Rayat Shikshan Sanstha's,

D. P. Bhosale College, Koregaon

Department of Chemistry

Chromatographic Technique (UG)
Report (2019-20)

Chromatography

History:

Mikhail Tswett, Russian Botanist (1872-1919).

In 1906 Tswett used the chromatography to separate plant pigments He called the new technique chromatography because the result of the analysis was 'written in color' along the length of the adsorbent column. Chroma means "color" and graphein means to "write".

Importance:

Chromatography has application in every branch of the physical and biological sciences. 12 Nobel prizes were awarded between 1937 and 1972alone for work in which chromatography played a vital role.

The main uses of chromatography involve: Analytical procedures, scientificresearch and Purification.

Definition:

Chromatography is a physical method of separation in which the components to be separated are distributed between two phases.One of which is stationary

(stationary phase) while the other (the mobile phase) moves through it in a definite direction.The chromatographic process occurs due to differences in the distribution constant of the individual sample components. It is used for large and small quantities so it is used quantitatively and qualitatively and proved to be more effective from the other means of separation and identification.The separation of a mixture of compounds in chromatography to its components depends on the action of two forces:

1- Mobile force (driving force) that will try to move the components ofmixture.

2- Opposing force (stationary or retardation force) that will try to keepcomponents in their places depending on many factors:

1. Solubility in mobile phase.
2. Adsorption ability of component to be separated.
3. Ionic forces.

Classification:

There are different types of chromatography classification.

- Classification of chromatography according to mobile phase:

  1- Liquid chromatography: mobile phase is a liquid. (LLC, LSC).

- Classification according to the packing of the stationary phase:

  1-Thin layer chromatography (TLC): the stationary phase is a thin layer supported on glass, plastic or aluminum plates.

2- Paper chromatography (PC): the stationary phase is a thin film ofliquid supported on an inert support.

3- Column chromatography (CC): stationary phase is packed in a glasscolumn.

Classification according to the force of separation:

1- Adsorption chromatography.

2- Partition chromatography

3- Ion exchange chromatography

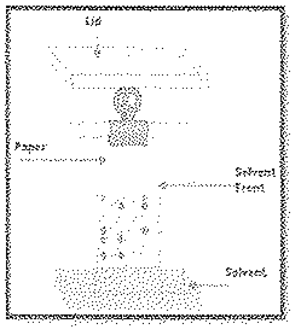
4- Gel filtration chromatography

5- Affinity Chromatography

6- Electrophoresis

Paper Chromatography

Paper chromatography is a method of partition chromatography using filter paper strips as carrier or inert support. The factor governing separation of mixtures of solutes on filter paper is the partition between two immiscible phases. One is usually water adsorbed on cellulose fibers in the paper (stationary phase).The second is the organic solvent flows past the sample onthe paper (stationary phase).



Partition occurs between the mobile phase and the stationary aqueous phase bound by the cellulose. The isolation depends on partition coefficient of thesolute.

$$K = \frac{c(stationary)}{c(mobile)}$$

General Procedure :

1- Choice of paper and solvent to be used.2- Desalting of sample.

3- Application of the sample.

4- Equilibration of paper.

5- Development.

6- Detection.

7- Identification of substances.

Techniques of development with various flow directions:

Ascending development

The paper will be dipped in the solvent mixture so that the solvent fronttravels up the paper.

Descending development

When the through of solvent will be supported at the top of the chamber. Inthis case the solvent travels down the paper.

Radial development

Circular or horizontal paper chromatography is another technique used, in which circular filter paper bearing a wick at the center of the paper is placed in apetri dish and the solvent system supplementation is through the central wick.

Multiple developments

Multiple chromatography includes all procedures in which

the development isrepeated after one development is completed.

A- Multiple developments: the chromatogram is repeatedly developed in the same direction and thus the complete resolution of two or more substances which have R_F values close together can be obtained.

As the mobile phase one can use either the same solvent system or different solvent systems.

B- two- dimensional chromatography:

When large numbers of substances are to be separated on a single chromatogram.

Development in a direction perpendicular to the first, and with a solvent system different from that used initially is often necessary.

The sample is applied on one corner of a square piece of paper and after development with the first solvent; the paper is dried, rotated 90o and developed in the second direction.

Usually, different types of solvents systems are used in each direction. It is essential that the first solvent be completely volatile.

