ULTIMATE KCET

CRASH COURSE 2026

Chemistry | Lecture - 03

General organic chemistry

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Recap *of previous lecture*

1. IUPAC Nomenclature
2. Reactive intermediates
3. MCQS
4. Isomerism
5. Electronic effects

Topics to be covered

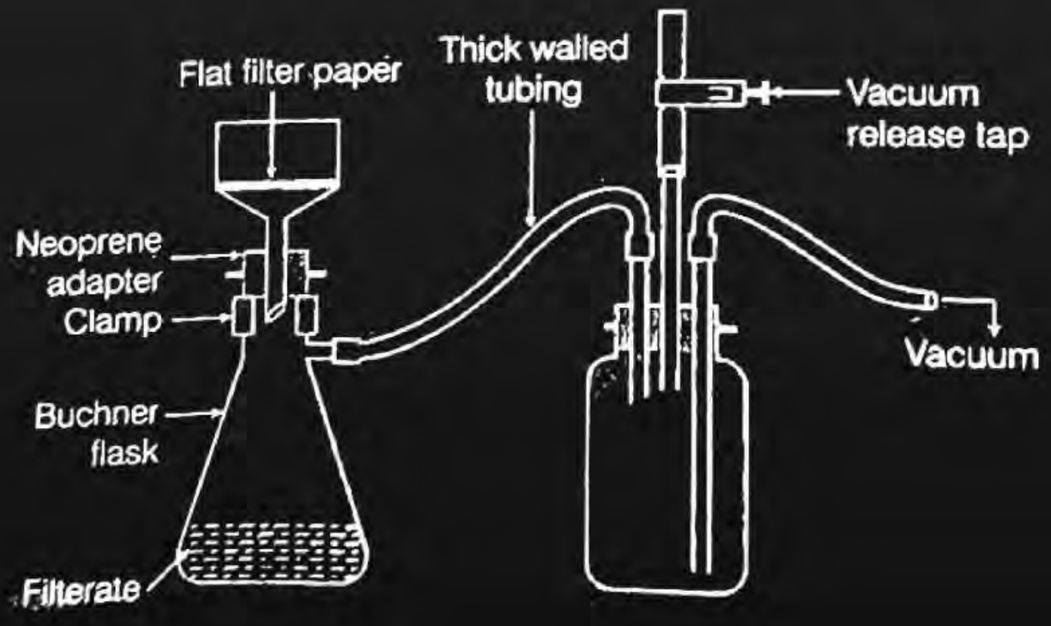
1. Purification methods
2. Qualitative and quantitative analysis

1 or 2 Qsn

→ practical chemistry

Filtration

It is a process used to separate solid material from solution by using a filter medium, i.e. a solvent. This process is very slow and takes a long time. The simplest filtration apparatus is a filter funnel with a filter paper



Purification methods

- Filtration (+)
- Crystallisation → solvent
- Sublimation
- Distillation
- Differential Extraction
- Chromatography

O.C → soluble → solvent

Toluene (CS2) → benzene (CCl4)

O.C

impurities should not be soluble in solvent

Residue

Crystallisation

O.C → glucose

glucose + H_2O → solvent

→ heat

O.C

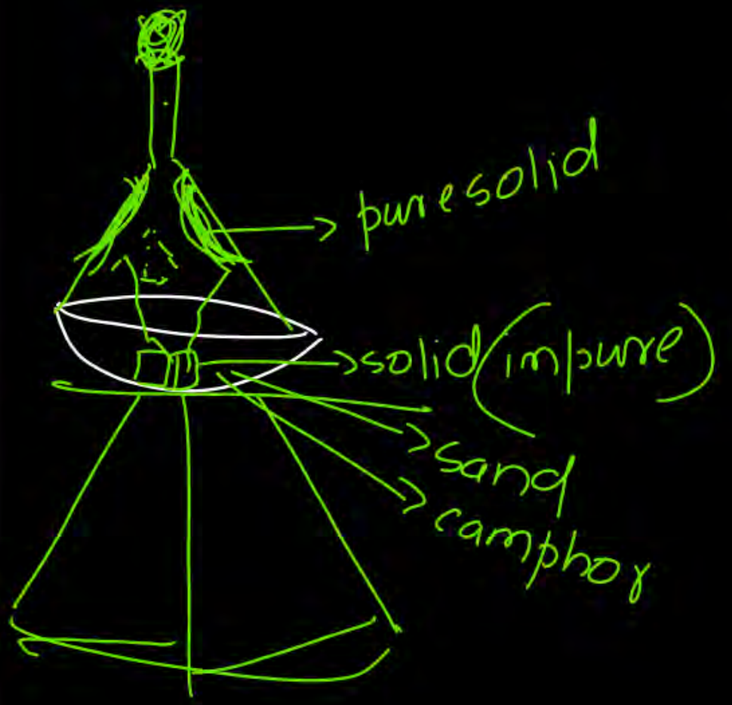
impurities → do not dissolve in water or solvent at high temp.

glucose + water

↓ cool → at room temp

Sublimation / atomisation

Solid $\underset{\text{deposition}}{\overset{\text{sublimation}}{\rightleftharpoons}}$ gas

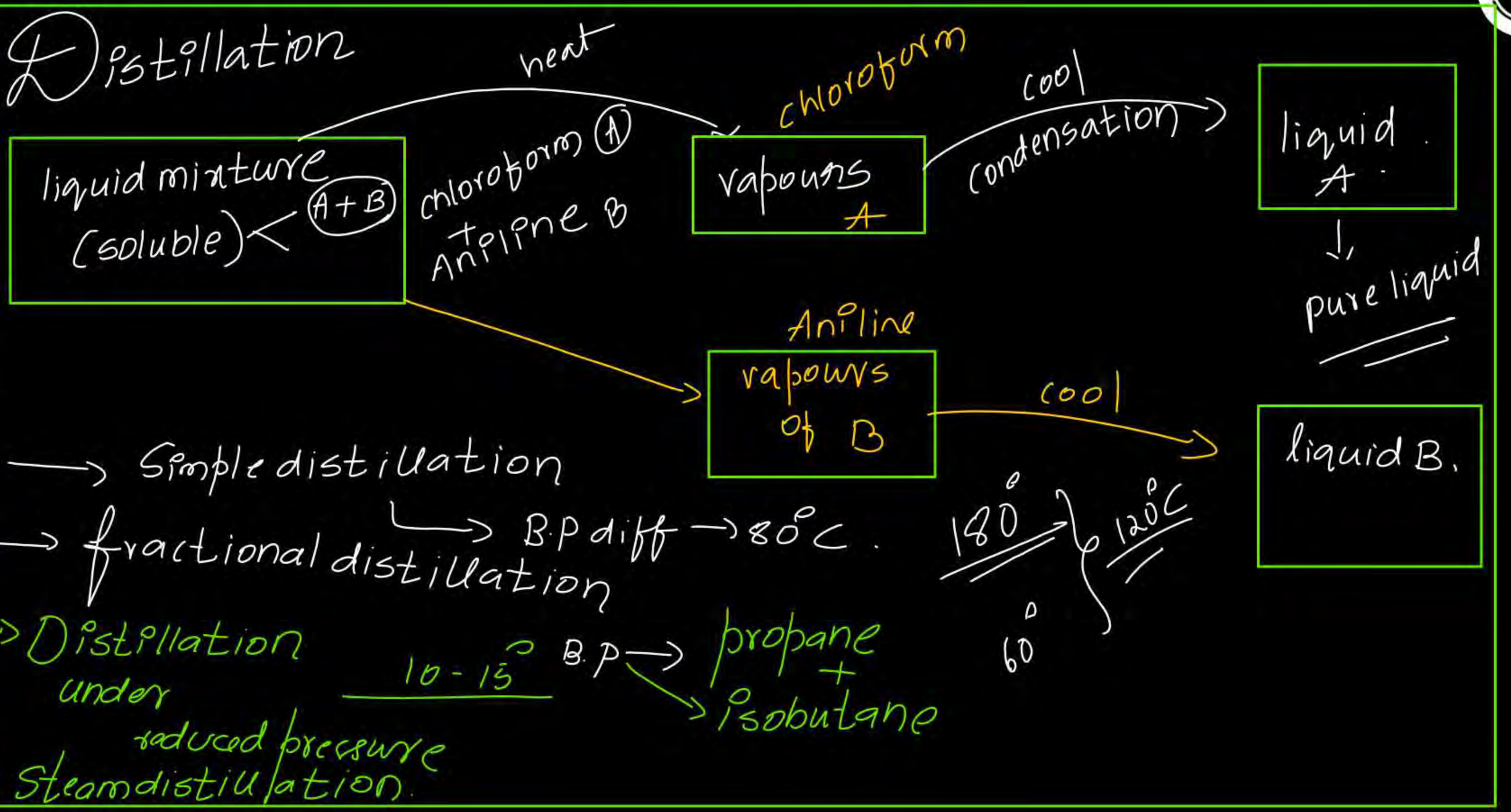


* Solid CO_2 → dry ice
* NH_4Cl
* I_2 crystals
* Naphthalene ball
* Camphor

impurities → should not sublime.

Nonsublimate

Distillation



Some examples that uses filtration process for purification

Sl.No.	Mixture	Solvent	Insoluble	Filtrate
1.	Naphthalene and urea	Hot water	Naphthalene	Urea (recovered by evaporation)
2.	Anthracene and benzoic acid	Hot water	Anthracene	Benzoic acid (recovered on cooling)
3.	Oxalic acid and para-dichloro benzene	Hot water	para-dichloro benzene	Oxalic acid (recovered by evaporation)

Sublimation

- Thus, non-sublimate impurities from a sublimate compound can be separated by this method.
- Impure samples of naphthalene, anthracene, camphor, benzoic acid, NH_4Cl, $HgCl_2$, dry ice, salicylic acid, iodine etc., can be purified by this method provided that impurities are non-volatile.

Procedure

$$\text{Solid} \xrightarrow{\text{Sublimate}} \text{Vapours} \xrightarrow{\text{Cool}} \text{Solid}$$

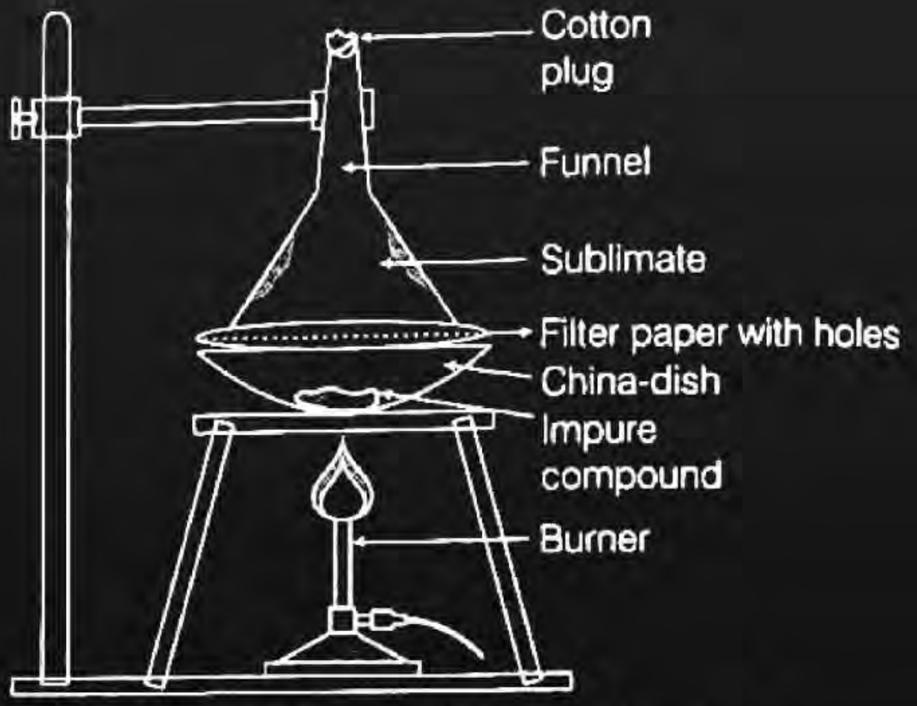


Fig. 20.2 (a) Ordinary sublimation

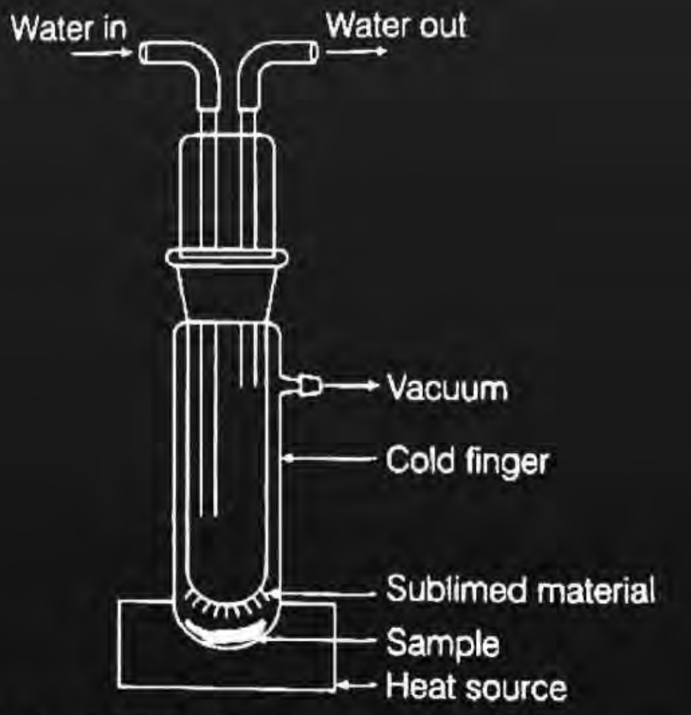


Fig. 20.2 (b) Sublimation under vacuum

Crystallisation

This method is based on the differences in the solubility of the organic compound and its impurities in a suitable solvent.

