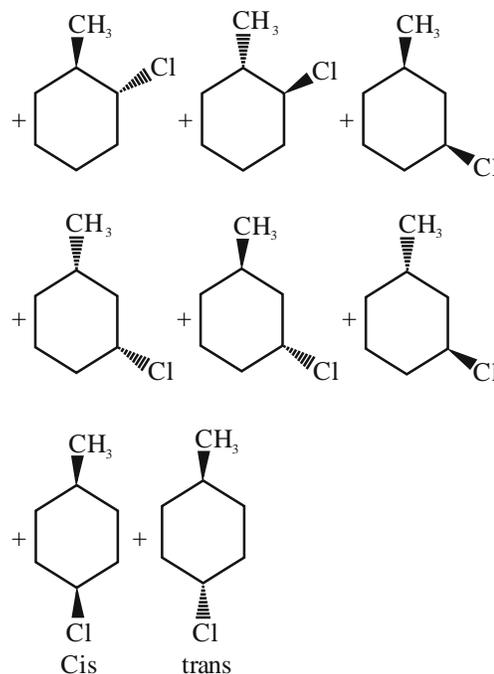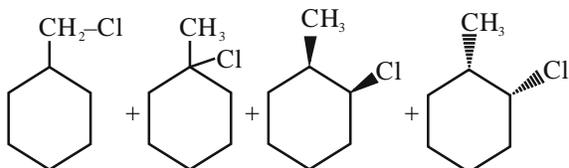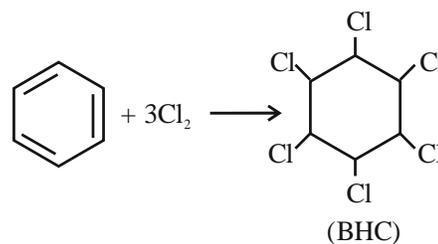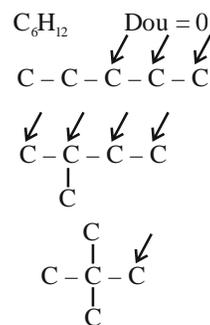
Q.13 (3)

$$\overset{\bullet}{Cl} + CH_4 \rightarrow HCl + \overset{\bullet}{C}H_3$$
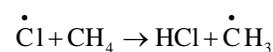
Q.14   (3)
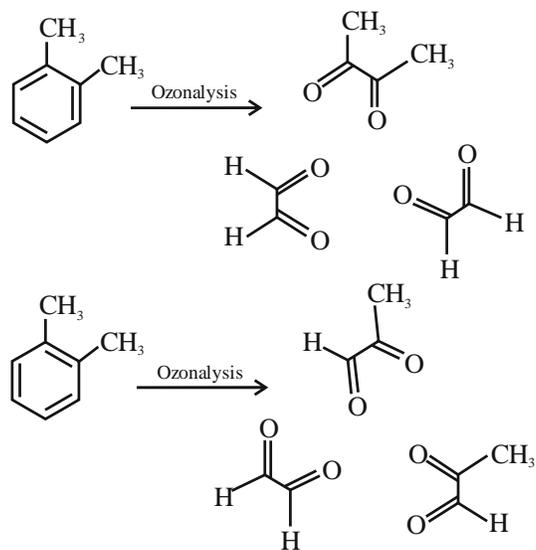
Environmental Chemistry

EXERCISE-I (MHT CET LEVEL)

Q.1 (1)
Particulates acquire negative charge and are attracted by the positive electrode.

Q.2 (4)

Q.3 (4)
Minamata is caused by Hg poisoning.

Q.4 (1)
Phosphate pollution is caused by sewage and agricultural fertilizers.

Q.5 (1)
Eutrophication causes reduction in dissolved oxygen.

Q.6 (2)
In presence of U.V. rays O_2 is converted into O_3.

Q.7 (1)

Green house gases such as CO_2, ozone, methane, the chlorofluoro carbon compounds and water vapour form a thick cover around the earth which prevents the IR rays emitted by the earth to escape. It gradually leads to increase in temperature of atmosphere.

Q.8 (3)
No pollutant is the main product of automobiles exhaust.

Q.9 (3)
The higt concentration of hydrocarbon pollutants in atmosphere causes cancer.

