EXERCISE - 1
Single Choice

11. The drugs used to get relief from pain are called analgesics.

12. Gammexane is insecticide.

15. Reserpine, morphine or quinine are complex nitrogeneous substances or alkaloids.

16. The antibiotic used for curing tuberculosis is streptomycin.

18. These are water insoluble dyes.

19. Direct dyes are water soluble dyes.

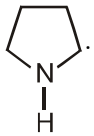
22. A composite solid propellant is Polyurethane + ammonium perchloride.

24. Dyes which are prepared right on the fabric during dyeing process are called Azo dyes.

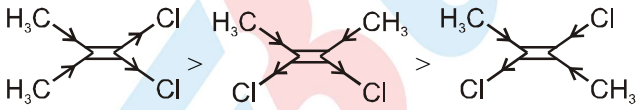
30. Liquid N_2O_4 + unsymmetrical dimethylhydrazine (UDMH) represents a biliquid propellant.

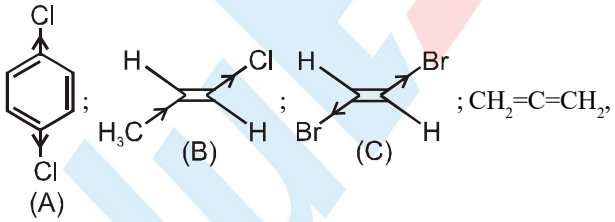
31. Due to more electronegativity of F.

32. Geometrical isomers have different value of θ so have different μ.

33. Due to more electronegativity of oxygen than N,  has higher dipole moment than  .

34. Dipole moment = q × d × cos θ,

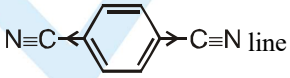
So 

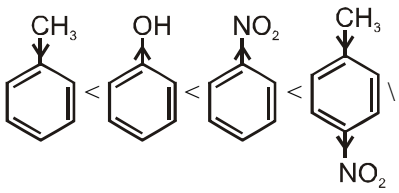
35.  ; $CH_2=C=CH_2$,

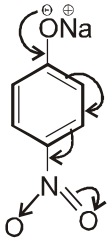
So B has dipole moment.

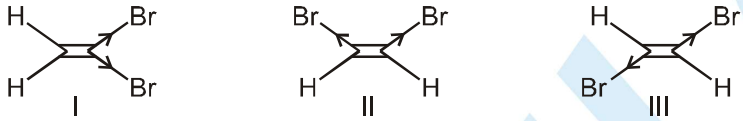
36. Due to the more inter nuclear distnace between carbon and chlorine, dipole moment (μ = Charge × distance) of CH_3–Cl is more as compare to CH_3–F.

37. cis form have some net dipole moment.

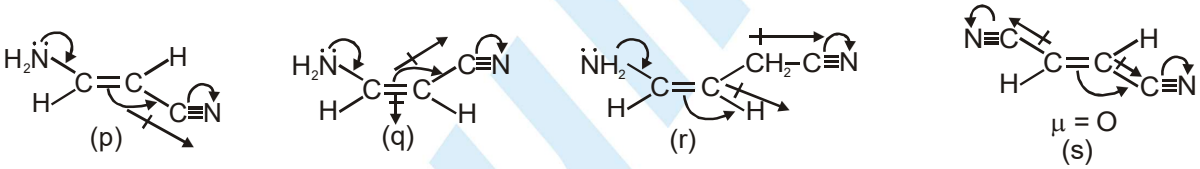
38.  line

39. 

40. 

41. 

Boiling point depends on dipole moment while melting point depends on symmetry.

42. 

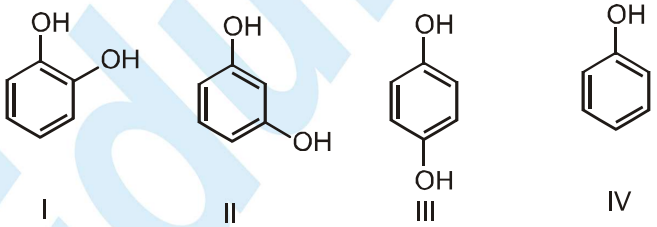
Dipole moment order is

$\boxed{p > q > r > s}$

43. Boiling point μ molecular weight.

44. Boiling points depends on molecular weight.

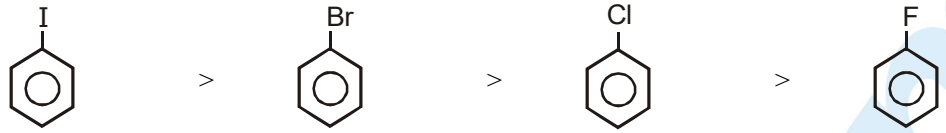
45. Boiling point μ molecular weight.