This method involves the following steps:

(i) Preparation of the solution:

- Impure organic compound is dissolved in a suitable solvent by heating.
- solvent should not dissolve the impurities,
- they should be chemically unreactive with the compound.

(ii) Filtration of the solution: The hot solution obtained above is then filtered immediately.

Distillation

This method is used, if organic liquid is stable at its boiling point and contains a non-volatile impurity. When the given liquid is heated to its boiling point, it is converted into vapours and the vapours on cooling condense to give back the original liquid in its pure form.

$$\text{Liquid} \xrightarrow{\Delta} \text{Vapour} \xrightarrow{\text{Cool}} \text{Liquid}$$

Distillation

- Liquids such as benzene, toluene, ethanol, acetone, chloroform, carbon tetrachloride can be purified by simple distillation.
- The liquid obtained is called distillate.
- This method can be of various type depending upon the condition and methodology used.

Types of distillation – Simple distillation:

imp

Simple distillation:

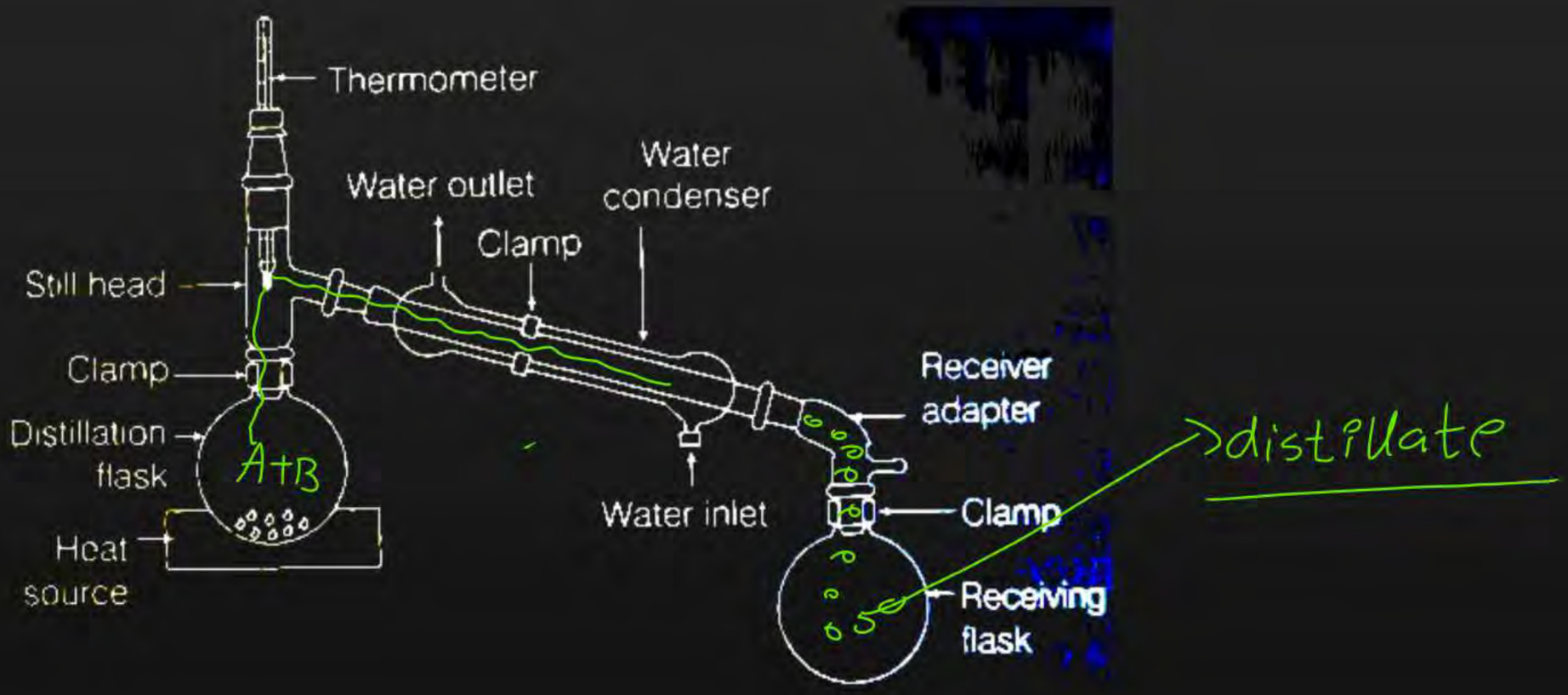
When liquid sample has non volatile impurities or when the difference in boiling points of components is 80° or more.

Mixutre of chloroform (bp 334 K) and aniline (bp 457 K). Ether and toluene, hexane and toluene etc.

Procedure :

Mixture is heated in a round bottom flask fitted with a water condenser. Vapours of lower boiling component are formed first which collected on condensation

Vapours of higher boiling components are formed later and condensed in the same way.



Fractional distillation

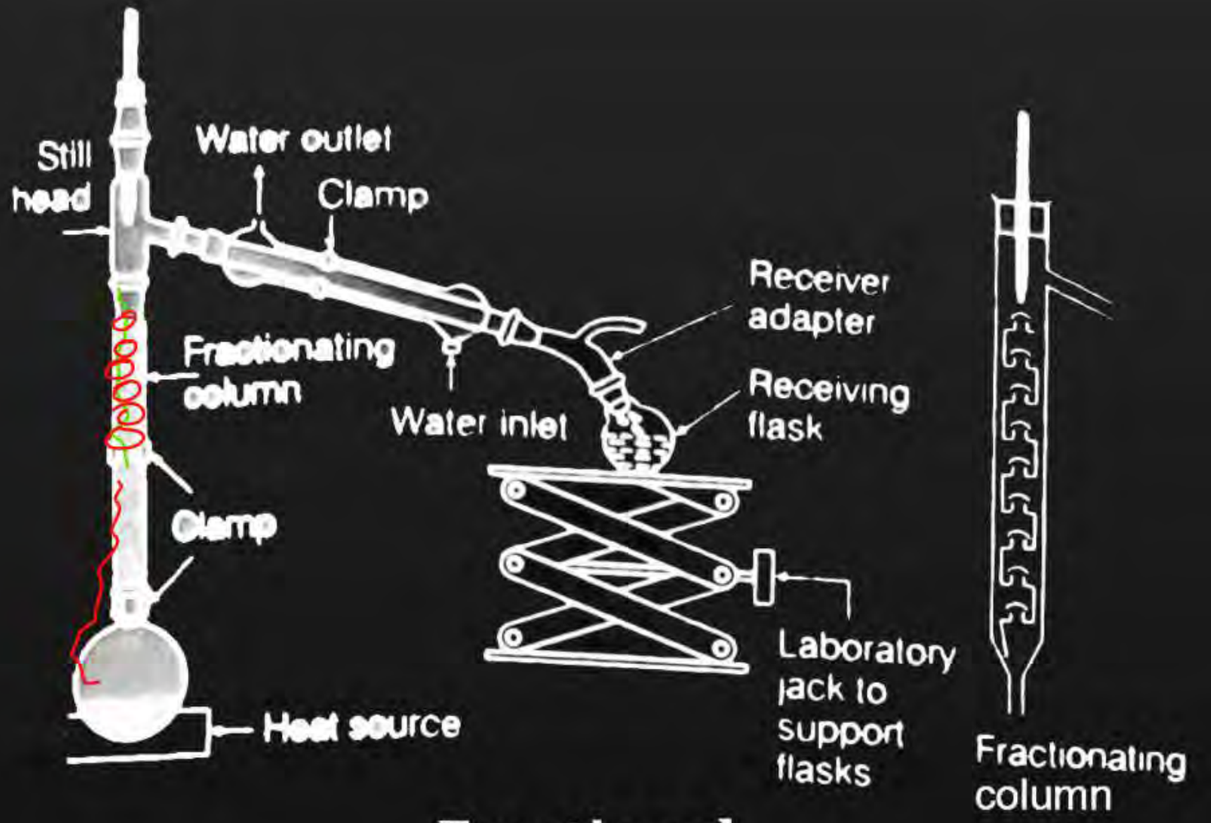
When the difference in boiling points of two liquids are not too much, i.e vapours of both the liquids are formed almost simultaneously. In such cases fractional distillation technique is adopted.

- Crude oil in petroleum industry, mixture of acetone and methyl alcohol.
- The difference between the boiling point of different components in these cases is **10-15 K.** 10 - 15 °C

Fractional distillation

Procedure

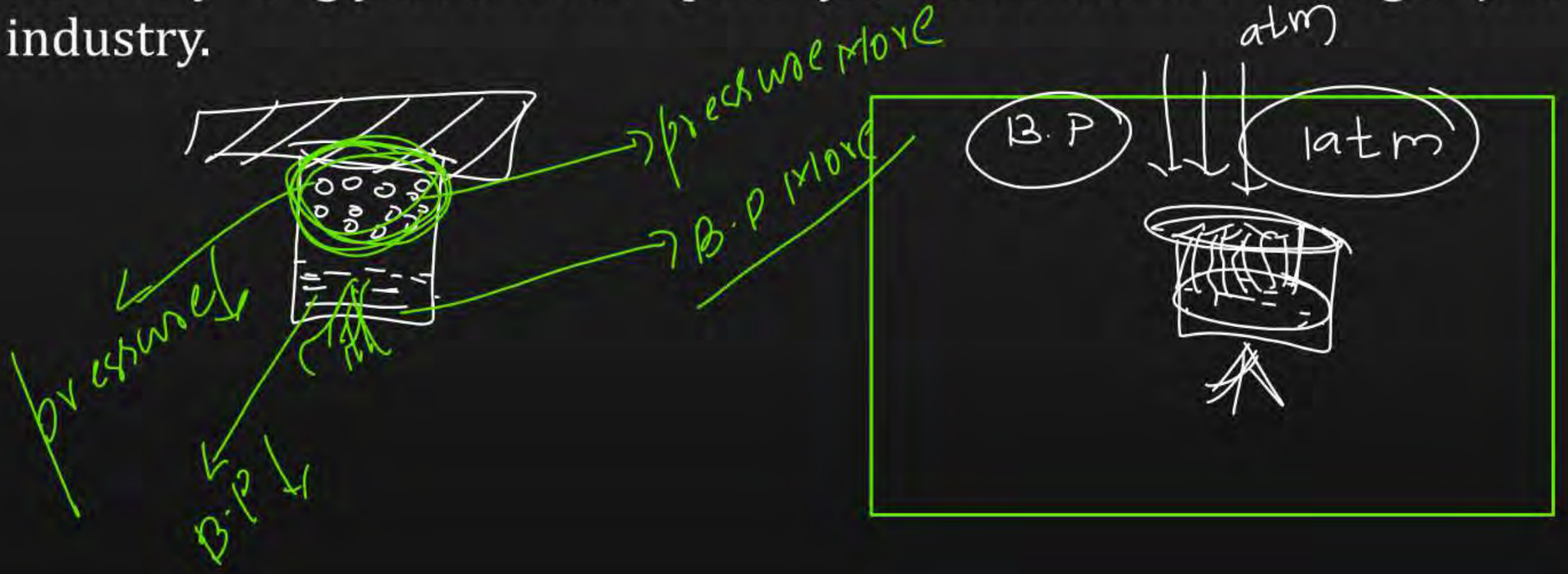
Fractionating columns of various types are used..