Retardation factor can be defined as the distance moved or traveled by the compound to the distance moved by the solvent and it is constant for each compound when chromatography is carried out using the same technique. Mobile phase and the same conditions. Usually the R_F value is used for the identification of the separated compound by comparison with the R_F value of a standard. The R_F value is going to change if we:

1) Change the solvent.
2) Aging.
3) Impurities.
4) Temperature.
5) Saturation.
6) Solvent front must be uniform

Methods of detection:

1) Chemical detection by using chemical reagents.
2) Physical detection by using UV light.
3) Radioactive method: specific detection procedures when we use to detectseparated compounds having some radioactivity or labeled' compounds.
4) Biological methods by using certain microorganisms and are especially used' for the detection of antibiotics.

Identification of isolated compounds:

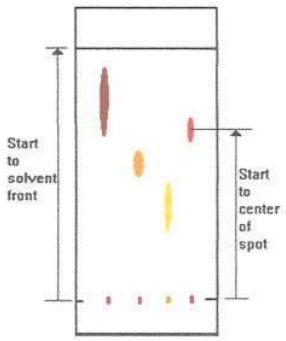
Identifying the Spots by visualization, if the spots can be seen, outline them with a pencil.

If no spots are obvious, the most common visualization technique is to hold the plate under a UV lamp. Then the R_f(retention factor) value for each spot should be calculated.

It is characteristic for any given compound on the same stationary phase using the same mobile phase for development of the plates.

Hence, known R_F values can be compared to those of unknown substances to aid in their identifications.

$$R_f = \frac{\text{Distance from start to center of substance spot}}{\text{Distance from start to solvent front}}$$



*Note: R_F values often depend on the temperatureand the solvent used in the TLC experiment.

CIRCULAR FILTER PAPER CHROMATOGRAPHY

Method:

1) Prepare a circular filter paper and insert a wick in the center of the paper. Mark four pencil dots (starting points), approximately 1 cm from the wick.

2) Apply the sample on pencil dot (3 different magic colors and ink).

3) Place a chromatographic paper over the dish that contains the mobile phasein such a way that develops to about 4-5cm.

4) Remove the chromatogram, mark the solvent front and dry at roomtemperature.

5) Examine the chromatogram by the daylight and calculate the R_f value foreach separated spot.

6) Make full report.

Not: mobile phase is prepared by shaking n-butanol, acetic acid, and water (4:1:5) for 3min in a separatory funnel and collect the upper phase.

PAPER CHROMATOGRAPHY FOR THE SEPARATION OF NATURAL PRODUCTS

Separation of a mixture of natural products (Leucine and Cysteine) uses ascending paper and their identification.

Technique: one way ascending.

Paper: Whatman no.1.

Mobile phase (solvent): n-butanol: glacial acetic acid: water (4: 1:5)

Temperature: at lab.emperature.

Reference solution: 0.5% Leucine and 1%Cystein in aqueous isopropanol.

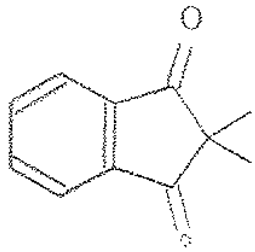
Examination: Day light after spraying and heating.

Spray: 0.1% Ninhydrine in n-butanol.

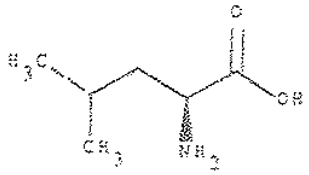
Requirement: calculate Rf values, note all colors and tabulate, the results.

What conclusions may be drawn from these results? The extracts provided contains amino acids, which are the building blocks for extracts provided contains amino acids, which are the building blocks for proteins and alkaloids, and which are readily separated by paper chromatography.

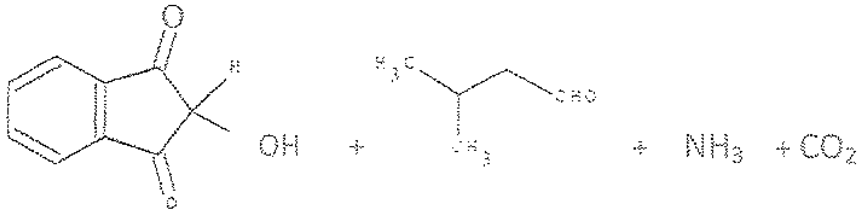
·*Note that amino acids and the spray reagent may produce different colors. Draw the chemical reaction between Ninhydrin and amino acids.



Ninhydrin



Leucine



Ninhydrine oxidatively dcarboxylate aminoacids to CO_2 and NH_3 and an aldehyde with less carbon atom than the parent aminoacids and reacted ninhydrine that react with liberated ammonia forming blue complex.