46. 

IV < I < II < III (due to extent of H-bonding)

47. Boiling point depends on H-bonding more than on dipole moment so order is w > z > x > y.

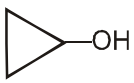
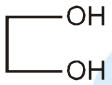
48. Boiling point $\propto$ molecular weight

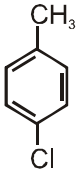


189° > (156°) > (132°) > (85°)

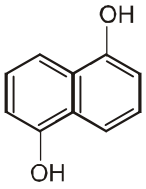
49. Boiling point $\propto$ molecular weight.

50. Boiling poin $\propto$ molecular weight.

51.  form H-bond,  has more dipole moment,  form more H-bond.

52.  is more symmetrical with maximum dipole.

53. Melting point depends on H-bonding which is dependent on surface area. Lower the surface area, more extent of the H-bonding.

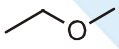
54.  is more symmetrical.

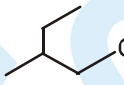
55. Melting point depends on symmetry so p-dibromobenzene has highest melting point.

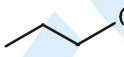
56. Melting point depends on H-bonding.

57. Parahydroxyphenol is more symmetrical with presence of intermolecular H-bond.

58. D has highest molecular weight so have highest melting point.

59.  does not form H-bond so has lower melting point.

 forms H-bond so has higher melting point.

 has dipole moment so higher melting point.

60. Melting point depends on symmetry of molecule.

61. Melting point depends on symmetry of molecule.

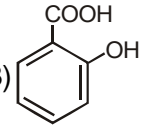
62. Solubility depend on extent of H-bonding. Lower the molecular wt. of alcohol greater the H-bonding and greater is the solubility.

63. Alcohol have H-bonding.

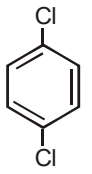
64. Pentan-1-ol has larger alkyl group which decreases H-bonding so least soluble in water.

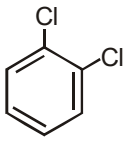
65. Phenyl group decreases the extent of H-bonding so solubility decreases.

66. (A) Surface area decreases, solubility increases, so A is wrong order.

(B) 

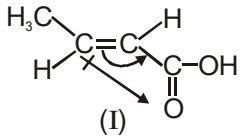
In it, due to the presence of intramolecular H – bonding the solubility is decrease, so B is wrong order.

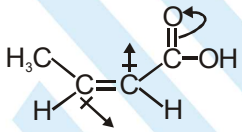
(C) 

$\mu = 0$ < 

$\mu \neq 0$

Like dissolve like so it is correct.

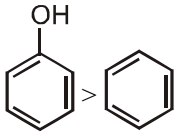
(D) 

(I) > 

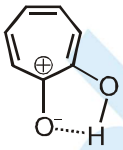
(II)

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

67. Solubility depends on Hydrogen bonding and dipole moment. Greater the H-bonding and dipole moment, greater the solubility of molecule in water.

68. 

> & $CH_3-\overset{\overset{O}{\|}}{C}-H > CH_3–O–CH_3$

69. 

> 

(in stability and aromatic character).

70. I and II have aromatic character, III has more polarity due to resonance.

71. It is fact

72. Solid substances are directly converted into vapour during sublimation.

73. Anthracene (solid) $\underset{\text{cool}}{\overset{\text{heat}}{\rightleftharpoons}}$ vapours

74. Malonic acid is having smaller alkyl part so more soluble in water.

75. Since boiling points are closer.
Methanol (65°C), acetone (57°C)

76. Because glycerine decomposes at its boiling point.

77. Anisol does not form salt with NaOH.

78. Benzene is non-polar so cannot form salt with any of these reagents.

79. $Na + \underbrace{C + N + S}_{\text{from organic compound}} \longrightarrow \underbrace{NaCNS}_{\text{Sod. sulphocyanide}}$