Q.10 (3)
The ozone layer, existing between 20 to 35km above the earth's surface, shield the earth from the harmful U.V. radiations from the sun. Depletion of ozone is caused by oxides of nitrogen

$$N_2O + hv \longrightarrow NO + N$$

$$NO + O_3 \longrightarrow NO_2 + O_2$$

$$O_3 + hv \longrightarrow O_2 + O$$

$$NO_2 + O \longrightarrow NO + O_2$$

$$2O_3 + hv \longrightarrow 3O_2 \left(\text{Net reaction} \right)$$

The presence of oxides of nitrogen increase the decomposition of O_3.

Q.11 (4)

Q.12 (3)

Q.13 (3)

EXERCISE-II (NEET LEVEL)

Q.1 (3)
Q.2 (1)
Q.3 (2)
Q.4 (3)
Q.5 (3)
Q.6 (3)
Q.7 (1)
Q.8 (3)
Q.9 (4)
**Q.10** (2)
Q.11 (4)
Q.12 (1)
Q.13 (2)
Q.14 (4)
Q.15 (3)
Q.16 (1)
Q.17 (2)
Q.18 (2)
Q.19 (3)
Nondegradable chemicals enter the food chain, and their concentration goes up as it moves up in the food chain. This phenomenon is called biomagnification. Naturally in an aquatic food chain, it would be highest in fishes.

Q.20 (3)
Q.21 (3)
Q.22 (3)

EXERCISE-III

Q.1 **(4)**
Q.2 (2)
Q.3 (1)
Q.4 **(4)**
Q.5 (1)
Q.6 (3)

PREVIOUS YEAR'S

MHT CET
Q.1 (2)
Q.2 (4)

Bio - phastic or bio - disesl is a product of green chemistry so other options (a,b,c) are incorrect .

Q.3 (3)

NEET/AIPMT

Q.1 (3)

Fact

Q.2 (4)

Green house gas is not SO_2

NCERT P No. 401 (Chapter [Environmental chemistryl])

.... Beside carbondioxide other green houser gasess are CH_4, water vapour, N_2O CFCs and ozone.

Q.3 (2)

Q.4 (2)

JEE MAIN

Q.1 (1)

Fact

Q.2 (4)

Q.3 (2)

$ClONO_2(g)+H_2O(g) \rightarrow HOCl(g)+HNO_3(g)$

Both Reaction takes place in stratosphere.

Q.4 (4)

$NaAsO_2$ is an insecticide, antibacterial agent herbicide.

Q.5 (1)

Hydrolysis of chlorine nitrate

$ClONO_2(g) + H_2O \rightarrow \underset{(A)}{HOCl(g)} + \underset{(B)}{HNO_3(g)}$

$ClONO_2(g) + HCl(g) \rightarrow \underset{(A)}{Cl_2(g)} + \underset{(B)}{HNO_3(g)}$

Q.6 (4)

Photo chemical smog results from the action of sunlight on unsaturated hydro carbons and nitrogen oxide

Q.7 (1)

Industries like oil refinery releases SO_2 which causes air pollution. If reacts with water to form acid rain when SO_2 mix with water if forms H_2SO_4 (Sulphuric acid). Option (A) is correct.

Q.8 (4)

Acid rain

$2SO_2 + O_2 + 2H_2O \rightarrow 2H_2SO_4$

Q.9 (1)

Q. 10 (3)

Clean water $\rightarrow$ B.O.D. < 5ppm

Highly polluted water $\rightarrow$ B.O.D. > 17ppm

Q.11 (3)

Fact

Q.12 (1)

Plastic waste are called green fuel.

Q.13 (2)

Sulphate (>500 ppm) $\rightarrow$ Laxative effect

Nitrate (> 50 ppm) $\rightarrow$ methemoglobinemia

Lead (> 50 ppb) $\rightarrow$ Kidney damage

Fluoride (>2 ppm) $\rightarrow$ Brown mottling of teeth

Q.14 (3)

A. Sulphate $\rightarrow$ Laxative effect

B. Fluoride $\rightarrow$ Bending of bone

C. Nicotine $\rightarrow$ Pesticide

D. Sodium arsinite $\rightarrow$ Herbicide

Q.15 (1)

A. Microorganisms $\rightarrow$ Domestic sewage

B. Plant nutrients $\rightarrow$ Chemical fertilizer

C. Toxic heavy metals $\rightarrow$ Chemical factory

D. Sediment $\rightarrow$ Strip mining

Q.16 (4)

B.O.D. $\rightarrow$ Biological oxygen demand.