*Note: Cysteine is freely soluble in water, slightly soluble in alcohol, practically in soluble in ether. While Leucine sparingly soluble in water, practically insoluble in alcohol and in ether, it dissolves in dilute mineral acids and in dilute solutions of alkali hydroxide.

THIN LAYER CHROMATOGRAPHY (TLC)

Is a method for identifying substances and testing the purity of compounds.

TLC is a useful technique because it is relatively quick and requires small quantities of material.

Separations in TLC involve distributing a mixture of two or more substances between a stationary phase and a mobile phase.

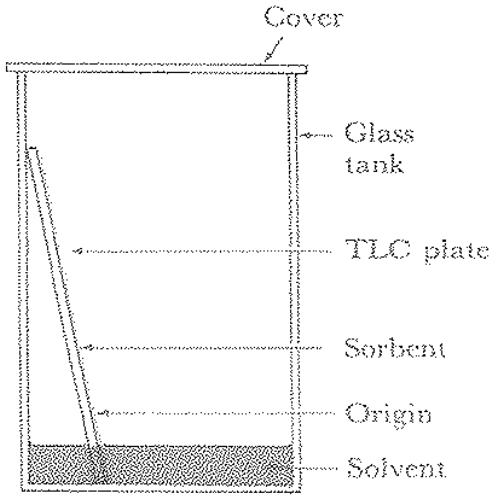
The stationary phase:

Is a thin layer of adsorbent (usually silica gel or alumina) coated on a plate.

The mobile phase:

Is a developing liquid which travels up the stationary phase, carrying the samples with it.

Components of the samples will separate on the stationary phase according to how much they adsorb on the stationary phase versus how much they dissolve in the mobile phase.



ADVANTAGES OF TLC OVER PC:

I) Fractionations can be effected more rapidly with smaller quantities ofa mixture.

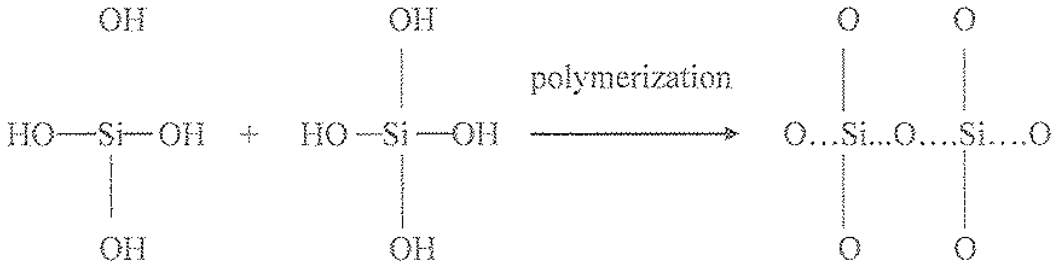
2) The separated spots are usually more compact and more clearly Identifiedfrom one another.

3) The nature of the film is often such that drastic reagents such as H_2S0_4 which would destroy a paper chromatogrnm , can be used for the locationof separated substances.

TLC ADSORBENTS:

The grain sizes of most TLC adsorbent lie between 5-50 μm. There are different types of adsorbents that have been used in TLC:

1) Silica gel is amorphous porous substances formed frompolysillicic gel.



Di- or higher polysilicilic acid

1) Alumina oxides used in chromatography containing either $-Al_2O_3$ or $X\ Al_2O_3$.

2) Kieselguhr: Naturally occurring amorphous silicic acid of fossil origin referred to as diatomaceous earth. It has a lot of impurities,water,and organic substances consist of small only slightly activesurface and relatively large pore volume (used for partition chromatography).
3) Kieselguhr G: Finally divided powder of grain size less than 60 µm, use in TLC with Gypsum used as binder.

The stationary phase in TLC is a solid stationary phase , used as a thin film and we can use plastic or glass sheath as an inert support for coating material which does not involve in the separation technique.

We can use Silica gel GF (G = Gypsum and F=Flourescence).In addition to that Alumina can be used as a coating material in TLC depending on the type or the chemical nature and the solubility of the separated compounds.

The mobile phase in TLC is a liquid and it could be a mixture of liquids or a single liquid. We have to know the solubility of the compound and determine what type of stationary phase and mobile phase should be used.

We have different types of silica gel depending on the number of free hydroxyl groups left on the silica gel:

1- Activated.
2- Inactivated. By the addition of water to silica gel we block the active sites of silica gel. If the silica gel have a large content of water, the water content is considered as a stationary phase and the mechanism ofseparation is partition.