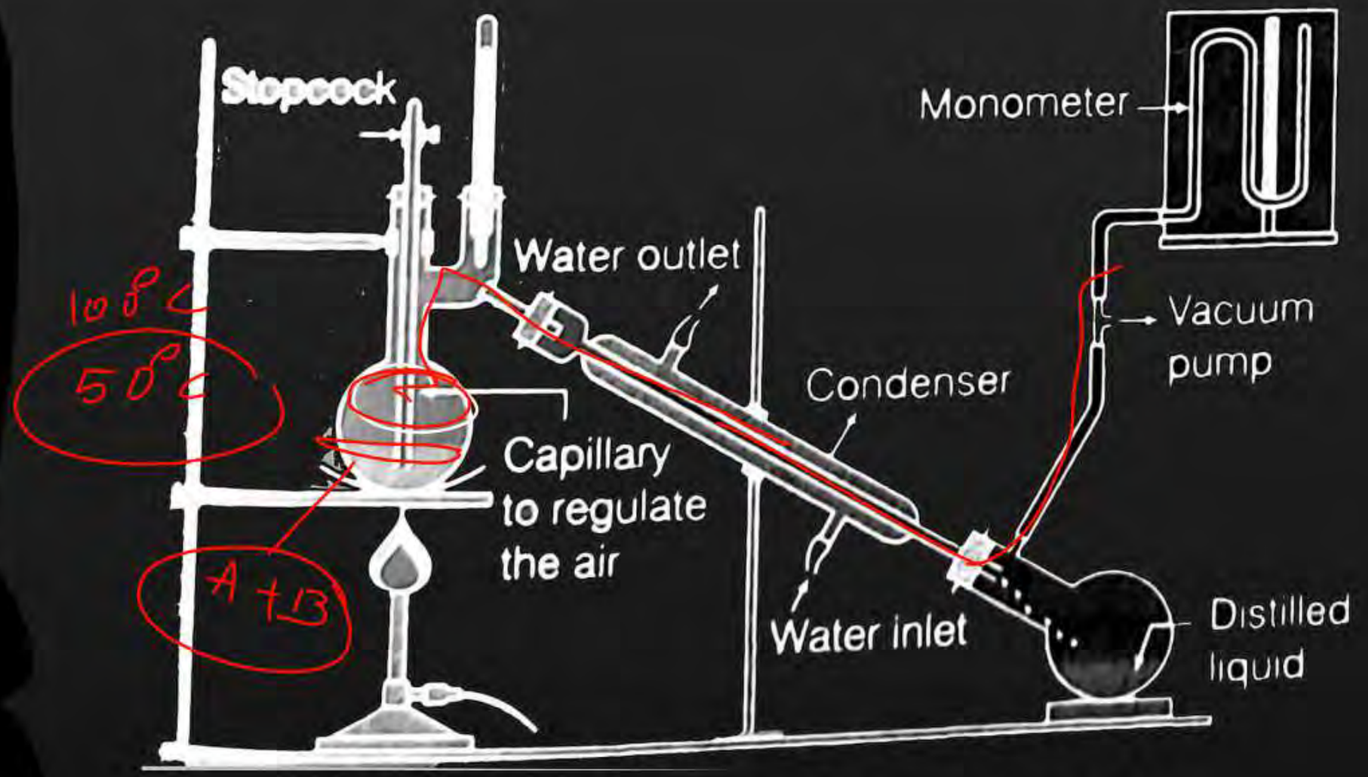
Fractional Distillation

Distillation under reduced pressure

- If the liquid decomposes at its boiling point then it can be made to boil at lower temperatures by the application of reduced pressure.
- Recovery of glycerol from spent-lye, concentration of sugar juice in sugar industry.

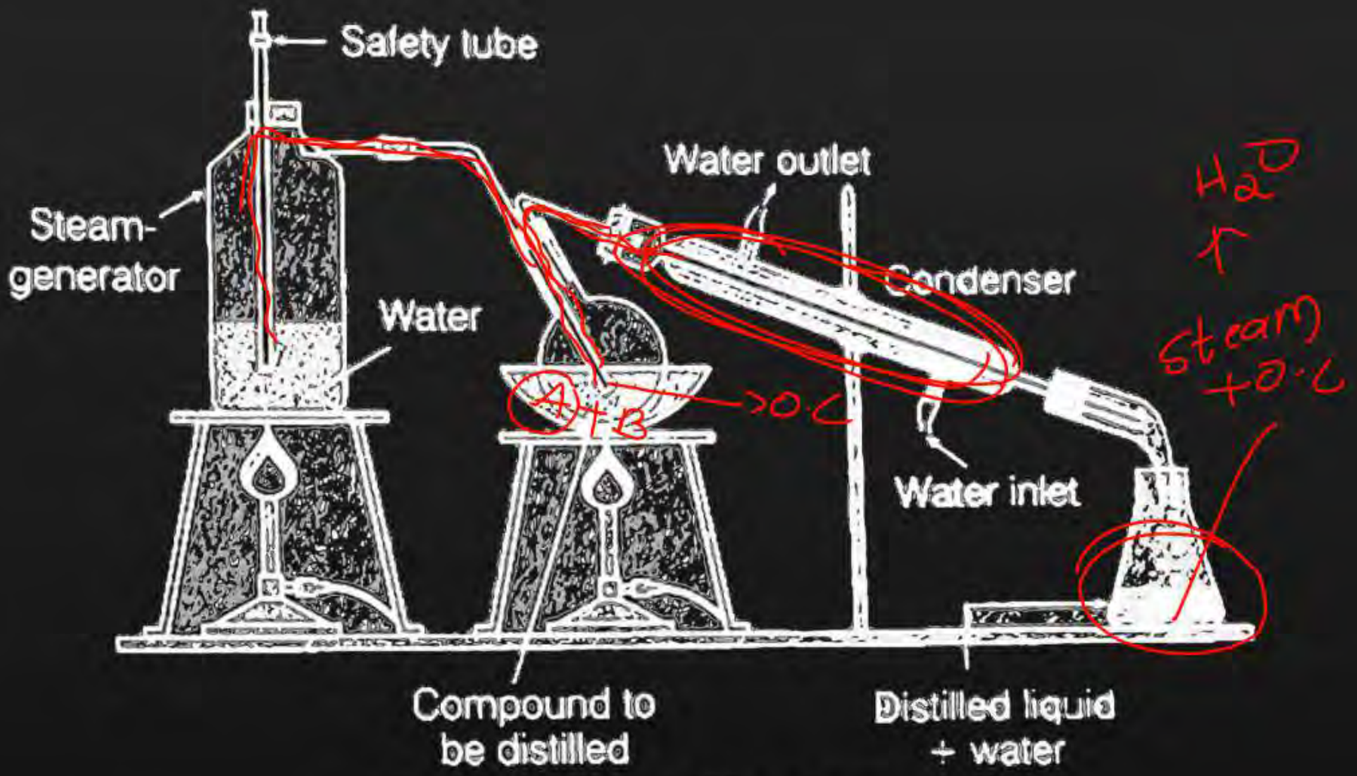


Distillation under reduced pressure



Distillation under reduced pressure (vacuum)

Steam distillation



Steam distillation

Differential Extraction

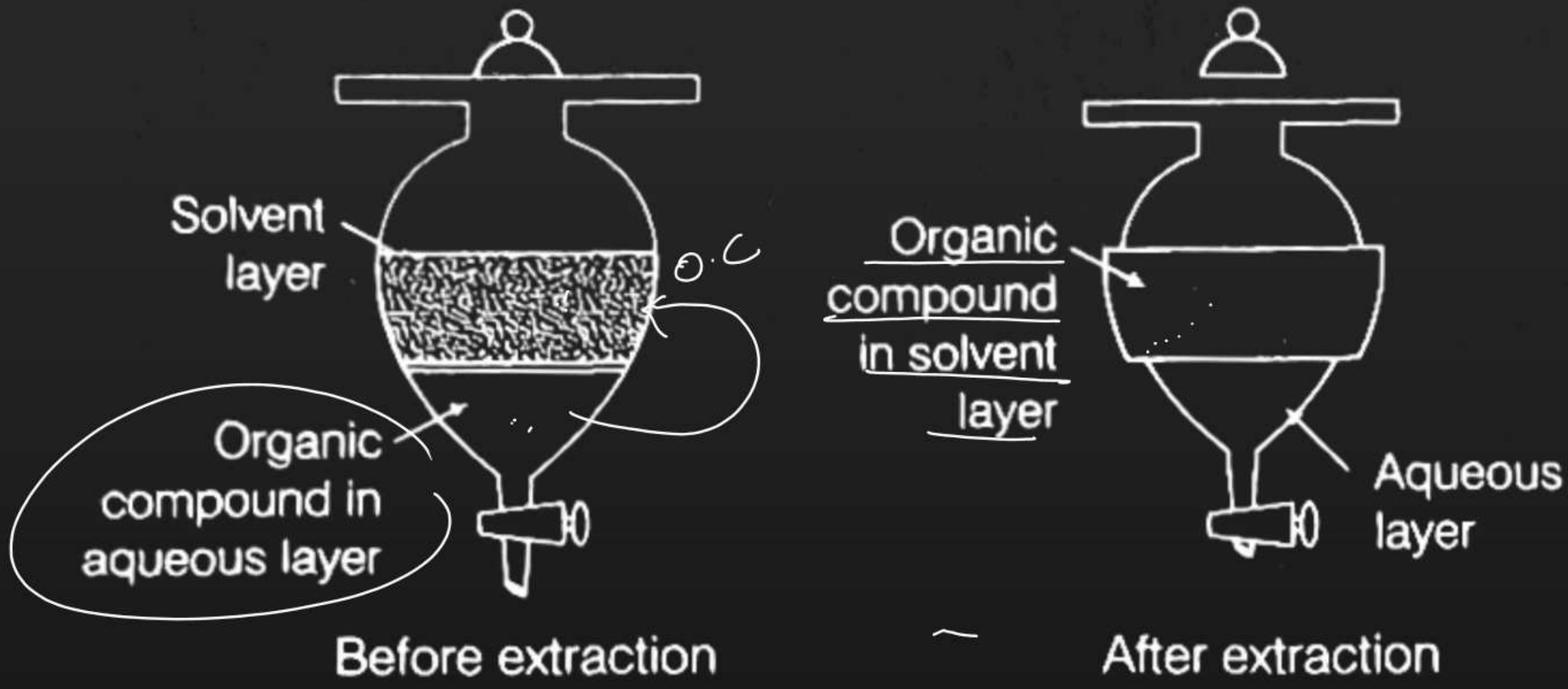
When an organic substance (liquid or solid) is present in an aqueous solution, then it can be extracted by shaking it with an organic solvent in which it is more soluble than in water.

The organic solvent and the aqueous solution should be immiscible with each other so that they form two distinct layers which can be separated by separatory funnel.

Differential Extraction

The above principle is called differential method and is carried out in a separating funnel.

$$\frac{\text{Solubility in organic solvent}}{\text{Solubility in water}} = K$$



Procedure for the process of differential extraction

Chromatography

(Chroma-color, graphy-writing)

- Chromatographic separation depends on the differences in the partition coefficients of the components of a mixture between two immiscible phases.
- One of these is the mobile phase which moves relative to the other, i.e. the stationary phase.
- The substances being separated are transported with the mobile phase.
- The partition coefficient K of a substance, in such a two-phase system is given by

$$K = \frac{C_s}{C_m}$$

Chromatography

- Where, C_s is the concentration of the substance in the stationary phase and C_m is the concentration of the substance in the mobile phase.
- Thus, greater the partition coefficient of a substance, the greater would be its concentration in the stationary phase; as a result of this, retention in the stationary phase would be higher and its movement with the mobile phase would be slower.

Chromatography

- **Adsorption chromatography**

This method is based upon the different rates of adsorption of different compounds by an adsorbent. Silica gel and alumina are generally used as adsorbent in this process. When the mobile phase is passed over the stationary phase (adsorbent), the components of the mixture are moved to different distances over the stationary phase and thus, they can be separated or identified.

Chromatography

1. **Column chromatography:** This method involves separation of mixture over a column of adsorbent packed in a glass tube.

   The mixture under study is poured over the column. A suitable solvent or a mixture of solvents (depending on the nature of components) is allowed to flow down the column slowly.

Depending upon the degree to which the compounds are adsorbed, partial or complete separation takes place. The most readily adsorbed substances are retained near the top and unabsorbed come down to various distances in the column as shown figure.