Statement I: In polluted water dissolved oxygen low and B.O. D level is high

Statement II: Eutrophication decrease in amount of dissolved oxygen

Q.17 (4)

Sodium chlorate and sodium arsinite are used as herbicides

$\Rightarrow$ DDT, BHC, Aldrin, Dieldrin $\Rightarrow$ insecticides

$\therefore$ Option (4)

Q.18 (4)

The reaction is endrothermic and require very high temperature.

Q.19 (3)

Higher concentration of NO_2 damage the leaves of plant and retard the rate of photosynthesis.

Option (3)

Practical Organic Chemistry

Q.1 (3)

Q.2 (3)

CH$_3$OH does not have – CH(OH)CH$_3$ group hence it will not from yellow precipitate with an alkaline solution of iodine (haloform reaction).

Q.3 (3)

Formic acid (HCOOH) has aldehydic group.

Q.4 (4)

I$_2$ and NaOH react with acetophenone (C$_6$H$_5$COCH$_3$) tot give yellow ppt. of CHI$_3$ but benzophenone (C$_6$H$_5$COC$_6$H$_5$) does not give haloform test.

Q.5 (3)

Acetaldehyde is easily oxidised to acetic acid by a mild oxidising agent like Fehling solution. Acetone is not easily oxidised.

Both acetone and acetaldehyde give iodo form test. Other two conditions are not relevant to aldehydes and ketones.

Q.6 (1)

Paper chromatography is a special case of partition chromotography where the special quality paper containing water trapped in it acts are a stationary phase and solvent as a mobile phase. Thus, both phases are liquids,

Q.7 (3)

I$_2$ gives blue colour with starch.

Q.8 (4)

Anthraccne is purified by sublimation, In sublimation, a solid is converted direetly into gascous state on heating without passing through liquid phase.

Q.9 (3)
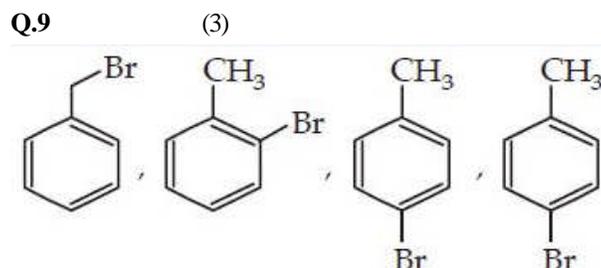
Q.10 (4)

Although blue coloured ferric cerrocyanide is formed but due to the prisence of yellow coloured Fe^{3+} salts, the blus colous geves the shade of green.

Q.11 (4)

Among the given compounds only CH$_3$OH does not give iodoform reaction.

Q.12 (3)

sucrose, being a non-reducing sugar, dose not reduse Benedict's solution. Remember that fructose has an α-hydroxy ketonic group. which is also reducing group (different from ordinary ketonic group)

Q.13 (3)

Q.14 (4)

Q.15 (2)

Q.16 (1)

Q.17 (3)

Q.18 (2)

Q.19 (1)

Q.20 (2)

Q.21 (2)

Q.22 (4)

Q.23 (2)

Q.24 (2)

Q.25 (3)

Q.26 (1)

Q.27 (4)

Q.1 (2)
Q.2 (1)
Q.3 (4)
Q.4 (1)
Q.5 (3)
Q.6 (2)
Q.7 (2)
Q.8 (3)
Q.9 (2)
Q.10 (3)
Q.11 (4)
Q.12 (1)
Q.13 (4)
**Q.14** (2)
Q.15 (1)
Q.16 (3)

Q.17 (1)
Q.18 (4)
Q.19 (4)
Q.20 (4)

EXERCISE-III (JEE MAIN LEVEL)

Q.1 (4)
boiling point depends on H-bonding more than on di-pole moment so order is w > z > x > y.

Q.2 (3)
Greater the mol. wt., greater will be boiling point hence I > II > III > IV.

Q.3 (4)
boiling point $\propto$ molecular weight.

Q.4 (3)
Melting point depends on molecular wt. Greater the mol. wt. greater will be melting point.