Development Technique in TLC:

Usually the same technique used in PC can be used in TLC but mainly we are going to use ascending technique in which the TLC plates are placed in a chamber contain the mobile phase.

Detection methods in TLC:

1- Physical detection.

2- Chemical detection.

3- Biological detection.

4- Radioactive detection.

1- Preparation of slides for TLC.

Thin layer slides are prepared from slurry of the adsorbent which after spreading and drying forms a powder film over the surface of glass slide. The slurry is prepared by mixing 35gm of silica gel G with 100 ml of acetone in a jar. Three clean slides are prepared by dipping in the slurry(make sure that the slurry is well shaken before each dipping process to ensure homogenous coating of the slurry).

2- Drying of TLC slides:

Number your slides by using fine needle at the top corner then:

a- Leave slide no.1 to dry at room temp.

b- Activate slide no.2by heating in an oven at 110 C for 10 min.

c- Hydrate slide no.3 by exposing it to water vapor on water bath andallow it to dry at room temperature for 5 min.

3- Application of test mixture:

The test mixture consists of 3 dyes (Crystal violet, Methyl red, Dimethl yellow). Measure 0.5 cm. above the bottom the level of the mobile phase in the jar, this is the base line of the chromatogram. Spot the test dye mixture from a capillary tube to the base line. Repeat the same spotting procedure on slide no. 2 and slide 3.

4- Preparation of tanks:

The developing solvent used is chloroform occupy about 0.5-1 cm depth of the tanks provided, then seal the tanks with a ground glass lid and leave for 15 min. to ensure saturation of atmosphere, mark the solvent front about 3/4

length of the slide and place the slides in the developing solvent. Allow the solvent to travel to the front line, then remove from the tank and allow drying at room temp.

5- Measurement of chromatographic data:

a- Making a permanent record by examine the slides and trace them onthe paper. Label the color of each spot.

b- Calculate the R_f value of the colored spots.

c- Make a conclusion drawn from these results, state which adsorbent layer has higher order of activity? Which of the three slides give thebest separation? Why?

d- Essential experimental details of the chromatographic procedure usedshould be recorded on the chromatogram, i.e.:

Title: Thin layer chromatography.

Technique: One way ascending.

Adsorbent: Silica gel G.

Solvent system: Chloroform.

Time: Record the time required by the solvent to travel up the slide.

Temperature: Record lab. Temp.

Examination: e.g. in day light or in UV light.

e- Draw the chemical structure of the test dye mixture.

EFFECT OF SOLVENT POLARITY UPON R_F- VALUES OF ALKALOIDS

Object:

To demonstrate the effect of solvent composition upon solutemigration by TLC.

Method:

-Slides: Silica gel adsorbent – prepare microscope slides using silica gel G slurry in acetone. The slides should be air – dried at room temp.

-Samples: 0.5% solution of the following alkaloids provided in methanol:

a- Strychnine.

b-Brucine.

-Solvent systems: The following solvent systems are provided:

1) Chloroform.
2) Ethyl acetate: Iso-propanol: Conc.ammonia (100:4:2).
3) Ethyl acetate: Iso-propanol: Conc.ammonia (80:15:5).
4) Ethyl acetate: Iso-propanol: Conc.ammonia (60:30:10).
5) Ethyl acetate: Iso-propanol: 5%.ammonia (45:35:20).

- Run chromatograms of the alkaloids in solvent systems from 1-5.
- Detection: Spray with Dragendorff's reagent.

* Ensure that ammonia is removed from a slide before spraying.

- Calculate the R_F values for each alkaloid in each solvent system.

-Construct a graph for strychnine and brucine alkaloids plotting R_F values against solvent system from 1-5.

-Conclusions:

Discuss the effect of solvent polarity upon R_F value.

Column Chromatography

Introduction:

This includes chromatographic methods in which: The stationary phase is packed into a column. The mobile phase is a moving liquid or gas. According to the mechanism of separation of solutes, five major types of CC are ditinguished. Usually, one mechanism predominates but does not exclude the others.