Alumina → Al_2O_3

→ Silicagel

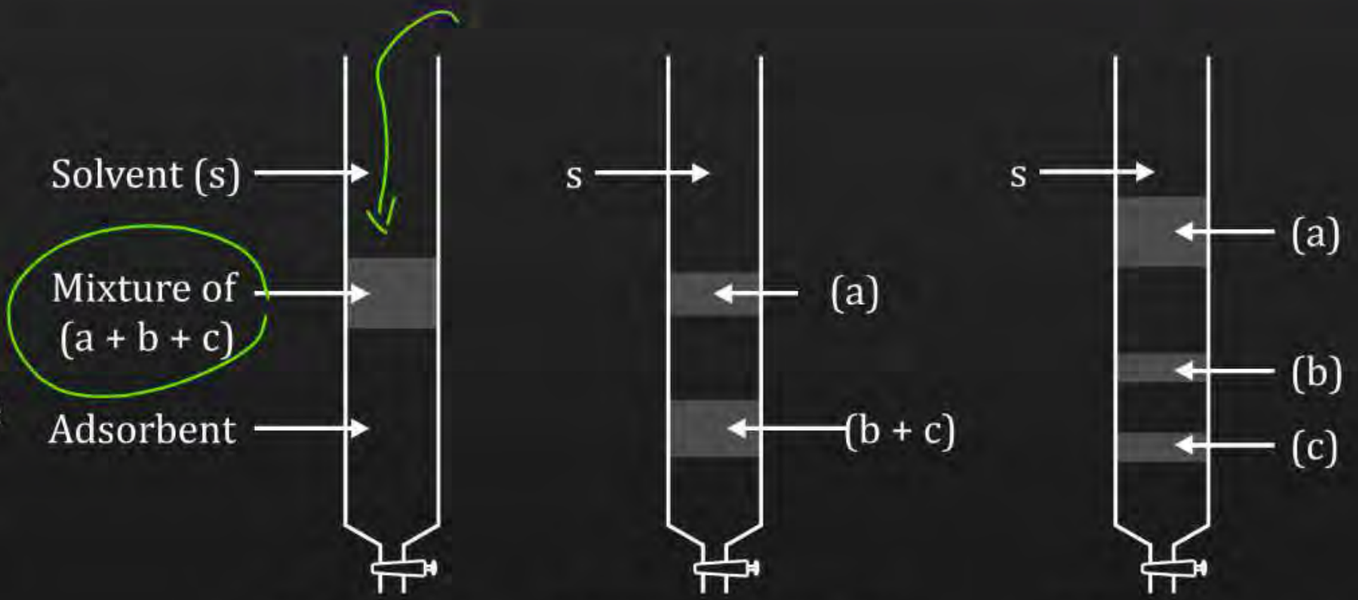
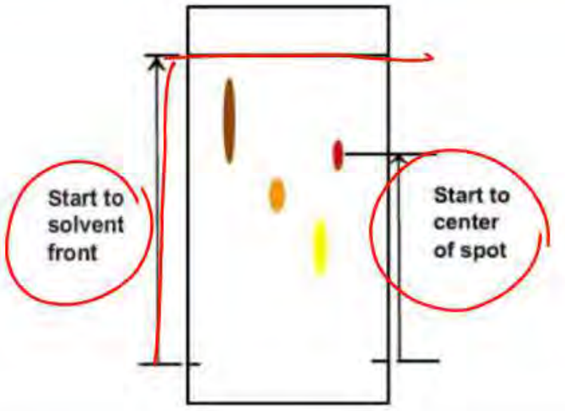


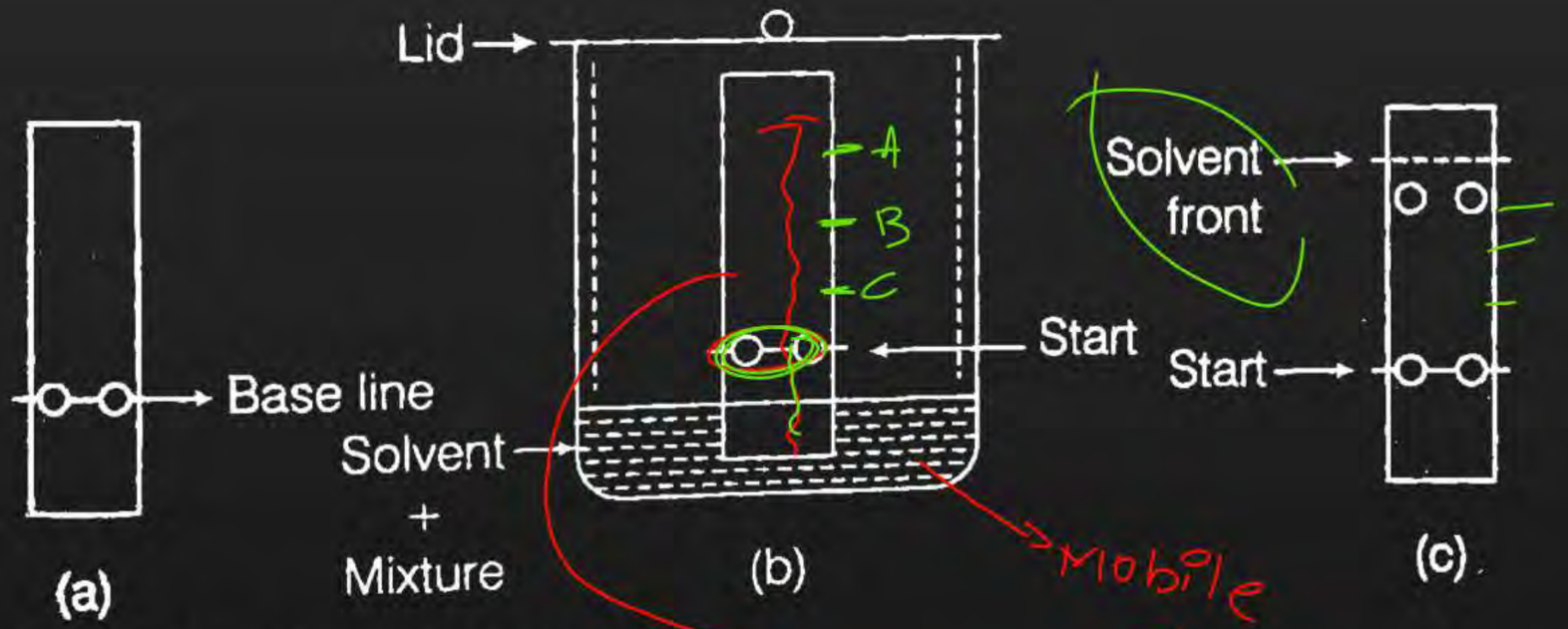
Fig. : Different stages of separation of components of mixture of (a), (b) and (c) by column chromatography.

Thin layer chromatography (TLC)

In this technique, adsorbent is the thin layer of silica gel or alumina spread over a glass plate of suitable size and spot of the mixture is placed about 2 cm above one end of the TLC plate. This treated TLC plate is placed in a closed jar having a suitable solvent. As the solvent moves up the plate, individual components move up along the plate to different distances depending on the degree of adsorption and separation takes place.

$$Rf = \frac{\text{distance moved by the substance from origin}}{\text{distance moved by solvent from origin}}$$



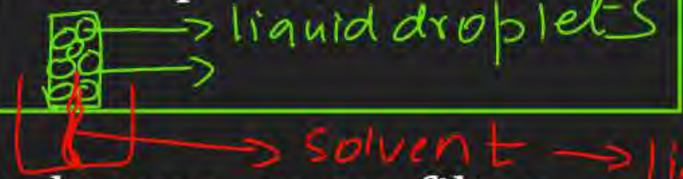


(a) TLC before development
(b) Development of TLC plate
(c) TLC after development

Partition chromatography

paper chromatography.

- It is based on continuous differential partitioning of components of a mixture between stationary and mobile phases



- It is a process used for the separation of mixtures in columns or on filter paper based on partition of a solute between two solvents one of which is immobilized by the substance in the column or by the paper.
- The stationary phase of partition chromatography is a liquid supported on an inert solid.
- Again, the mobile phase may be a liquid.

- Paper chromatography is a type of partition chromatography in which the stationary phase is a layer of water adsorbed on a sheet of paper.

- The spots of the coloured compounds in case of paper chromatography are visible at different heights from the position of initial spot on the chromatogram.
- The spots of the separated coloured compounds may be observed by the similar methods as in TLC.

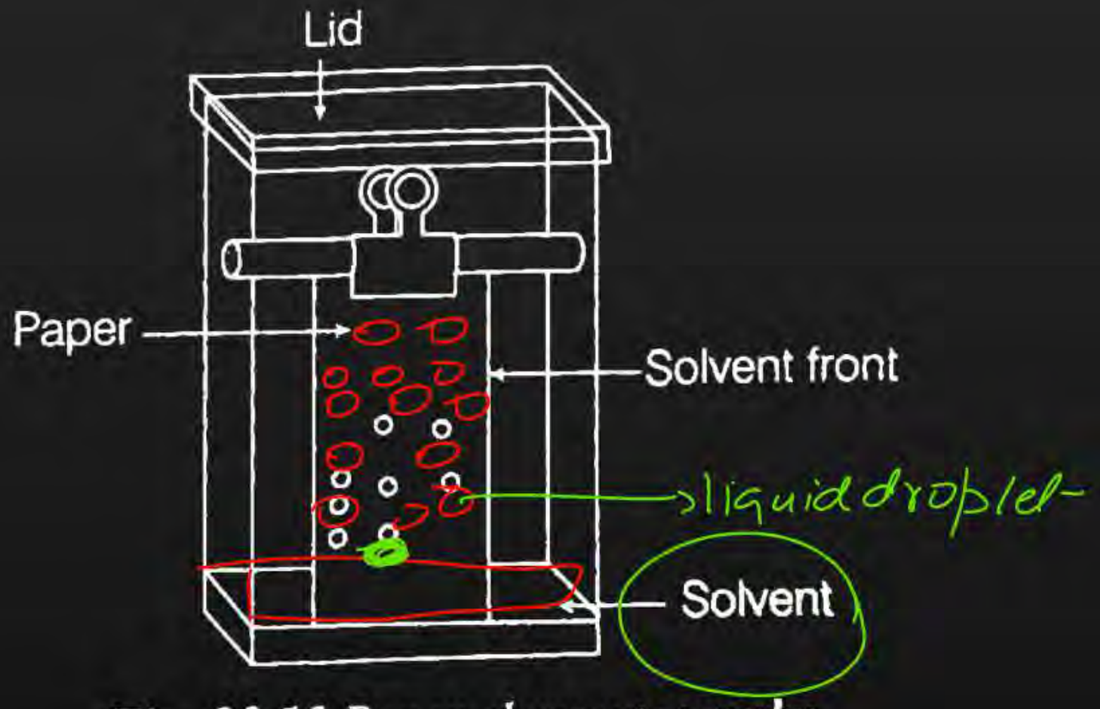


***Fig. 20.11** Paper chromatography (Liquid-liquid chromatography)*

Purification Methods

Distillation Techniques :

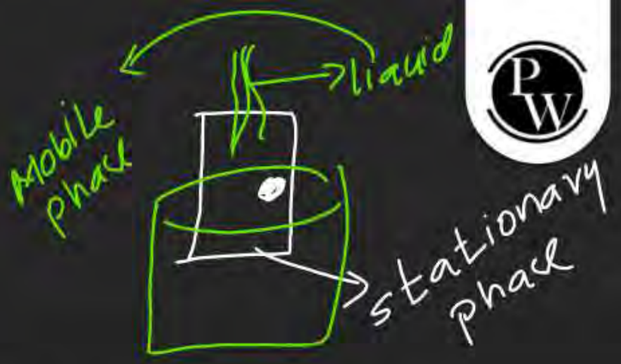
Type	Conditions	Examples
(A) Simple distillation	(i) When liquid sample has non volatile impurities (ii) When boiling point difference is 80°K or more.	(i) Mixture of chloroform (BP = 334 K) and Aniline (BP = 457 K) (ii) Mixture of Ether (BP = 308 K) & Toluene (BP = 384 K) (iii) Hexane (342K) and Toulene(384K)

Type	Conditions	Examples
(B) Fractional distillation	When BP difference is 10° 15°C	(i) Crude oil in petroleum industry (ii) Acetone (329) and Methyl alcohol(338K)
(C) Distillation under reduced pressure (Vacuum distillation)	When liquid boils at higher temperature and it may decompose before BP is attained.	(i) Concentration of sugar juice → VV IMP (ii) Recovery of glycerol from spent lye

Dalton's law

Type	Conditions	Examples
(D) Steam distillation	When the substance is immiscible with water and steam volatile. $P_T = P_1 + P_2$	(i) Aniline is separated from water ✓✓ (ii) Turpentine oil (iii) Nitro Benzene (iv) Bromo Benzene (v) Naphthalene (vi) o-Nitrophenol

CHROMATOGRAPHY



This technique initially used to separate mixture of colour pigment found in plants so named given chromatography (greek word chroma = colour).