Q.5 (3)
Melting point depends on symmetry so p-dibromobenzene has highest melting point.

Q.6 (2)
Melting point depends on H-bonding.

Q.7 (3)
Parahydroxyphenol is more symmetrical with presence of intermolecular H-bond.

Q.8 (4)
Phenyl group decreases the extent of H-bonding so solubility decreases.

Q.9 (1)
Surface area decreases, solubility increases, so A is wrong order.

(2)
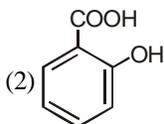
In it, due to the presence of intramolecular H – bonding the solubility is decrease, so B is wrong order.

(3)
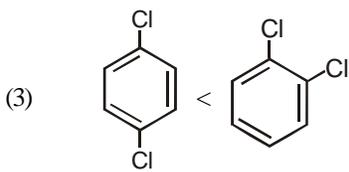
$\mu = 0$ $\mu \neq 0$

Like dissolve like so it is correct.

(4)

(I) >

(II)
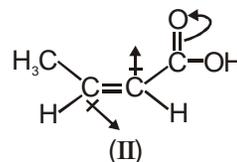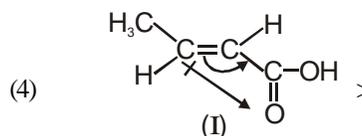
dipole moment of I is greater than II. Greater the dipole moment greater its solubility.

Q.10 (1)
Solubility depend on extent of H-bonding. Lower the molecular wt. of alcohol greater the H-bonding and greater is the solubility.

Q.11 (3)
Alcohol have H-bonding.

Q.12 (2)
aniline is base so form salt with HCl .

Q.13 (1)
anisol does not form salt with NaOH.

Q.14 (1)
benzene is non-polar so cannot form salt with any of these reagents.

Q.15 (4)
Terminal alkyne form white ppt. with Tollen's reagent.

Q.16 (2)
3° alcohol gives instant turbidity with lucas reagent.

Q.17 (3)
aldehydes gives black or silver ppt. with tollen's reagent.

Q.18 (3)
 group gives positive iodoform test.

Q.19 (1)
Secondary amine does not give +ve test with $CHCl_3$/ KOH.

Q.20 (4)
I, II & IV have 2 DU.

EXERCISE-IV

Q.1 [0012]

$P_1 = 756\,mm\,Hg$ $P_2 = 760$

$V_1 = 48.6\,ml$ $V_2 = ?$

$T_1 = 300\,K$

$T_2 = 273\,K$

Applying general gas equation $\dfrac{P_1 V_1}{T_1} = \dfrac{P_2 V_2}{T_2}$

$V_2 = \dfrac{P_1 V_1 T_2}{T_1 P_2} = \dfrac{756 \times 48.6}{300} \times \dfrac{273}{760} = 44\,ml$

Mass of organic compound $= 0.45$ g

$\% \text{ of } N_2 = \dfrac{28}{22400} \times V_2 \times \dfrac{1}{0.145} \times 100 = \dfrac{28}{22400} \times 44 \times \dfrac{1}{0.45} \times 100 = 12.22 \approx 12$
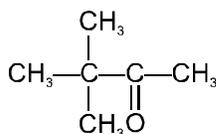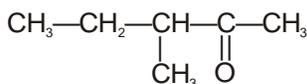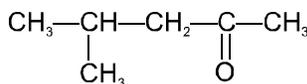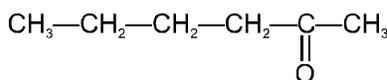
Q.2 [0005]

Alkene, Alkyne, phenol and aniline decolorise Br_2 water solution.

Q.3 [0004]

$CH_3-CH_2-CH_2-CH_2-\underset{\underset{O}{\|}}{C}-CH_3$

$CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-\underset{\underset{O}{\|}}{C}-CH_3$

$CH_3-CH_2-\underset{\underset{CH_3}{|}}{CH}-\underset{\underset{O}{\|}}{C}-CH_3$

$CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-\underset{\underset{O}{\|}}{C}-CH_3$

Q.4 [0004]

Except aromatic aldehyde all other aldehyde react with Fehling's solution.