Different Types of Column chromatography:

Mode or type	Stationary phase	Mobile phase	Mechanism
Adsorption Chromatography	Solid that attracts the solutes	Liquid or gas	Solutes move at different rates according to the forces of attraction to the stationary phase.
Partition Chromatography	Thin film of liquid formed on the surface of a solid inert support	Liquid or gas	Solutes equilibrate between the 2 phases according to their partition coefficients
Ion Exchange Chromatography	Solid resin that carries fixed ions & mobile couterions of opposite charge attached by covalent bonds	Liquid containing electrolytes	Solute ions of charge opposite to the fixed ions are attracted to the resin by electrostatic forces & replace the mobile counterions.

Term	Definition
Solvent	Mobile liquid phase with no affinity to the stationary phase (i.e. inert towards it) & no effect onsolutes.
Developer	Any liquid with more affinity to the stationary phase than the solvent but less than solutes and justcapable to move them through the column.
Effluent	Any liquid that passes out of the column.
Eluent	Any liquid that has lesser affinity to the stationaryphase than solutes but is capable to move them out ofthe column.
Eluate	Fraction of eluent containing a required specificsubstance.
Retention volume *(VR)*	(or retardation volume): Volume of mobile phasethat passes out of the column, before elution of a specific substance.

Packing & operating the column:

1- Packing

The selection of the method of packing depends mainly on the density of thesolid. Techniques used are the wet, dry & slurry methods.

In all cases avoid inclusion of air bubbles.2- Sample Application

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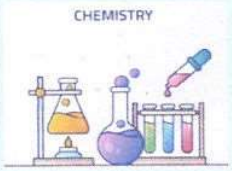

Skill Based Course (Chromatographic Techniques)

TIME TABLE (1 Nov.- 23 Nov. 2019)
(2019-20)(UG)

Class	Time	**Friday**(01/11/2019)	**Saturday**(02/11/2019)
B.Sc.-III	11.20 am-12.08pm	Theory (SDJ)	Theory (NDN)
	12.08pm-12.56pm	Theory(NDN)	Theory(NMG)
	3.00 pm-6.00pm	Practical(SDJ)	Practical(NDN)

Class	Time	**Friday**(08/11/2019)	**Saturday**(09/11/2019)
B.Sc.-III	11.20 am-12.08pm	Theory (PSP)	Theory (NAG)
	12.08pm-12.56pm	Theory(NBP)	Theory(PPJ)
	3.00 pm-6.00pm	Practical(NBP)	Practical(NAG)

Class	Time	**Friday**(15/11/2019)	**Saturday**(16/11/2019)
B.Sc.-III	11.20 am-12.08pm	Theory (NBP)	Theory (NSG)
	12.08pm-12.56pm	Theory(PSP)	Theory(KBJ)
	3.00 pm-6.00pm	Practical(PSP)	Practical(ABD)

Class	Time	Friday(22/11/2019)	Saturday(23/11/2019)
B.Sc.-III	11.20 am-12.08pm	Theory (NBP)	Theory (NSG)
	12.08pm-12.56pm	Theory(PSP)	Theory(KBJ)
	3.00 pm-6.00pm	Practical(NSG)	Practical(ABD)

SDJ - Dr. S. D. Jadhav

NDN - Dr. N. D. Nikam

NMG - Mr. N. M. Gosavi

PSP - Miss. P. S. Patil

NSG - Miss. N. S. Ghadge

NAG - Miss. N. A. Ghadge

KBJ - Miss. K. B. Jagtap

PPJ - Miss .P.P. Jadhav

ABD - Miss. A.B. Deshmukh

Course Coordinator

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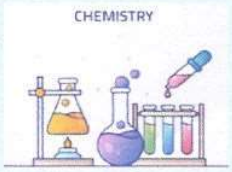

(2019-20)

Notice

Date: 25/10/2019

All the Students of B.Sc. III (Chemistry) are here by informed that Department of Chemistry going to organize your Skill Based Course (Chromatographic Techniques) has been Scheduled from 01/11/2019 to 23/11/2019 Kindly, remain present at prescribed time in lecture hall.

Course Coordinator

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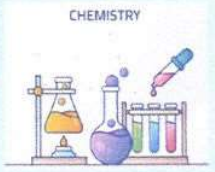

Skill Based Course (2019-20)
(Chromatographic Technique)
RESISTRATION

Sr.No	Roll No.	Students Name
1	3571	Adhav Atul Machindra
2	3572	Barge Sanket Subhash
3	3573	Belose Komal Ashok
4	3574	Bhise Varsha Maruti
5	3575	Bhosale Pranali Dnyandev
6	3576	Bhosale Ujwala Anil
7	3577	Bhosale Vijay Balawant
8	3578	Chavan Dhanadhri Shankar
9	3579	Chavan Nikita Vishvas
10	3580	Chavan Omkar Balkrishna
11	3581	Chavan Prajakta Suryakant
12	3582	Chavan Priyanka Bhaskar
13	3583	Chavan Vishal Bharat
14	3584	Dhotre Anjali Ankush
15	3585	Ghadge Ankita Anandrao
16	3586	Ghadge Kajal Somnath
17	3587	Ghadge Vaishnavi Manohar
18	3588	Ghodake Swapnali Dnyaneshwar