In this technique, mixture of substances are applied on stationary phase which may be solid or liquid.

A pure solvent, mixture of solvent or a gas is allowed to move slowly over stationary phase. The moving phase is called mobile phase. The component of the mixture get gradually separated from one another.

According to principle involved, chromatography is classified into category.

(i) Adsorption chromatography

Principle – adsorption

Adsorbate – Substances which are being purified

Adsorbent – Silica gel and alumina

(ii) Partition chromatography

Principle – Continuous differential partioning of components of a mixture between stationary and mobile phase.

coloumn adsorption

Thin layer chromatography

	Adsorption chromatography		Partition chromatography
	(a) Column chromatography	(b) Thin layer chromatography	Paper chromatography
Stationary phase	Silica gel and alumina	Silica gel and alumina	Chromatography paper contain water trapped in it
Mobile phase	Eluant which is a liquid or a mixture of liquid	Liquid or a mixture of liquid	Liquid or a mixture of liquid
Process	Mobile phase flow from top to bottom in a column having stationary phase	Mobile phase flow from bottom to top over a thin layer of an adsorbent coated on glass plate	Mobile phase flow from bottom to top over chromatography paper

QUALITATIVE AND QUANTITATIVE ANALYSIS OF ORGANIC COMPOUND

Qualitative analysis : Detection of element present in compound :

(i) Detection of C and H :

(ii) $\text{Compound} + CuO \xrightarrow{\Delta} CO_2 + H_2O + Cu$

$CO_2 + Ca(OH)_2 \longrightarrow \underset{\text{Milky}}{CaCO_3} \downarrow + H_2O$

Lime water

$\underset{\text{Colourless}}{H_2O} + CuSO_4 \longrightarrow \underset{\text{Blue}}{CuSO_4 \cdot 5H_2O}$

(ii) Detection of Nitrogen, Sulphur and halogen :[Lassaigne's Test]

Preparation of lassaigne's solution or sodium extract.

Compound is heated with sodium in combustion tube and poured in cold water and heated for some time it gives lassaigne's solution or sodium extract. In lassaigne solution elements present in compound get converted from covalent to ionic.

e.g $Na + C + N \longrightarrow NaCN$

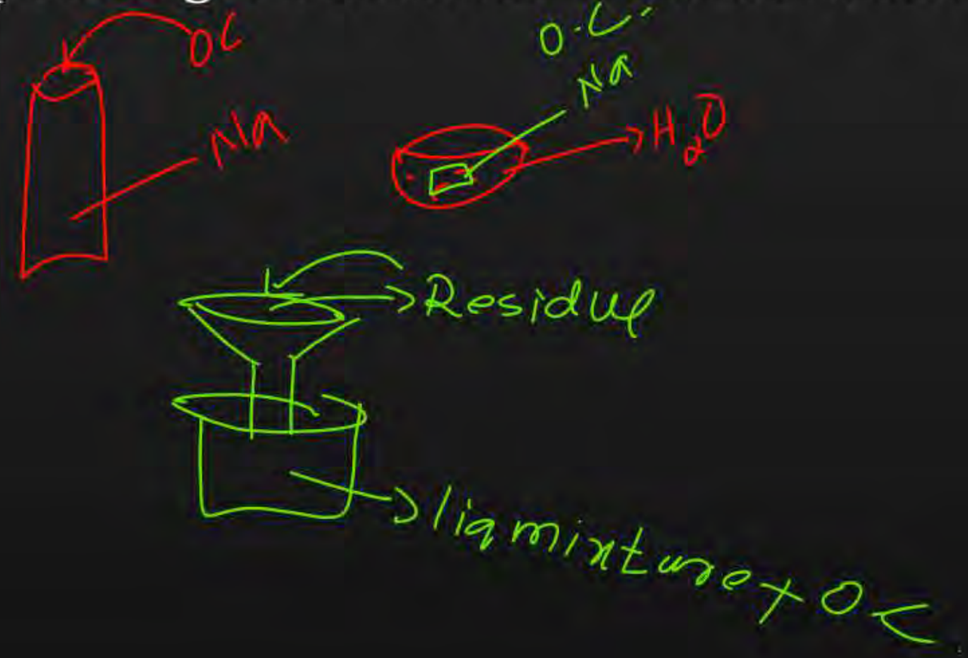
$Na + S \longrightarrow Na_2S$

$Na + X \longrightarrow NaX$ (Ionic)

Cl — NaCl

Br — NaBr

I — NaI



(i) Test of Nitrogen : Sodium extract is boiled with $FeSO_4$, which gives sodium hexacyano ferrate (II). Now few amount of $FeCl_3$ is added which gives prussian blue coloured ferro ferri cyanide that shows presence of Nitrogen.

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

$$Na_4[Fe(CN)_6] + FeCl_3 \longrightarrow \underset{\text{Prussian blue colour}}{[Fe_4(CN)_6]_3} + NaCl$$

(ii) Test of sulphur : Sulphur is present in form of $Na_2\ S$

(a) Sodium Extract is acidified with acetic acid and lead acetate is added to it which gives black ppt of PbS and shows the presence of Sulphur

$$Na_2\ S + (CH_3COO)_2\ Pb \longrightarrow 2CH_3COONa + PbS(\text{ Black }) \downarrow$$

(b) Nitroprusside test

Sodium extract + Sodium Nitroprusside ⟶ Violet colour.

$$Na_2S + Na_2[Fe(CN)_5NO] \longrightarrow Na_4[Fe(CN)_5NOS] \text{ (Violet colour)}$$

Note : If Nitrogen and sulphur both are present in compound then they form sodium thiocyanate in sodium extract.

$$Na + C + N + S \longrightarrow NaCNS$$

during test of Nitrogen in place of prussian blue, we get blood red colour of $Fe(CNS)_3$

$$Fe^{+3} + SCN^{-} \longrightarrow [Fe(SCN)]^{2+}$$

Thioryanate

blood red colour.

Therefore sodium extract is prepared in presence of excess of sodium which decomposes sodium thiocyanate.

$$NaCNS + Na\ (Excess) \longrightarrow Na_2S + NaCN$$

(iii) Test of halogen : Before the test of halogen sodium extract is boiled with conc. HNO_3 to decompose the Na_2S and NaCN in form of H_2S and HCN

$Na_2S + \text{Conc. } HNO_3 \longrightarrow H_2S \uparrow$

$NaCN + \text{Conc. } HNO_3 \longrightarrow HC$

Now sodium extract is treated with silver nitrate which gives precipitate of AgX .

$NaX + AgNO_3 \longrightarrow AgX + NaNO_3$

Cl

Br I

ppt

AgX

- AgCl
  - White ppt (Soluble in NH_4OH)
- AgBr
  - Pale Yellow ppt (Sparingly soluble in NH_4OH)
- AgI
  - Yellow ppt (Insoluble in NH_4OH)

(iv) Test of phosphorous : Compound is heated with an oxidising agent [Na_2O_2] so the phosphorus in compound is converted in to phosphate which on further reaction with ammonium molybdate in presence of HNO_3 gives canary yellow ppt of ammonium phospho molybdate and shows the presence of phosphorus.

$$\text{Compound} + Na_2O_2 \longrightarrow Na_3PO_4$$

$$Na_3PO_4 + 3HNO_3 \longrightarrow H_3PO_4 + 3NaNO_3$$

$$H_3PO_4 + 12(NH_4)_2MoO_4 + 21HNO_3 \longrightarrow$$

$$(NH_4)_3PO_4.12MoO_3 + 21NH_4NO_3 + 12H_2O$$

(canary yellow)

Quantitative analysis : Calculation of percentage of element in compound.

Estimation of carbon and hydrogen : [Leibigs method]

CO_2 H_2O

$$\% C = \frac{12 \times X_{CO_2} \times 100}{44 \times W_{(O.C)}}$$

H_2O

$2+16=18g$

$18g \longrightarrow 2g$

$+1 +1 +1 +{}^{16}O$

${}^{16}O$ ${}^{16}O$

$\longrightarrow 16\times 2 = 32.$

CO_2

$12+32$

$44g \longrightarrow 12g$ C

x of $CO_2 \longrightarrow ?$

$$\% H = \frac{2 \times X_{H_2O} \times 100}{18 \times W_{(O.C)}} \%$$

Carius method

AgCl, AgBr, AgI

$$\% X = \frac{X \times (AgX\downarrow)}{AgX \times W_{(0.c)}} \times 100$$

$\frac{108}{35.5}$ (X) ⟶ AgX

143.5

108 35.5

Ag + Cl

Cl ⟶ AgCl↓ white

Br ⟶ AgBr↓ white

I ⟶ AgI↓ white

$$\% Cl = \frac{Cl \times (AgCl\downarrow)}{AgCl \times W_{(0.c)}} \times 100 = \frac{35.5 \times AgCl}{143.5 \times W_{0.c)}} \times 100\%$$

$$\% Br = \frac{Br \times (AgBr\downarrow)}{AgBr \times W_{(0.c)}} \times 100$$

$$\% Br = \frac{80 \times (AgBr\downarrow)}{188g \times W_{(0.c)}} \times 100$$

108 + 80

AgBr = 188g.

S ⟶ $BaSO_4$ ↓ white.

P ⟶ $Mg_2P_2O_7$ ↓ white

(pyrophosphate)

$$\% I = \frac{I \times (AgI) \times 100}{AgI \times W_{(O.C)}} = \frac{127 \times (AgI\downarrow) \times 100}{235g \times W_{(O.C)}}$$

$$\% S = \frac{S \times (BaSO_4\downarrow) \times 100}{BaSO_4 \times W_{O.C}}$$

$$\% S = \frac{32 \times (BaSO_4) \times 100}{233 \times W_{(O.C)}}$$

22,400 mL
22.4 L

$N_2 = 14\ 14$
$N + N$
$= 28g$

1 Mole $= N_2 \rightarrow 28g \longrightarrow 22.4\,L$
1 Mole of N_2 gas (22,400 mL)

Duma's method $\longrightarrow (N_2)$ gas

$$\left(\frac{P_1 V_1}{T_1}\right)_{expt} = \left(\frac{P_2 V_2}{T_2}\right)_{STP}$$

$V_2 = ?$ (STP)

$$\% N = \frac{28 \times V_2 \times 100}{22,400 \times W_{(O.C)}}$$

Kjeldalh's method

$N \longrightarrow (NH_4)_2SO_4 \longrightarrow NH_3$ → gas

Ammonium sulphate

$$\% N = \frac{1.4 \times M \times 2 \times (V)}{W_{(0.6)}}$$

(V → volume of H_2SO_4)

$$\% N = \frac{1.4 \times 1M \times 2 \times (10)}{0.5}$$

$$= 56\%$$

$N \longrightarrow (NH_4)_2SO_4 \longrightarrow NH_3$

azo → $-N=N-$

pyridine

NO_2

$$\% N = 1.4 \times M \times 2(V - V_{1/2})$$

Question

Match List-I with List-II.