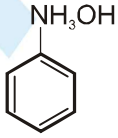
$3NaCNS + Fe^{+3} \longrightarrow Fe(CNS)_3 + 3Na^+$

80. Aniline is base so form salt with HCl .

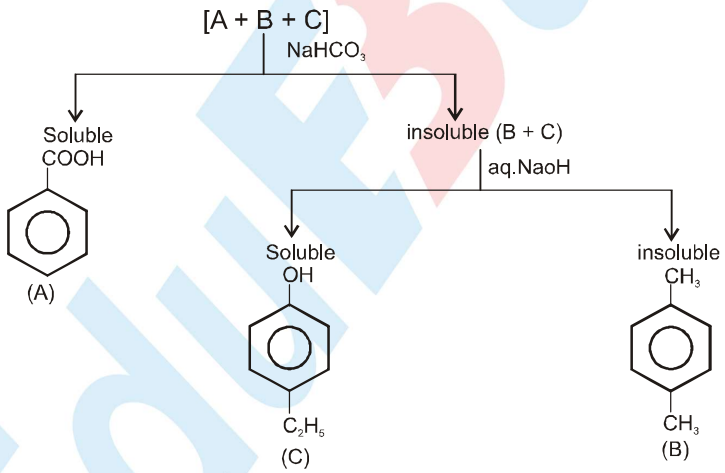
81. Carboxylic acid form salt with $NaHCO_3$.

82. Lower alcohol are soluble in water.

83. Since organic compounds are covalent, hence direct test is not possible.

84. Ammonical $AgNO_3$ give white ppt. with first and second gives this 

85. Acids dissolves in $NaHCO_3$ but phenols are insoluble.



86. Fractional distillation is used to separate compounds which differ in boiling point.

88. II is soluble in $NaHCO_3$, I is soluble in NaOH and III is soluble in HCl.

EXERCISE - 2

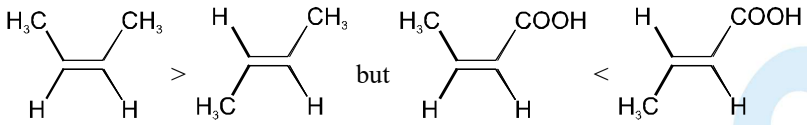
Part # I : Multiple Choice

7. Malaria is infectious disease.

9. Both phenol and benzoic acid form salt with NaOH.

10. Urea is polar while naphthalene is non-polar.

11. p–hydroxybenzoic acid due to intermoleculer H–bonding has higher boiling point.

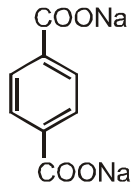
12. 

13. Melting point depends on packing of atoms.

EXERCISE - 3

Part # I : Matrix Match Type

1. Melting point and boiling point depend on H-bonding in molecule while dipole moment depends on direction of electron flow.

2. Benzene is non-polar, phenol has –OH group so slightly soluble, p-hydroxyphenol has 2–OH group so more soluble on water, 

is salt so is most soluble in water.

Part # II : Comprehension

Comprehension # 1 :

1. $-NH_2$ containing compound form salt with HCl.

2. –COOH group forms salt with $NaHCO_3$.

3. Naphthalene does not form salt with HCl, $NaHCO_3$ and NaOH.

Comprehension # 2 :