19	3589	Ghorpade Adavari Sambhaji
20	3590	Gorad Sagar Kailas
21	3591	Gore Aniket Dattatray
22	3592	Jadhav Ankita Satish
23	3593	Jadhav Ganesh Tanaji
24	3594	Jadhav Mangal Sayaji
25	3595	Jadhav Prajakta Popat
26	3596	Jadhav Shrushti Rajendra
27	3597	Jadhav Supriya Chandrakant
28	3598	Jagadale Yuvraj Narshing
29	3599	Jare Komal Sanjay
30	3600	Kadam Mahesh Ramchndra
31	3601	Kadam Prajakta Rajendra
32	3602	Kadam Rutuja Uttam
33	3603	Kasurde Shivani Raju
34	3604	Kulkarni Vaishnavi Chintamani
35	3605	Madame Snehal Ramesh
36	3606	Mahangade Shital Dattatray
37	3607	Mane Varsha Vijay
38	3608	Maske Swapnil Bhagwan
39	3609	Mohire Mayur Bharat
40	3610	More Ajinkya Pradeep
41	3611	Mulani Salman Husen
42	3612	Nidan Chaitali Sharad
43	3613	Nikam Pooja Anil

44	3614	Patil Nandini Dilip
45	3615	Pawar Ashwini Anandrao
46	3616	Phadtare Prashant Sanjay
47	3617	Rashinkar Shubham Ramchandra
48	3618	Raut Gaurav Muralidhar
49	3619	Salunkhe Rupali Dinkar
50	3620	Sankpal Mangesh Shankar
51	3621	Satre Gauri Jeevan
52	3622	Shinde Arati Ramdas
53	3623	Shinde Neha Balasaheb
54	3624	Shinde Nikita Dipak
55	3625	Shinde Prajakta Jitendra
56	3626	Shinde Prashant Laxman
57	3627	Shinde Sourabh Ganpat
58	3628	Thombare Kiran Baban
59	3629	Tiwatane Neha Uttam
60	3630	Yewale Pallavi Pramod
61	3631	Pachangane Prajakta Tanaji
62	3632	Mane Rushikesh Vasant
63	3633	Jagtap Ajinkya Santaji
64	3634	Wadgkar Nagesh Kashinath
65	3635	Roman Omkar Sadanand
66	3636	Ubale Prashant Bhagwan

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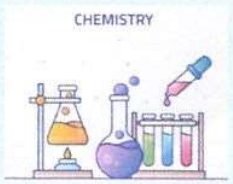

(2019-20)

Skill Based Course
Question Paper (Chromatographic Technique)

Day & Date: 23/11/2019 **Marks- 20**
Time – 12:30pm to 01:00pm

Q.1 Multiple Choice Question

1. Chromatography is a physical method that is used to separate and analyse _____

a) Simple mixtures
b) Complex mixtures
c) Viscous mixtures
d) Metals

2. In which type of chromatography, the stationary phase held in a narrow tube and the mobile phase is forced through it under pressure?
a) Column chromatography
b) Planar chromatography
c) Liquid chromatography
d) Gas chromatography

3. In chromatography, the stationary phase can be _____ supported on a solid.
a) Solid or liquid
b) Liquid or gas
c) Solid only
d) Liquid only

4. In chromatography, which of the following can the mobile phase be made of?
a) Solid or liquid
b) Liquid or gas
c) Gas only
d) Liquid only

5. Which of the following cannot be used as adsorbent in Column adsorption chromatography?
a) Magnesium oxide
b) Silica gel
c) Activated alumina
d) Potassium permanganate

6. Which of the following types of chromatography involves the separation of substances in a mixture over a 0.2mm thick layer of an adsorbent?
a) Gas liquid
b) Column
c) Thin layer
d) Paper

7. Chromatography cannot be used to purify volatile substances.
a) True
b) False

8. In Column chromatography, the stationary phase is made of _____ and the mobile phase is made of _____
a) Solid, liquid
b) Liquid, liquid
c) Liquid, gas
d) Solid, gas