Q.5 [0002]

No. of active H = 2

112 ml of H_2 is obtained from 0.45 g

22400 ml of H_2 is obtained from $\dfrac{0.45 \times 22400}{112} = 90$ g

90 g compound give one mole H_2 gas

i.e. 2H obtained from 1 mole of compound.

Ans. No. of active H = 2

Q.6 [0081]

Compound Y is $\Rightarrow$ NaSCN

Molecular mass of NaSCN $= 23 + 32 + 12 + 14 = 81$

Q.7 (4)
Q.8 (2)
Q.9 (1)
Q.10 [(A)-S, (B)-R, (C)-Q, (D)-P]

PREVIOUS YEAR'S

MHT CET

Q.1 (2)
Q.2 (4)
Q.3 (4)
Q.4 (1)
Q.5 (1)
Q.6 (3)
Q.7 (4)
Q.8 (1)
Q.9 (3)

Given , C = 42.8% H = 7.2 % and N = 50 %

Element	%	Moles	Simplest ratio	Whole number
C	42.8	$\frac{428}{12} = 3.56$	1	1
H	7.2	$\frac{7.2}{1} = 7.2$	2	2
N	50	$\frac{50}{14} = 3.57$	1	1

$\therefore$ Empirical formula $= CH_2N$

Empirical formula mass $= 28$

Now , number of moles $= \dfrac{\text{Volume given at STP}}{22400\,mL}$

$= \dfrac{50}{22400} = 2.23 \times 10^{-3}$

Also, Number of moles $= \dfrac{\text{weight}}{\text{molecular weight}}$

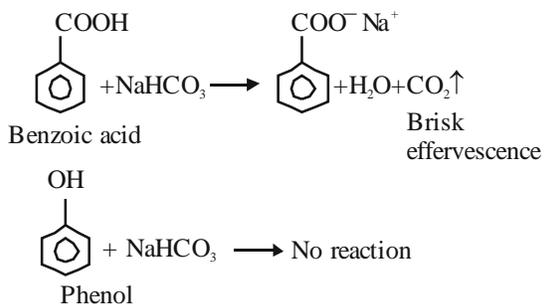$\Rightarrow$ Molecular weight $= \dfrac{1}{2.23 \times 10^{-3}} = 448$

$\therefore n = \dfrac{\text{molecular weight}}{\text{empirical weight}} = \dfrac{448}{28} = 16$
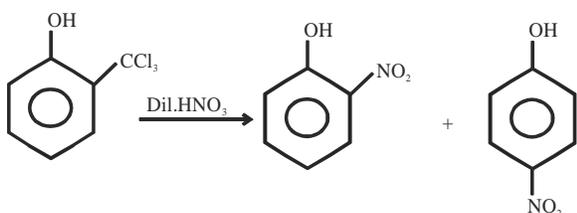
Hence , molecular formula $= (\text{empirical formula})_n$
$= (CH_2N)_{16} = C_{16}H_{32}N_{16}$

Q.10 (1)

$NaHCO_3$ test is used to distinguish benzonic acid and phenol.

$$P = \frac{100}{760} \, atm$$

$$T = 257 + 273 = 530 \, K$$

$$d = 0.46 \, \frac{g}{L}$$

$$M = \frac{0.46 \times 0.082 \times 530}{100} \times 760$$

$$= 151.93 = 152$$

Q.7 (3)

NEET/AIPMT

Q.1 (2)

JEEMAIN

Q.1 (3)

Q.2 (2)

Biuret test is given by all proteins and peptides having atleast two peptide linkages. Hence positive test must be given by tripeptide and Biuret.

Q.3 [14]

Volume of N_2 gas = 22.4 ml at STP

$$\text{mole of } N_2 \text{ gas} = \frac{22.4}{22400} = \frac{1}{1000} \text{mole}$$

$$\text{weight of } N_2 \text{ gas} = \frac{1}{1000} \times 28$$

$$\% \text{ of N in organic compound} = \frac{28}{1000} \times \frac{100}{0.2} = 14\%$$

Q.4 (18)

Q.5 (64)

Mili equivalent of H_2SO_4 used by $NH_3 = 12.5 \times 1 \times 2 = 25$

$$\% \text{ of N in the compound} = \frac{25 \times 10^{-3} \times 14 \times 100}{0.55} = 63.66$$

$$\boxed{\approx 64\%}$$

So answer will be 64%

Q.6 (152)

$$P = \frac{dRT}{M}$$

Isomers must = molecular mass 184

Can be solved by using option.
Option (C) gives us the only optically active isomer of compound A.