1. Boiling point ∝ Extent of H-bonding.

2. Boiling point ∝ Surface area.

3. Boiling point ∝ Molecular weight.

EXERCISE - 4
Subjective Type

1. Proteins, carbohydrates, lipids and nucleic acids.
2. "The use of chemicals to destroy infectious micro organisms without causing any injury to the host is called as chemotherapy" .
3. Chloroxylenol and terpineol are the main constituents of dettol.
4. Ampicillin and amoxicillin.
5. Boric acid acts as an antiseptic and as buffering agent.
6. Dichlorometaxylenol.
7. Aspartame is unstable to heat and therefore it can be used as a sugar substitute in cold drinks and cold foods only.
8. Mestranol.
9. It is bactericidal antibiotic.
10. Clay and feldspar.
11. $YBa_2Cu_3O_7$.
12. Titanium, vandium and niobium.
13. Aspirin.
14. Sandalwood oil, benzoin.
15. It stabilises the emulsion present in cold cream.
16. Acrylic rubber is used as fuel and liquid N_2O_4 as an oxidiser.
17. In a double-base propellant nitrocellulose is used as fuel while nitroglycerine is the oxidiser.
18. Polyurethane as fuel and ammonium perchlorate as the oxidiser.
19. Medicine should always be taken after consulting a doctor because any medicine if taken in overdoes may act as a poison. Moreover, only a doctor can diagnose the disease properly and prescribe the correct medicine in appropriate dose.
20. Drug is held to the amino acid residues of the protein present on the active site of the enzyme through forces such as ionic bonding, hydrogen bonding, van der Waals interaction or dipole-dipole interaction.
21. A 2-3% solution of iodine in alcohol-water mixture is called tincture of iodine. It is used as an antiseptic.
22. Bithional is added to soap to reduce undesirable odour, resulting from bacterial decomposition of organic matter on skin.
23. (i) Equanil is a tranquiliser and is used for reducing depression.
    (ii) Morphine is an alkaloid and is used as an analgesic.
24. Target molecules or drug-targets are the macromolecules such as carbohydrates, proteins, lipids, nucleic acids with which the drug interacts in our body to produce therapeutic effect.
25. Alitame is a high potency sweetener. It is about 2000 times sweeter than sucrose, therefore, the control of sweetness of food is difficult while using it.
26. (i) Sodium benzoate (ii) Potassium metabisulphite.
27. The two examples of synthetic detergents are :
    (i) Sodium lauryl sulphate (ii) Sodium dodecyl benzenesulphonate.
28. We will use synthetic detergent because calcium salts of detergents are soluble in water but that of soap are insoluble in water. Therefore, soap will form curdy white precipitate with calcium ions and some soap will be wasted in the process.

29. (i) $\underbrace{CH_3(CH_2)_{10}CH_2}_{\text{Hydrophobic or non-polar part}}-\underbrace{OSO_3^-Na^+}_{\text{Hydrophilic or polar part}}$

(ii) $\underbrace{CH_3(CH_2)_{15}}_{\text{Hydrophobic or non-polar part}}-\underbrace{\overset{+}{N}(CH_3)_3Br^-}_{\text{Hydrophilic or polar part}}$

(iii) $\underbrace{CH_3(CH_2)_{16}}_{\text{Hydrophobic part}}-\underbrace{COO(CH_2CH_2O)_nCH_2CH_2OH}_{\text{Hydrophilic part}}$

30. **(i) Streptomycin :** It is an effective broad spectrum antibioctic. It is used for the treatment of tuberculosis, meningitis and pneumonia.

(ii) Paracetamol : These drugs act as antipyretic (reducing fever), and preventing platelet coagulation.

(iii) Anti-fertility drugs : Mifepristone is a synthetic steriod that blocks the effects of progesterone and is used as a "morning after pill" in many countries.

31. Substances which are used as sweetening agents in place of sugar but have no nutritive value are called artificial sweetening agents. Saccharin and aspartame are examples of artificial sweetening agents.

32. Ortho-sulphobenzimide, also known as saccharine can be used because it is non-nutritive and is excreted from the body in urine.

33. Cleansing action of soaps is because they are soluble in water and can emulsify grease and take it away in the water along with dirt present on grease. Now Ca^{2+} and Mg^{2+} ion present in water react with soap and make it insoluble in water.

$$\underset{\text{Soap (soluble in water)}}{2C_{17}H_{35}COONa} + \underset{\text{(Hardness of water)}}{MgCl_2} \longrightarrow \underset{\text{White ppt (Insoluble in water)}}{(C_{17}H_{35}COO)_2Mg\downarrow} + 2NaCl$$

These insoluble soaps are useless as cleansing agent.

34. **(i) Hypertension :** Tranquilizers are effective in such mental disorder when ordinary hypnotics or sedatives fail. These are called as psychotherapeutic drugs. e.g., Barbituric acid.

(ii) General body pain : The chemicals which are used for relieving pain are called ANALGESICS. e.g. Aspirin.

35. Antacids and antiallergic drugs do not interfere with the function of each other because they work on different receptors. Thus, antihistamines (antiallergic drugs) do not affect the secretion of acid in stomach because they do not interact with the receptors present in the stomach wall.

36. Drugs which can inhibit the enzymes which catalase the degradation of noradrenaline are needed. This will slow down the process of metabolism of noradrenaline and will thus help in counteracting the effect of depression. **Iproniarid and phenelzine** are two such drugs.