9. Chromatography cannot be used to separate delicate products.
a) True
b) False

10. In Thin layer chromatography, the stationary phase is made of _____ and the mobile phase is made of _____
a) Solid, liquid
b) Liquid, liquid
c) Liquid, gas
d) Solid, gas

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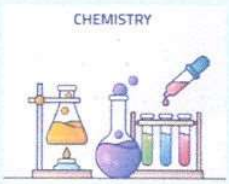

(2019-20)

Skill Based Course

Model Answer Paper (Chromatographic Technique)

Marks- 20

Q.1 Multiple Choice Question

1. Chromatography is a physical method that is used to separate and analyse _____

a) Simple mixtures
b) Complex mixtures
c) Viscous mixtures
d) Metals

2. In which type of chromatography, the stationary phase held in a narrow tube and the mobile phase is forced through it under pressure?
a) Column chromatography
b) Planar chromatography
c) Liquid chromatography
d) Gas chromatography

3. In chromatography, the stationary phase can be _____ supported on a solid.
a) Solid or liquid
b) Liquid or gas
c) Solid only
d) Liquid only

4. In chromatography, which of the following can the mobile phase be made of?
a) Solid or liquid
b) Liquid or gas
c) Gas only
d) Liquid only

5. Which of the following cannot be used as adsorbent in Column adsorption chromatography?

a) Magnesium oxide
b) Silica gel
c) Activated alumina
d) Potassium permanganate

6. Which of the following types of chromatography involves the separation of substances in a mixture over a 0.2mm thick layer of an adsorbent?
a) Gas liquid
b) Column
c) Thin layer
d) Paper

7. Chromatography cannot be used to purify volatile substances.
a) True
b) False

8. In Column chromatography, the stationary phase is made of _____ and the mobile phase is made of _____
a) Solid, liquid
b) Liquid, liquid
c) Liquid, gas
d) Solid, gas

9. Chromatography cannot be used to separate delicate products.
a) True
b) False

10. In Thin layer chromatography, the stationary phase is made of _____ and the mobile phase is made of _____
a) Solid, liquid
b) Liquid, liquid
c) Liquid, gas
d) Solid, gas

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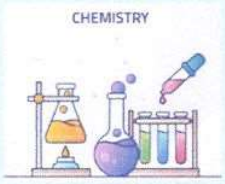

(2019-20)

Skill Based Course
(Chromatographic Technique)

Result Analysis

Sr.No	Roll No.	Students Name	Marks	Grade
1	3571	Adhav Atul Machindra	14	B
2	3572	Barge Sanket Subhash	16	B+
3	3573	Belose Komal Ashok	18	A
4	3574	Bhise Varsha Maruti	16	B+
5	3575	Bhosale Pranali Dnyandev	20	A+
6	3576	Bhosale Ujwala Anil	18	A
7	3577	Bhosale Vijay Balawant	14	B
8	3578	Chavan Dhanadhri Shankar	16	B+
9	3579	Chavan Nikita Vishvas	14	B
10	3580	Chavan Omkar Balkrishna	16	B+
11	3581	Chavan Prajakta Suryakant	18	A
12	3582	Chavan Priyanka Bhaskar	20	A+
13	3583	Chavan Vishal Bharat	16	B+

14	3584	Dhotre Anjali Ankush	14	B
15	3585	Ghadge Ankita Anandrao	14	B
16	3586	Ghadge Kajal Somnath	16	B+
17	3587	Ghadge Vaishnavi Manohar	18	A
18	3588	Ghodake Swapnali Dnyaneshwar	20	A+
19	3589	Ghorpade Adavari Sambhaji	20	A+
20	3590	Gorad Sagar Kailas	18	A
21	3591	Gore Aniket Dattatray	14	B
22	3592	Jadhav Ankita Satish	16	B+
23	3593	Jadhav Ganesh Tanaji	20	A+
24	3594	Jadhav Mangal Sayaji	18	A
25	3595	Jadhav Prajakta Popat	16	B+
26	3596	Jadhav Shrushti Rajendra	18	A
27	3597	Jadhav Supriya Chandrakant	14	B
28	3598	Jagadale Yuvraj Narshing	16	B+
29	3599	Jare Komal Sanjay	20	A+
30	3600	Kadam Mahesh Ramchndra	20	A+
31	3601	Kadam Prajakta Rajendra	14	B
32	3602	Kadam Rutuja Uttam	16	B+
33	3603	Kasurde Shivani Raju	18	A
34	3604	Kulkarni Vaishnavi Chintamani	18	A
35	3605	Madame Snehal Ramesh	14	B
36	3606	Mahangade Shital Dattatray	18	A