List-I (Test)		List-II (Reagent involved)	
A.	Dumas test	I.	H_2SO_4
B.	Hinsberg test	II.	Conc. HCl and $ZnCl_2$
C.	Kjeldahl's test	III.	CuO/CO_2 ($N \longrightarrow N_2$)
D.	Lucas test	IV.	$C_6H_5SO_2Cl$ aq. KOH

Choose the correct answer from the option given below:

(A) A-I, B-II, C-III, D-IV

(B) A-III, B-IV, C-I, D-II

(C) A-II, B-IV, C-I, D-III

(D) A-IV, B-III, C-II, D-I

Question

VIMP

During the confirmatory test, sodium extract is heated with concentrated HNO_3 before testing for halogens because

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(A) Ag_2S and AgCN are soluble in acidic medium

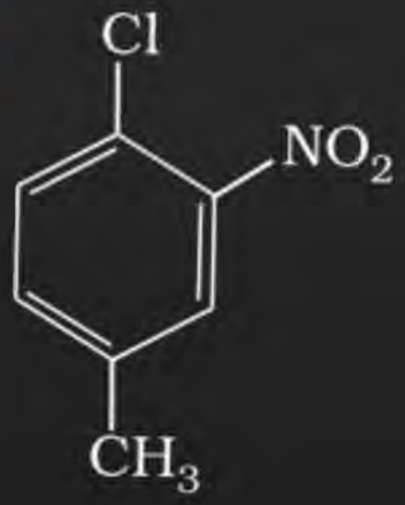
(B) silver halides are totally insoluble in nitric acid

(C) S^{2-} and CN^-, if present, are decomposed by conc. HNO_3 and hence do not interfere in the test

(D) Ag reacts faster with halides in acidic medium

Question No.–03

The IUPAC name for



Homework

A 1-Chloro-2-nitro-4-methylbenzene

B 1-Chloro-4-methyl-2-nitrobenzene

C 2-Chloro-1-nitro-5-methylbenzene

D m-Nitro-p-chlorotoluen

Question No.-06

The fragrance of flowers is due to the presence of some steam volatile organic compounds called essential oils. These are generally insoluble in water at room temperature but are miscible with water vapour in vapour phase. A suitable method for the extraction of these oils from the flowers is:

A Distillation

B Crystallisation

C Distillation under reduced pressure

D Steam distillation ✓

Steam Distillation:

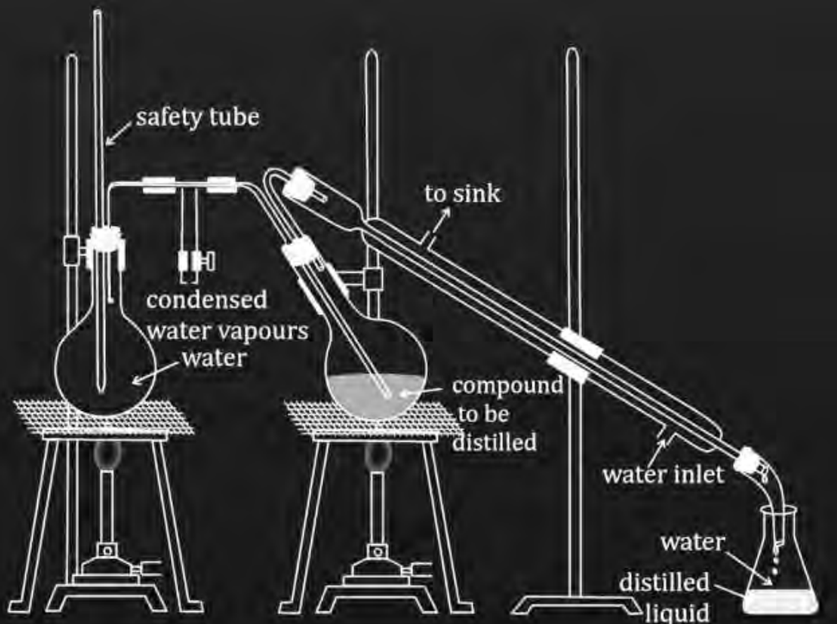
The process is employed for the distillation of those substances (solid or liquid) which

(i) are insoluble in water

(ii) have high molecular mass

(iii) have fairly high vapour pressure at about 373 K and

(v) are volatile in steam but the impurities present in them are non-volatile.



Question No.-07

During hearing of a court case, the judge suspected that some changes in the documents had been carried out. He asked the forensic department to check the ink used at two different places. According to you which technique can give the best results?

A Column chromatography

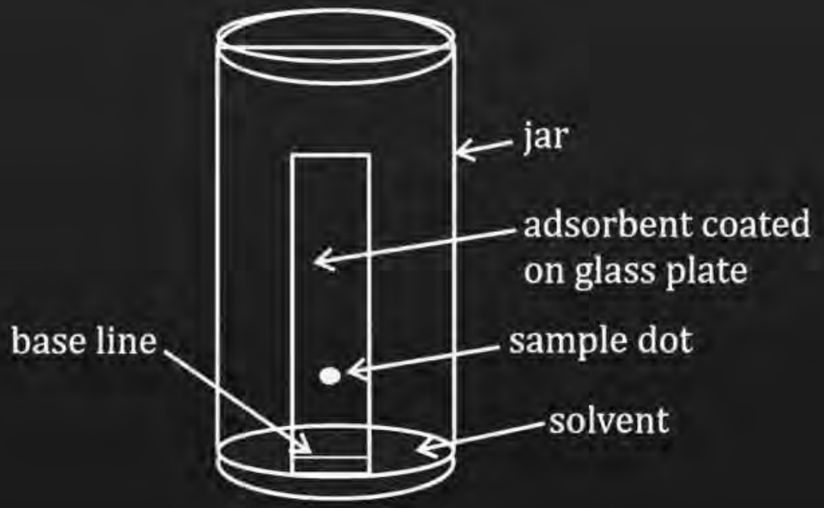
B Solvent extraction

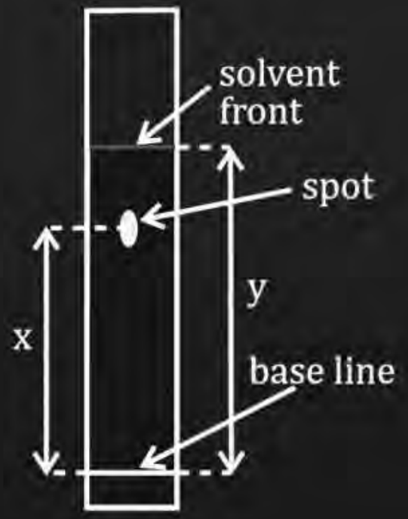
C Distillation

D Thin layer chromatography

Aminoacids separation
↓
UV light / Ninhydrin

Thin Layer Chromatography (TLC): Thin layer of adsorbent (silica gel or alumina) is spread over a glass sheet. The plate is called as thin layer chromatography plate (TLC-plate).





$$R_f = \frac{\text{Distance moved by the substance from base line (x)}}{\text{Distance moved by the solvent from base line (y)}}$$

Question No.-08

The principle involved in paper chromatography is

(A) Adsorption

(B) Partition

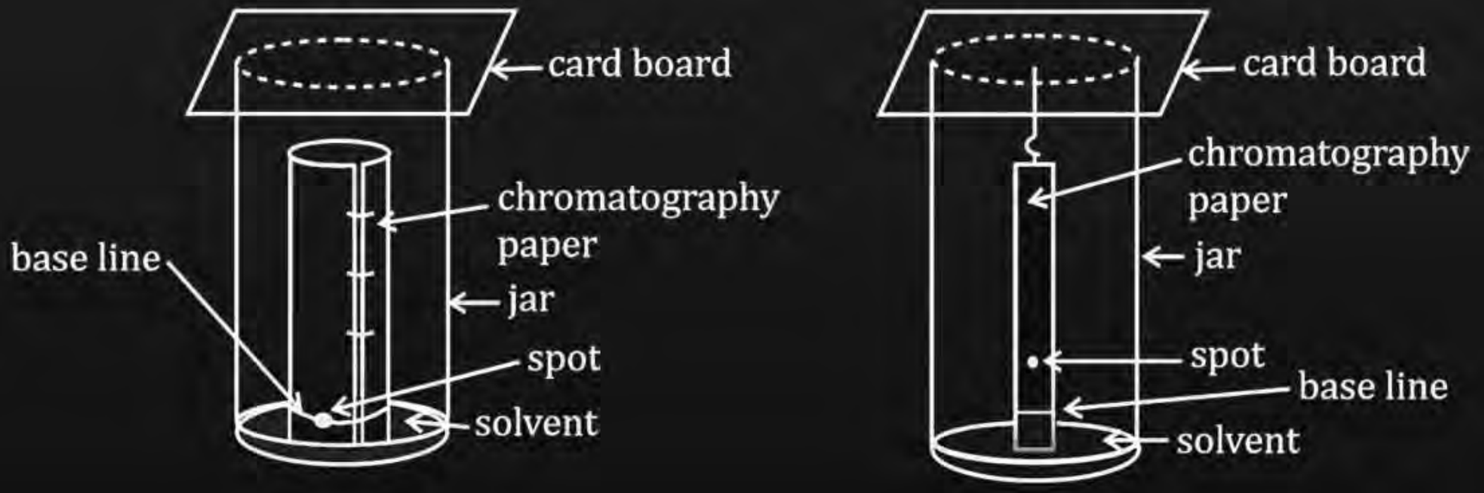
(C) Solubility

(D) Volatility

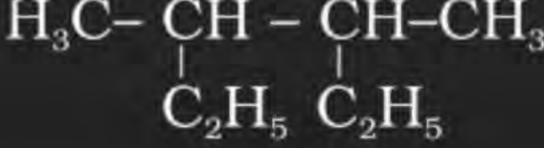
Partition Chromatography –

Paper Chromatography:

This is a special type of chromatography in which stationary and mobile both phases are liquid. Its common example is paper chromatography in which chromatographic paper is used as adsorbent surface as TLC plate in thin layer chromatography. The water trapped in paper acts as stationary phase.



Question No.–10

Correct IUPAC name for  _____.

(A) 2- ethyl-3-methylpentane

(B) 3, 4- dimethylhexane

(C) 2-sec-butylbutane

(D) 2, 3-dimethylbutane

Question No.-11

In which of the following compounds the carbon marked with asterisk is expected to have greatest positive charge?

A $*CH_3—CH_2—Cl$

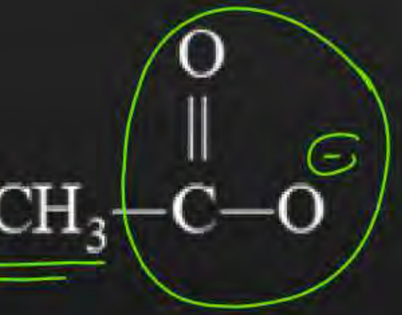
B $*CH_3—CH_2—Mg^+Cl^-$

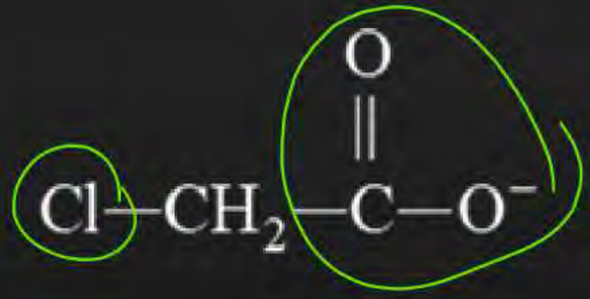
C $*CH_3—CH_2—Br$

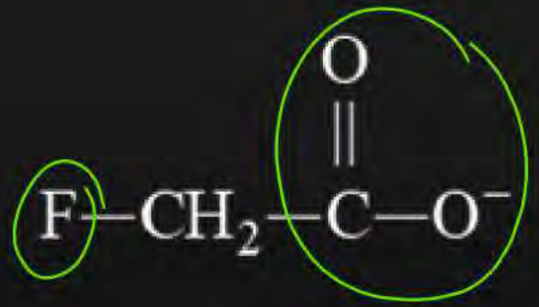
D $*CH_3—CH_2—CH_3$

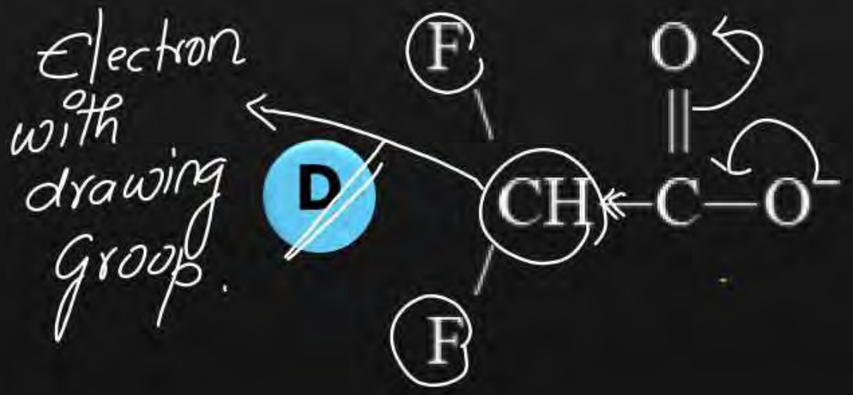
Question No.-12

Ionic species are stabilized by the dispersal of charge. Which of the following carboxylate ion is the most stable?

A 

B 

C 

D 

Question No.-13

Electrophilic addition reactions proceed in two steps. The first step involves the addition of an electrophile. Name the type of intermediate formed in the first step of the following addition reaction.