37. Over production of hydrochloric acid in the stomach causes acidity. So, sodium bicarbonate or magnesium or aluminium hydroxide are used as treatment of acidity. However excessive bicarbonate can make the stomach alkaline and trigger the production of even more acid. But the drugs cimetidine and rantidine work in different way. They prevent the interaction of histamine with the receptors present in the stomach wall and this results in release of lesser amount of acid.

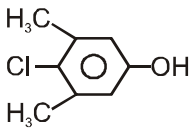
38. **Talcum Powder :** Talcum powder is used to reduce irritation of the skin. Talcum powder, like face powder and body powders contains talc i.e., hydrated magnesium silicate [$Mg(OH)_2 Si_4O_{10}$] as one of the most important ingredient. The other main constituents of talcum powder include chalk ($CaCO_3$), zinc oxide, zinc stearate and a suitable perfume. Generally specific ingredients such as antiseptic and cooling agents are also added. A good powder is one which spreads evently, stays on well and has right degree of opacity (i.e., covering power).

Talcum powders should be dusted with care to prevent inhalation of the fine particles which cause irritation in the lungs.

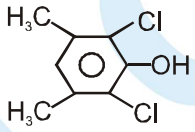
39. **Deodorants :** Deodorants are the chemical substances which are applied primarily to mask the body odour, Since this is considered a non-therapeutic purpose and a function of the body is not considered to be alterned, they are classed as cosmetics. Deodorants may contain an astringent* such as aluminium sulphate, which closes the openings of he sweat glands.

The body odour is largely produced by the action of bacteria following perspiration.

Phenolic antibacterials which have figured as effective body deodorants are parachlorometaxylenol and dichlorometa-xylenol having the following structures.



p-Chlorometaxylenol



Dichlorometaxylenol

40. Soaps can be used to check the hardness of water. A sample of soft water will form lather with soap immediately but a sample of hard water will take some time to form lather and also there will be some curdy white precipitates formed in this case.

Synthetic detergents cannot be used to check the hardness of water because they produce lather with soft as well as hard water.

41. Hard water contains calcium and magnesium ions.The ions form insoluble calcium and magnesium soaps when sodium soap or potassium soaps are dissolved in hard water

$2C_{17}H_{35}COONa + CaCl_2 \rightarrow 2NaCl + (C_{17}H_{35}COO)_2Ca$

insoluble calcium stearate

These insoluble soaps separate as scum in water and are useless as cleaning agent in fact these are hinderance to good washing. Hair washed with hard water become dull because of sticky precipitate. The precipitate adheres on to the fibre of cloth or hairs as gummy mass.

42. Drugs are classified in different ways because different types of classification are useful to different persons dealing with drugs. For example, classification of drugs on the basis of pharmacological effect is most useful for doctors because it provides them whole range of drugs available for the treatment of a particular type of health related problem. On the other hand, classification of drugs on the basis of chemical structure or on the basis of molecular targets is useful for medicinal chemists i.e., chemists who are involved in designing and synthesis of drugs.

43. H_2O, H_2S and SO_2 are non linear molecule so have net dipole moment.

44. c and e are non-linear molecule so have net dipole moment.

46. Dipole moment is produced due to electronegativity difference in asymmetric molecule.

47. As CH_3CH_3 and $CH_2 = CH_2$ has no polarity so no dipole moment.

48. $\mu = q.d.\cos\theta$; In Ist angle is 60°, 2nd have 120° and 3rd have 180°.

49. (a) Neopentane < Isopentane < Pentane < Isohexane
(b) Neohexane < 2, 3-dimethylbutane < Isohexane < n-Hexane
(c) n-Butane < 2, 2, 3, 3-Tetramethyl Butane < Isooctane < Octane

50. (a) pentan-1-ol (b) benzyl alcohol (c) butanone (d) pentanal

51. Boiling points depends on extent of H-bonding and surface area of molecules.

52. (a) Isopentane < n-Pentane < Neopentane
(b) n-Butane < n-Pentane < n-Hexane < n-Heptane

53. (a) Ph_2 CHOH > Ph – CH_2– OH ; The first member has higher molecular weight.
M.P. (69ºC) M.P. (– 15ºC)

(b) Cyclo hexanol > 1– hexanol ; The first member has more compact structure so has closer packing in solid state
M.P. (25ºC) M.P. (– 52ºC)

54. Melting point depends upon molecular weight in hydrocarbon. Greater the molecular weight greater the melting point.

55. Boiling point depends on extent of H-bonding and dipole moment.

56. Boiling point depends on extent of H-bonding and molecular weight.

57. Boiling point depends on power of H-bonding.

58. Alkyl groups are hydrophobic so it decreases the extent of H-bonding.

59. Melting point depends on power of H-bonding.

60. Greater the dipole moment, greater the melting point.

61. Average bond energy of F – H .... F is 23 to 25 kJ / mole while of O – H ... F is 12 – 15 kJ / mole. Hence CH_3F is more soluble in HF than H_2O.