Q.8 (46)

$$\text{Mole of } CO_2 = \text{Moles of } C = \frac{0.793}{44}$$

$$\text{Weight of 'C'} = \frac{0.793}{44} \times 12 = 0.216 gm$$

$$\text{Moles of 'H'} = \frac{0.442}{15} \times 2$$

$$\text{Weight of 'H'} = \frac{0.442}{18} \times 2 \times 1 = 0.049 gm$$

$$\therefore \text{Weight of 'O'} = 0.492 - 0.216 - 0.049 = 0.227 gm$$

$$\% \text{ of 'O'} = \frac{0.227}{0.492} \times 100 = 46.13\%$$

Q.9 (40)
Given;
mass of organic compound = 0.25 g
mass of silver chloride = 0.40 gm; $(\text{mol. wt})_{AgCl}$= 143.5

$$\% \text{ Cl in the compound} = \frac{0.40 \times 35.5 \times 100}{143.5 \times 0.25}$$
$$= 39.58\%$$
$$\approx 40\%$$

Q.10 (3)
TLC is a technique used to separate mixture of compounds based on differences in polarity. In TLC a glass plate coated with a stationary phase is spotted with the mixture to be separated.
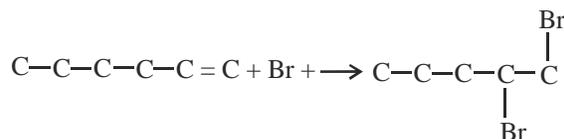
Q.11 (1)

Q.12 (4)

Q. 13 [1143]

$$\text{C}-\text{C}-\text{C}-\text{C}-\text{C}=\text{C} + \text{Br} + \longrightarrow \text{C}-\text{C}-\text{C}-\overset{\overset{\displaystyle Br}{|}}{\underset{\underset{\displaystyle Br}{|}}{\text{C}}}-\text{C}$$

    1 mole   1 mole
Molecular mass of pent-1-ene = 70

$$\text{Mole of pent-1-ene} = \frac{5}{70} \times \frac{1}{14} \text{mole}$$

$$\text{Required mole of bromine} = \frac{1}{14} \times 160 = 11.42 \text{ or } 1142$$
$$\times 10^{-2}$$

Q.14 (63)
Mili eq. intial $H_2SO_4 = N \times v$ (ml)
= 50 ×0.5=25 mili eq.
Mili eq. of NaOH=30×0.25=7.5 mili eq.
Mili eq. of H_2SO_4 Neutralise by NH_3 (NH_4OH)
= 2.5–7.5=17.5 mili eq. of H_2SO_4
= 17.5 mili eq. of NH_3 (NH_4OH)
Mass of N=17.5×10⁻³×14=0.245 g

$$\text{Mass \% of N} = \frac{0.245}{0.166} \times 100 - 147.5\%$$

(% of N in compound is obtained 147.5% it is not possible more than 100%)
That why it is Bonus

Q.15 (3)
Weak acid $\Rightarrow$ pH must be between 8 – 10

Q.16 (1)
Thin layer chromatography is a adsorption chromotography and silica gel coated on glass plate in thin layer chromatography is used as adsorbent.

Q.17 (22)
Pressure of nitrogen = 759 – 14.2
= 744.8 mm of Hg = 0.98 atm
Volume of moist nitrogen gas = 22.78 ml
Man of sample of organic compound = 0.125 g
T = 280 k

$$\text{Mole of } N_2 \text{ gas} = \frac{Pv}{RT}$$

$$= \frac{0.98 \times 22.78 \times 10^{-3}}{0.0821 \times 280}$$
$$= 0.97 \times 10^{-3} \text{ Mole}$$
Man of N_2 = 0.9 × 10⁻³ × 28
$$= 27.16 \times 10^{-3} \text{ g}$$
$$= 27.16 \text{ mg} = 0.0276 \text{ g}$$

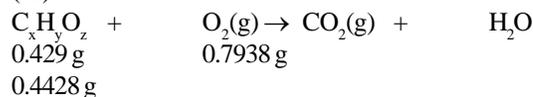$$\% \text{ of nitrogen} = \frac{0.02716}{0.125} \times 100$$

$$= 21.728 \%$$
$$\approx 22\%$$

Q.18 (46)