$H_3C—HC = CH_2 + H^+ \rightarrow ?$

A 2° Carbanion

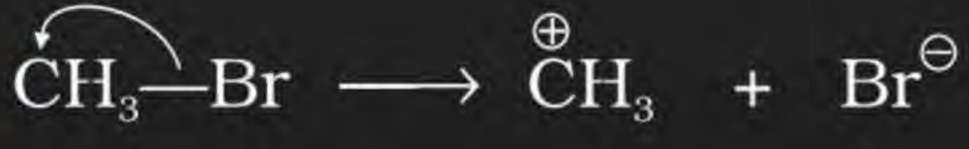
B 1° Carbocation

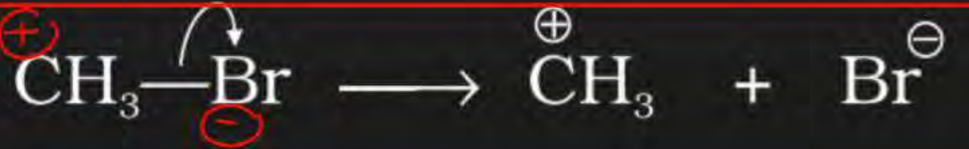
C 2° Carbocation

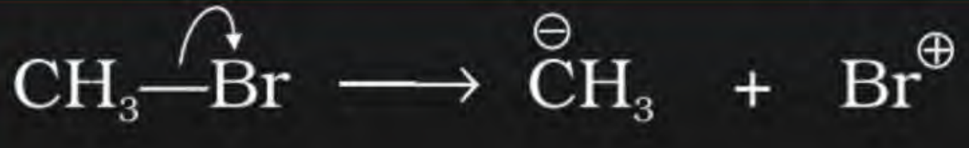
D 1° Carbanion

Question No.-14

Covalent bond can undergo fission in two different ways. The correct representation involving a heterolytic fission of $CH_3—Br$ is

A 

B 

C 

D 

Question No.-23

Match the type of mixture of compounds in Column I with the technique of separation/purification given in Column II.

Column I	Column II
(i) Two solids which have different solubilities in a solvent and which do not undergo reaction when dissolved in it.	(a) Steam distillation
(ii) Liquid that decomposes at its boiling point	(b) Fractional distillation
(iii) Steam volatile liquid	(c) Simple distillation
(iv) Two liquids which have boiling points close to each other	(d) Distillation under reduced pressure
(v) Two liquids with large difference in boiling points	(e) Crystallization

Question No.–24

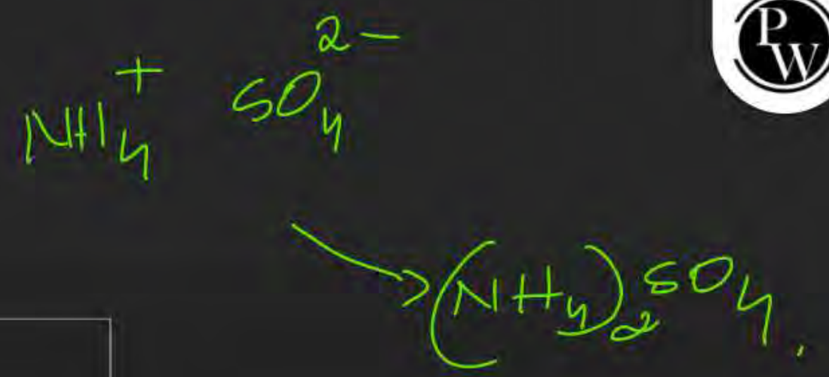
Match the terms mentioned in Column I with the terms in Column II.

Column I	Column II
(i) Carbocation	(a) Cyclohexane and 1- hexene
(ii) Nucleophile	(b) Conjugation of electrons of C–H σ bond with empty p-orbital present at adjacent positively charged carbon.
(iii) Hyperconjugation	(c) sp^2 hybridised carbon with empty p-orbital
(iv) Isomers	(d) Ethyne
(v) sp hybridisation	(e) Species that can receive a pair of electrons
(vi) Electrophile	(f) Species that can supply a pair of electrons

Question No.-25

Match Column I with Column II.

Column I	Column II
(i) Dumas method	(a) $AgNO_3$
(ii) Kjeldahl's method	(b) Silica gel
(iii) Carius method	(c) Nitrogen gas
(iv) Chromatography	(d) Free radicals
(v) Homolysis	(e) Ammonium sulphate



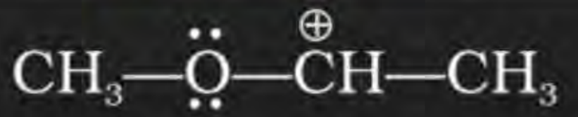
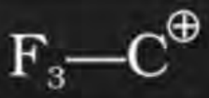
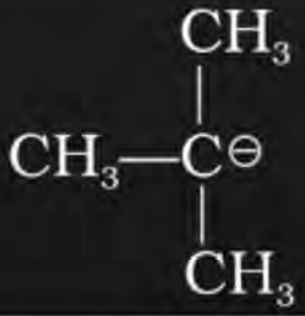
Question No.–26

Match the intermediates given in Column I with their probable structure in Column II.

Column I		Column II	
(i)	Free radical	(a)	Trigonal planar
(ii)	Carbocation	(b)	Pyramidal
(iii)	Carbanion	(c)	Linear

Question No.–27

Match the ions given in Column I with their nature given in Column II

Column I	Column II
(i) 	(a) Stable due to resonance
(ii) 	(b) Destabilized due to inductive effect
(iii) 	(c) Stabilised by hyperconjugation
(iv) 	(d) A secondary carbocation

Carius method can be used for the estimation of

A sulphur

B halogen

C Both (A) and (B)

D None of these

0.32 g of an organic compound when treated by Carius method gave 0.233 g of $BaSO_4$. The percentage of sulphur in the compound is

A. 10%

B. 15%

C. 20%

D. 25%

$$S\% = \frac{32 \times (BaSO_4 \downarrow) \times 100}{233 \times W_{(O.C)}}$$

$$S\% = \frac{32 \times 0.233 \times 100}{233 \times 0.32}$$

$$S\% = \frac{32 \times 233 \times 100 \times 100}{233 \times 32 \times 1000}$$

$BaSO_4 \longrightarrow 233\,g.$

$\longrightarrow {}^{32}S.$

Codes

	A	B	C	D	E
A	2	4	3	1	5
B	4	2	5	1	3
C	3	2	4	5	1
D	1	2	3	4	5

Column I (Element)		Column II (Formula)	
A.	Carbon	1.	$\frac{32}{233} \times \frac{100m_1}{m}$
B.	Hydrogen	2.	$\frac{12}{44} \times \frac{100m_1}{m}$
C.	Nitrogen	3.	$\frac{1.4\,NV}{m}$
D.	Sulphur	4.	$\frac{12}{18} \times \frac{100m_1}{m}$
E.	Chlorine	5.	$\frac{35.5}{143.5} \times \frac{100m_1}{m}$

QUESTION-12

How much sulphur is present in an organic compound, if 0.53 g compound gave 1.158 g of $BaSO_4$ on analysis?

A 25%

B 20%

C 30%

D 15%

Sprayer used in the detection of amino acids are

A iodine

B Benedict's solution

C Fehling's solution

D ninhydrin solution

Paper chromatography is an example of

A partition chromatography

B thin layer chromatography

C column chromatography

D adsorption chromatography

Lassaigne's test is used in qualitative analysis to detect

A nitrogen

B sulphur

C chlorine

D All of these

Kjeldahl's method cannot be used for the estimation of nitrogen in

A pyridine

B nitro compounds

C azo compounds

D All of these

- **Pyridine** → Nitrogen is present in a **heterocyclic aromatic ring**, not easily converted to NH_3
- **Nitro compounds (–NO_2)** → Nitrogen is in a highly oxidized state
- **Azo compounds (–N=N–)** → Nitrogen is present in a **stable azo linkage**

Expt $P_1 = 715 - 15 = 700$ mm Hg, $V_1 = 55$, $T_1 = 300$ K

STP $T = 273$ K $= 0^\circ$C, $P = 760$ mm Hg

In Duma's method of estimation of nitrogen 0.35 g of an organic compound gave 55 mL of nitrogen collected at 300 K temperature and 715 mm pressure. The percentage composition of nitrogen in the compound would be (Aqueous tension at 300 K = 15 mm)

$N_2 = 28\,g \longrightarrow 22{,}400$ ml

$$\left(\frac{P_1V_1}{T_1}\right)_{Expt} = \left(\frac{P_2V_2}{T_2}\right)_{STP}$$

$$\frac{700 \times 55}{300} = \frac{760 \times V_2}{273}$$

$\therefore V_2 = 46.098$ ml

A. 14.45%

B. 15.45%

C. 16.45%

D. 17.45%

$$\%N = \frac{28 \times 46.098}{22{,}400 \times 0.35} \times 100$$

$\%N = 16.45\%$

$$\therefore V_2 = \frac{(715-15)\times 55}{300} \times \frac{273}{760} = 46.098mL$$

% of nitrogen in given compound

$$= \frac{28}{22400} \times \frac{V_2}{W} \times 100 = -\frac{28}{2400} \times \frac{46.098}{0.35} \times 100$$

$$= 16.45\ \%$$

1.2 g of organic compound on Kjeldalisation liberates ammonia which consumes 30 cm^3 of 1 N HCl. The percentage of nitrogen in the organic compound is

A 30%

B 35%

C 46.67%

D 20.8%

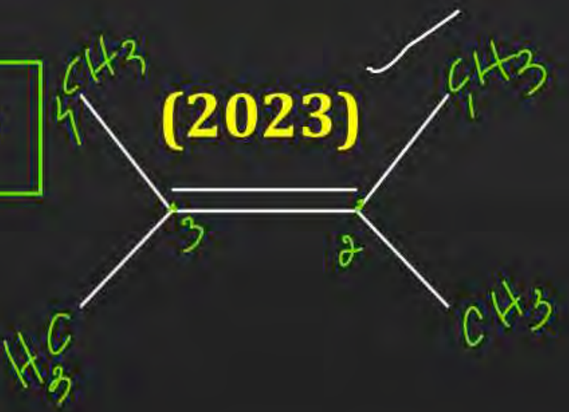
Solution:

$$\text{Percentage of nitrogen} = \frac{1.4 \times N \text{ of acid} \times \text{Vol. used with } NH_3}{\text{Weight of organic compound}}$$

$$= \frac{1.4 \times 1 \times 30}{1.2}$$

$$= 35$$

Question

IUPAC name of the compound is  **(2023)**

but + 2 – ene

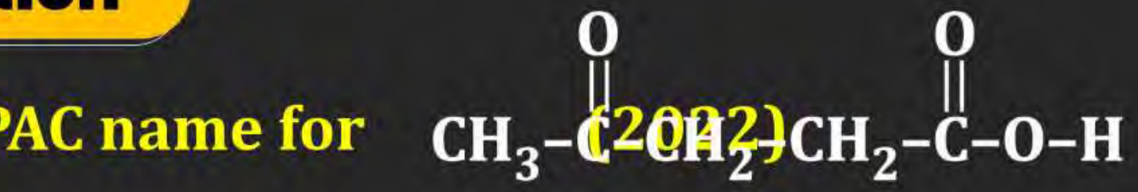
(A) 2, 3-dimethylbut-2-ene

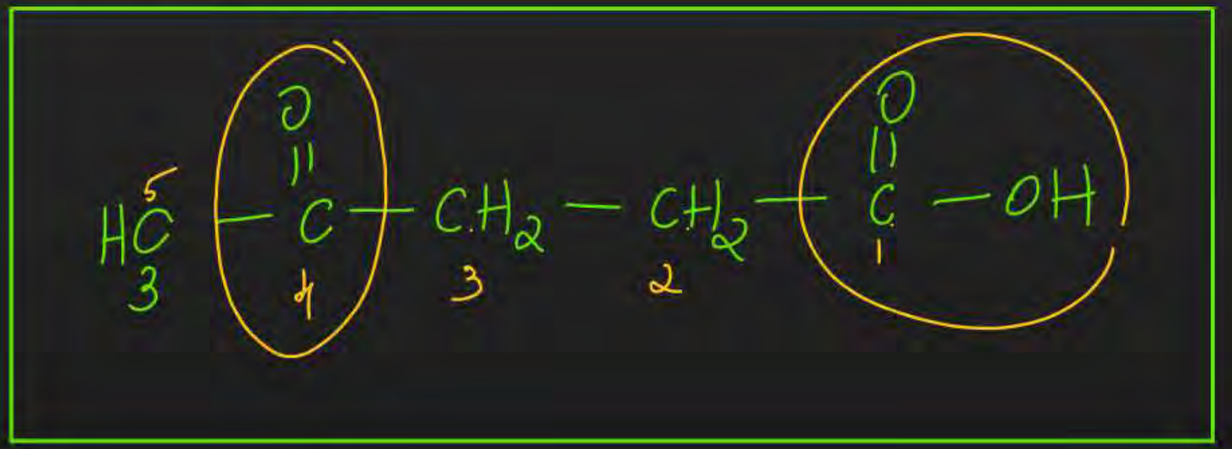
(B) 2, 3-dimethyl butyne

(C) 1, 1, 2, 2-tetra methyl ethene

(D) 2, 3-dimethyl butene

Question

The IUPAC name for  (2022)