62. Solubility in water depends on extent of H-bonding.

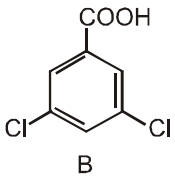
63. Solubility in water depends on extent of H-bonding. Bulky alkyl group decreases the H-bonding.

64. Larger size of alkyl group decreases the solubility in water.

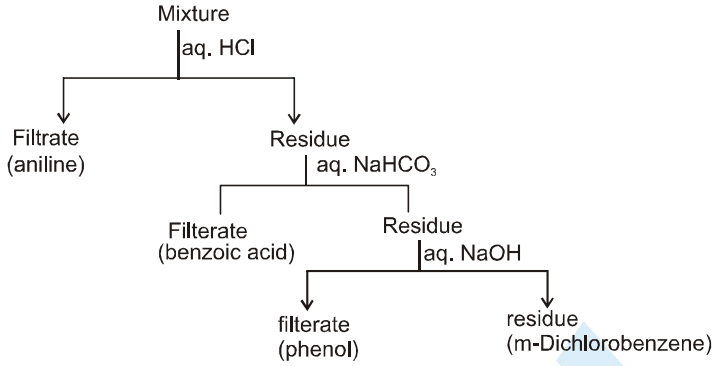
65. Solubility in water depends on H-bonding and dipole moment.

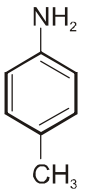
66. Solubility in water depends on extent of H-bonding.

67.  has polarity so solubility in water.

68. In aq. $NaHCO_3$,  is soluble.

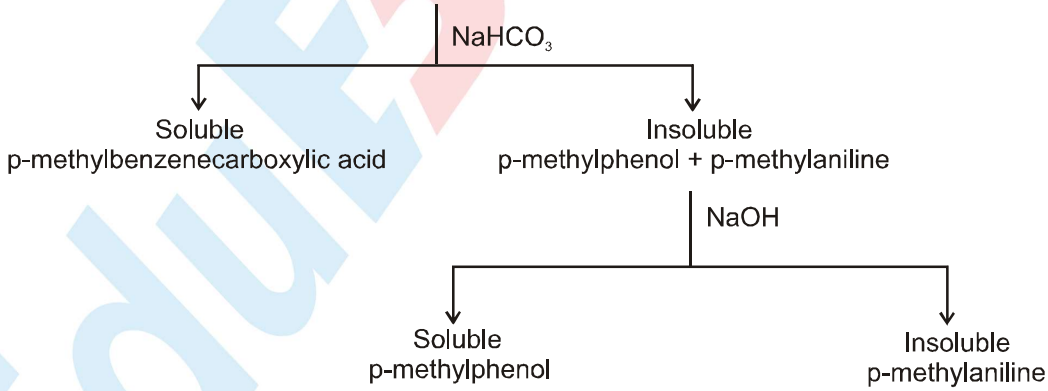
69.



70.  can form salt with HCl.

71. The 1, 4-isomer has a more symmetrical structure, allowing it to fit better into crystal lattice than either of its isomers.

72. p-methylbenzenecarboxylic acid + p-methylphenol + p-methylaniline.