$C_xH_yO_z$ +	$O_2(g) \rightarrow CO_2(g)$ +	H_2O
0.429 g	0.7938 g	
0.4428 g		

$$\text{Mass of carbon} = \frac{0.7938}{44} \times 12 = 0.2164 \text{g}$$
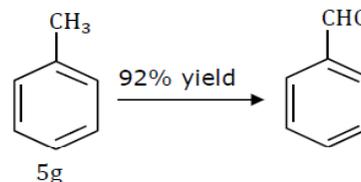
$$\text{Mass of Hydrogen} = \frac{0.4428}{18} \times 2 = 0.0492 \text{g}$$

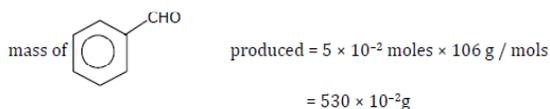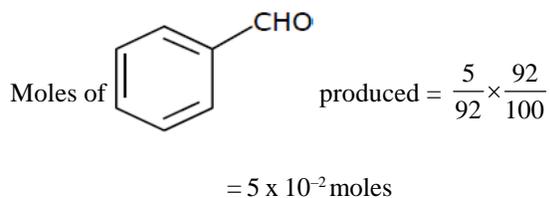Total mass of oxygen = 0.492 - (0.2164 + 0.0492) = 0.2264

$$\% \text{ of oxygen} = \frac{0.2264}{0.492} \times 100 \simeq 46$$

Q.19 [530]

$$\text{moles} = \frac{5}{92}$$

Moles of [benzaldehyde structure with CHO] produced $= \dfrac{5}{92} \times \dfrac{92}{100}$

$= 5 \times 10^{-2}$ moles

mass of [benzaldehyde structure with CHO] produced $= 5 \times 10^{-2}$ moles $\times 106$ g / mols

$= 530 \times 10^{-2}$ g

Q.20 (1)

$AgNO_3 + Br^- \rightarrow AgBr$
$\qquad \uparrow$
Organic compound
Mass of AgBr $= 0.36$ g
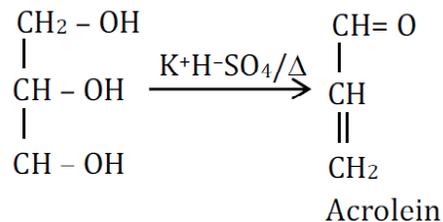Molar mass of AgBr $= 108 + 80 = 188$ g

Moles of AgBr $= \dfrac{0.36}{188}$

Moles of Br $= \dfrac{0.36}{188}$

Mass of Br $= \dfrac{0.36}{188} \times 80$

% of Br $= \dfrac{\text{mass of Br}}{\text{Mass of O.C.}} \times 100$

$= \dfrac{0.36}{188} \times \dfrac{80}{0.45} \times 100 = 34\%$

Q.21 (3)

$$\begin{array}{c} CH_2 - OH \\ | \\ CH - OH \\ | \\ CH - OH \end{array} \xrightarrow{K^+H^-SO_4/\Delta} \begin{array}{c} CH = O \\ | \\ CH \\ \| \\ CH_2 \end{array}$$

Acrolein

Q.22 [56]

M_{eq} of $H_2So_4 = 2.5 \times 2 \times 2$
$\qquad = 10 = m_{eq}$ of NH_3
m.moles of $NH_3 = m_{eq}$ of NH_3 [nf $= 1$]
$= 10$
m.moles of N $= 10$, moles of N $= 10 \times 10^{-3}$
wt. of N $= 10^{-2} \times 14 = 0.14$ gm

% of N $= \dfrac{0.14}{0.25} \times 100 = 56\%$

Q.23 [2]

$R_f(A) = \dfrac{2.08}{3.25} = 0.64$

$R_f(B) = \dfrac{1.05}{3.25} = 0.32$

$R_f(A) : R_f(B) = 2 : 1$

Q.24 (4)

[structure: phenol with OH and NO₂] Shows inter molecular H-bonding

[structure: phenol with OH, two NO₂ at ortho and NO₂ at para] Shows intra molecular H-bonding