A. 1, 4-dioxopentanol

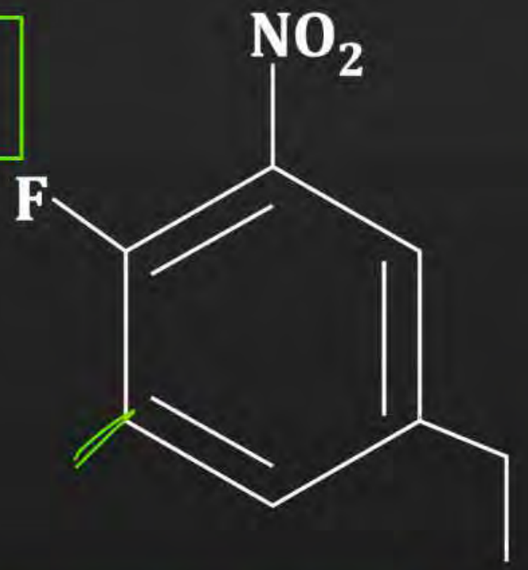
B. 1-carboxybutan-3-one

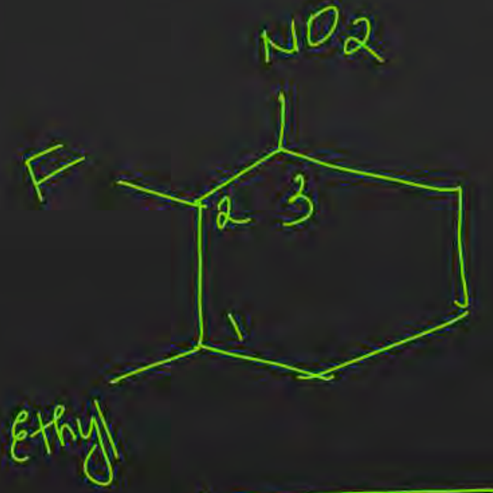
C. 4-oxopentanoic acid

D. 1-hydroxy pentan-1, 4-dione

Question

The correct IUPAC name of (2021)





1+2+3 = 6

(A) 4-ethyl-1-fluoro-2-nitrobenzene

(B) 1-ethyl-4-fluoro-3-nitrobenzene

(C) 3-ethyl-6-fluoronitroberzene

(D) 5-ethyl-2-fluoronitrobenzene

NO_2 + alkyl + Halogens

→ Lowest set of locant rule → 99.99.1

→ alphabetical order

→ Halogens, imp

Question

Which of the following is not a pair of functional isomers? (2020)

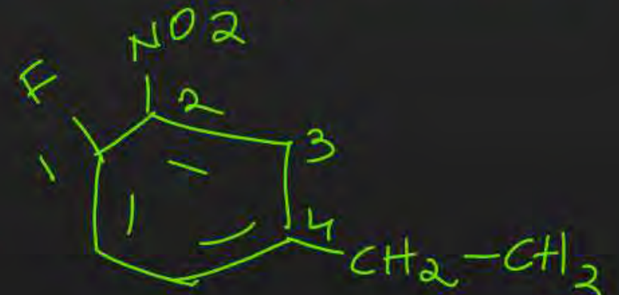
→ same molecular formula but diff. functional groups.

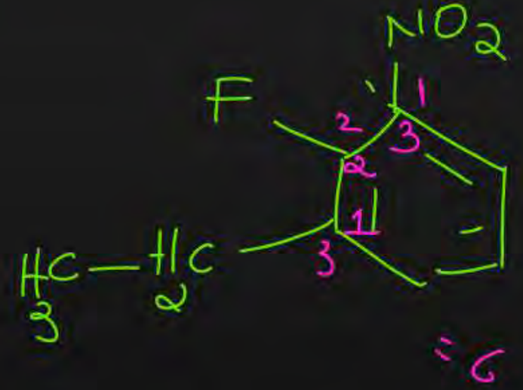
A $C_2H_5OC_2H_5$ and $C_2H_5OCH_3$

B CH_3CH_2OH and CH_3OCH_3 ✓

C $CH_3CH_2NO_2$ and H_2NCH_2COOH ✓

D CH_3COOH and $HCOOCH_3$ ✓





1+2+3 = 6

Question

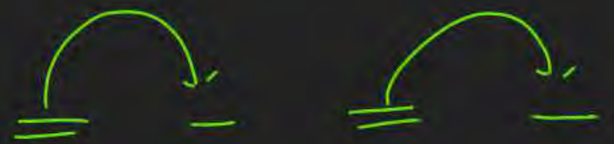
Resonance effect is not observed in (2019)

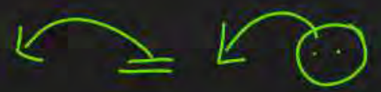
A $CH_2 = CH - CH = CH_2$

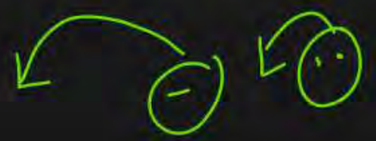
B $CH_2 = CH - C \equiv N$

C $CH_2 = CH - Cl$

D $CH_2 \equiv CH - CH_2 - NH_2$



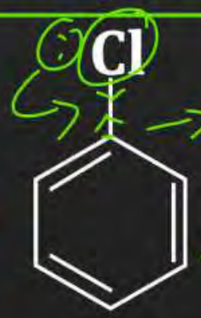




Question

C = Cl

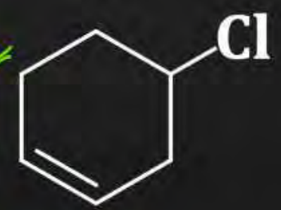
The compound having longest C–Cl bond is (2019)

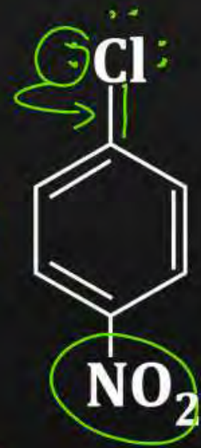
A 

sp^2

→ s orbital → 33% → electronegative

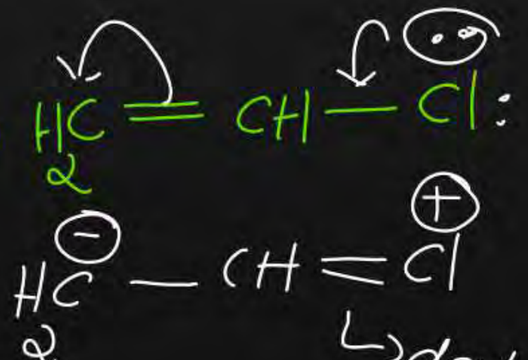
→ Haloalkane & Haloarenes

B 

C 

C = C

D $CH_2 = CHCl$

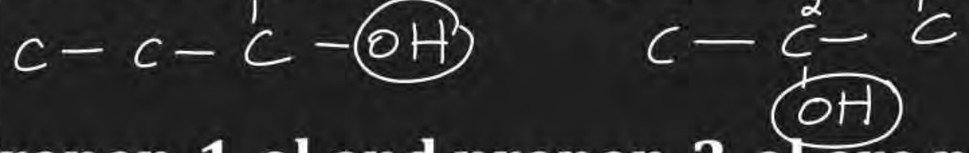


→ double length.

Question

Identify the correct statement in the following. (2017)

(A) **n-butane and isobutane are functional isomers.**



(B) **Propan-1-ol and propan-2-ol are position isomers**

(C) **Dimethyl ether and ethanol are chain isomers:**

(D) **Ethanoic acid and methyl methanoate are position isomers.**

Question

$H_2CO_3 > HCOOH > phenol > H_2O > alcohol$

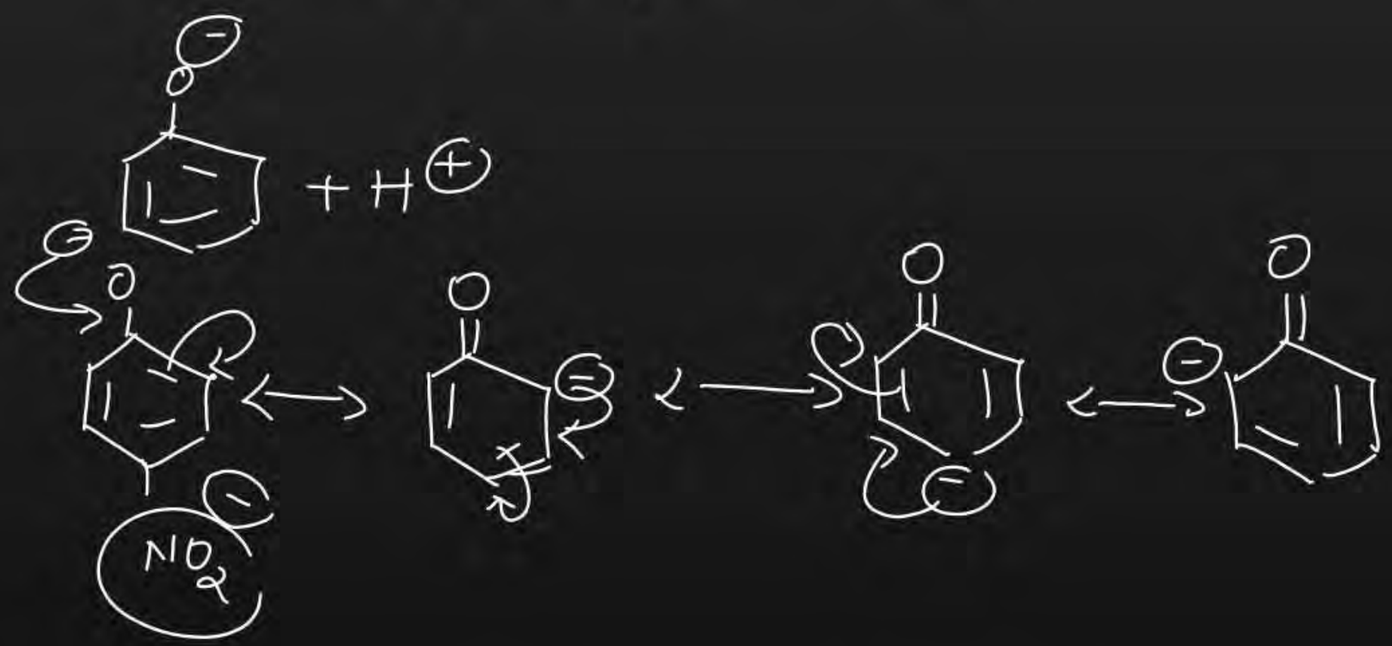
→ acidity order

Which of the following compounds is most acidic? (2016)

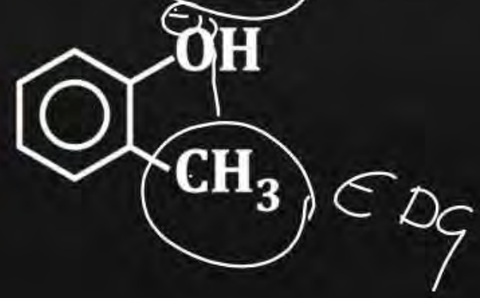
-I effect

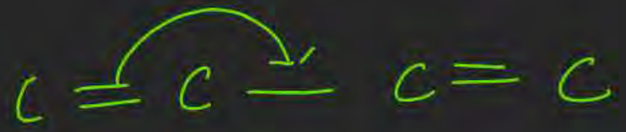
(A) $Cl \leftarrow \overset{\delta+}{C}H_2 - \overset{\delta\delta+}{C}H_2 \leftarrow OH^{\oplus}$ ⇝ $Cl-CH_2-CH_2-\overset{\ominus}{O} + H^{\oplus}$

(B) 



(C)  → strong acid. → EWG

(D)  → EDG



Thank You