73. H_2NCONH_2 is soluble in water but naphthaline is not.

74. Fumaric acid is soluble in H_2O but picric acid is soluble in aq. NaOH.

75.

m-nitrobenzenecarboxylic acid, m-nitrophenol and m-nitroaniline.

aq. $NaHCO_3$

Filtrate (salt formation of m-nitrobenzenecarboxylic acid)

Residue

aq. NaOH

Filterate (salt formation of m-nitrophenol)

Residue (m-nitroaniline)

76. Boilling point depends on molecular wt. more the molecular wt. more the bpoint point.

EXERCISE - 5

Part # I : AIEEE/JEE-MAIN

1. If nitrogen is present in organic compound, then sodium extract contains $Na_4[Fe(CN)_6]$

$$Na + C + N \xrightarrow{\text{fuse}} NaCN$$

$$FeSO_4 + 6NaCN \longrightarrow Na_4[Fe(CN)_6] + Na_2SO_4$$

(1)

A changes to prussian blue $Fe_4[Fe(CN)_6]_3$

on reaction with $FeCl_3$

$$4FeCl_3 + 3Na_4[Fe(CN)_6 \longrightarrow Fe_4[Fe(CN)_6]_3 + 12\,NaCl$$

2. Isobutene has minimum force of attraction (due to steric hindrance).

3. In Wurtz reaction alkyl halide reacts with sodium metal in the presence of dry ether to givealkane.

4. Antipyretic drugs reduce fever. An algesic relieves in pain, antibiotics act against bacterial infections while tranquilisers are used against mental disorders.

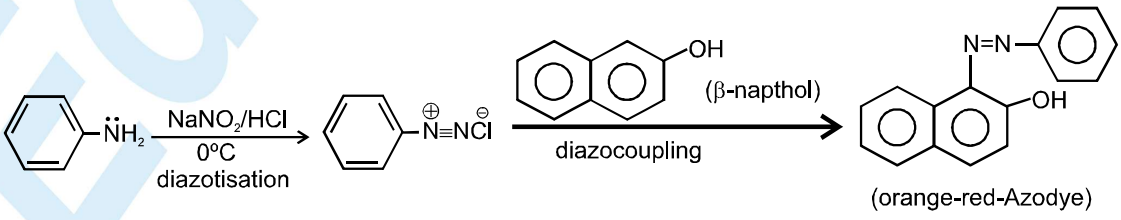
5. Dipole-dipole interactions occur among the polar molecules. Polar molecules have permanent dipole. The positive pole of one molecule is thus attracted by the negative pole of the other molecule. The magnitude of dipole-dipole forces in different polar molecules is predicted on the basis of the polarity of the molecules, which in turn depends upon the electronegativities of the atoms present in the molecule and the geometry of the molecule (in case of polyatomic molecules, containing more than two atoms in a molecule).

6. Terminal alkyne evolve hydrogen gas on addition with sodium.

Part # II : IIT-JEE ADVANCED

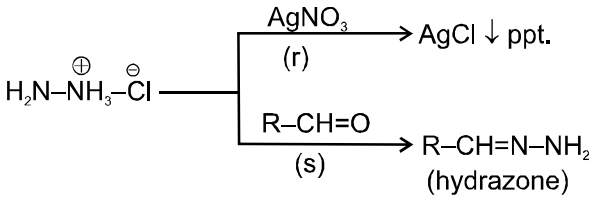
1. Intermolecular H-bonding increases molecular association while intramolecular H-bond decreases molecular association and decreases the boiling point.

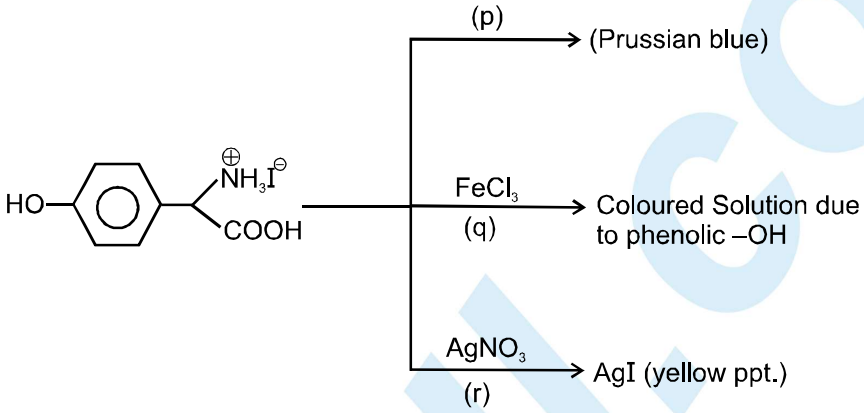
2.

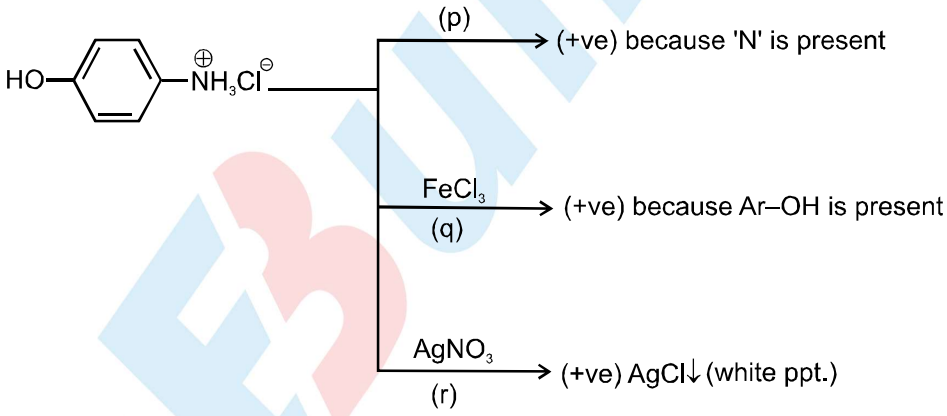


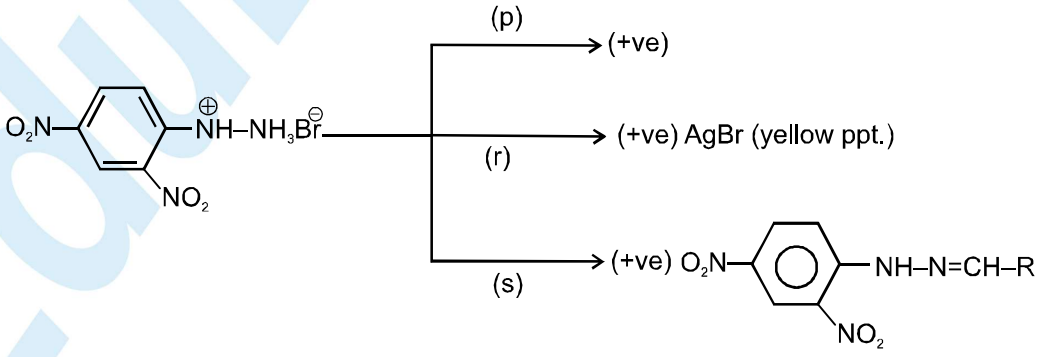
(orange-red-Azodye)

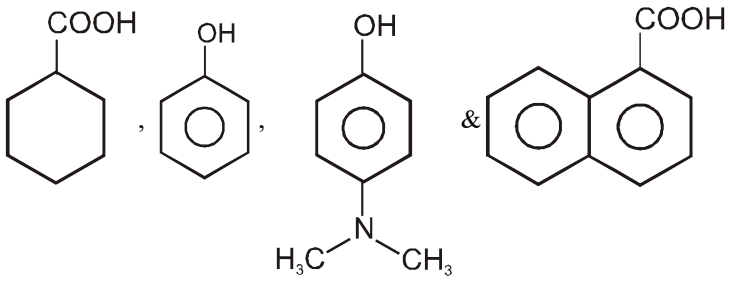
The colour of Azo-dyes,is due to extended conjugation.

3. (A) 
$H_2N-\overset{\oplus}{N}H_3-\overset{\ominus}{Cl}$
$AgNO_3$
(r)
AgCl ↓ ppt.
R–CH=O
(s)
R–CH=N–NH$_2$
(hydrazone)

(B) 
HO
$\overset{\oplus}{N}H_3\overset{\ominus}{I}$
COOH
(p)
(Prussian blue)
$FeCl_3$
(q)
Coloured Solution due to phenolic –OH
$AgNO_3$
(r)
AgI (yellow ppt.)

(C) 
HO
$\overset{\oplus}{N}H_3\overset{\ominus}{Cl}$
(p)
(+ve) because 'N' is present
$FeCl_3$
(q)
(+ve) because Ar–OH is present
$AgNO_3$
(r)
(+ve) AgCl↓ (white ppt.)

(D) 
O_2N
NO_2
$NH-\overset{\oplus}{N}H_3\overset{\ominus}{Br}$
(p)
(+ve)
(r)
(+ve) AgBr (yellow ppt.)
(s)
(+ve) O_2N
NO_2
NH–N=CH–R

4. 

are soluble in aqueous NaOH.