37	3607	Mane Varsha Vijay	20	A+
38	3608	Maske Swapnil Bhagwan	20	A+
39	3609	Mohire Mayur Bharat	16	B+
40	3610	More Ajinkya Pradeep	16	B+
41	3611	Mulani Salman Husen	16	B+
42	3612	Nidan Chaitali Sharad	14	B
43	3613	Nikam Pooja Anil	18	A
44	3614	Patil Nandini Dilip	18	A
45	3615	Pawar Ashwini Anandrao	14	B
46	3616	Phadtare Prashant Sanjay	14	B
47	3617	Rashinkar Shubham Ramchandra	18	A
48	3618	Raut Gaurav Muralidhar	16	B+
49	3619	Salunkhe Rupali Dinkar	16	B+
50	3620	Sankpal Mangesh Shankar	20	A+
51	3621	Satre Gauri Jeevan	16	B+
52	3622	Shinde Arati Ramdas	14	B
53	3623	Shinde Neha Balasaheb	16	B+
54	3624	Shinde Nikita Dipak	18	A
55	3625	Shinde Prajakta Jitendra	18	A
56	3626	Shinde Prashant Laxman	18	A
57	3627	Shinde Sourabh Ganpat	14	B
58	3628	Thombare Kiran Baban	16	B+
59	3629	Tiwatane Neha Uttam	14	B

60	3630	Yewale Pallavi Pramod	16	B+
61	3631	Pachangane Prajakta Tanaji	14	B
62	3632	Mane Rushikesh Vasant	20	A+
63	3633	Jagtap Ajinkya Santaji	20	A+
64	3634	Wadgkar Nagesh Kashinath	20	A+
65	3635	Roman Omkar Sadanand	18	A
66	3636	Ubale Prashant Bhagwan	16	B+

Course Coordinator

Head
Department of Chemistry
D. P. Bhosale College, Koregaon

Chromatographic Techniques (UG)
Report (2019-20)

As far as characterization of organic and inorganic material is concerned, the chromatographic tools are very much important technique for identification of compounds. The techniques is found to be less expensive and fast analysis to confirm unknown identity of materials in very less concentration. Generally simple practical equipments like glass chromatogram, paper chromatogram, column chromatograph with polar and non polar solvents like diethyl ether, PET ether, Hexane, ethyl acetate etc. The overall development of Chromatogram can be done with gradient elution techniques either by descending or ascending mode. For visualization of unknown compounds, Chemical reagents or UV lamps, the R_f values calculated for comparison with reference materials.

More than 60 students have been participated in the said course with actual demonstration and hands on training with proper guidance. After completion of the STC, certificates are conferred individually at the end of Course.

Prof. Dr. S.D. Jadhav sir explaining Chromatography in STC

Course Coordinator

Head
Department of Chemistry
D. P. Bhosale College, Koregaon

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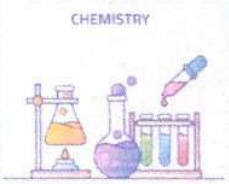

Chromatographic Techniques(2019-2020)

Feedback

Name of Student	Nikam pooja Anil
Roll. No	3631
Mobile. No	-
Email. Id	-

Give your Valuable feedback marking the appropriate option with

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus		✓		
3	Topics Taught		✓		
4	and Overall Management		✓		
5	Overall impression		✓		

Suggestion for improving, if any

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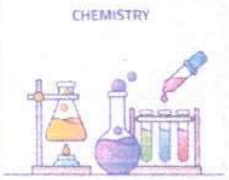
Department of Chemistry



Chromatographic Techniques(2019-2020)

Feedback

Name of Student	Bhosale vijay mahindra.
Roll. No	3577
Mobile. No	—
Email. Id	bhosalevijay@rediffmail.com

Give your Valuable feedback marking the appropriate option with

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus	✓			
3	Topics Taught		✓		
4	and Overall Management		✓		
5	Overall impression		✓		

Suggestion for improving, if any

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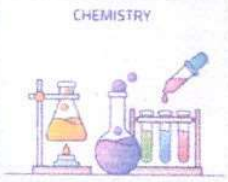
Rayat Shikshan Sanstha's,

D. P. Bhosale College, Koregaon

Department of Chemistry



Chromatographic Techniques(2019-2020)
Feedback

Name of Student	Adhav Atul Machindra.
Roll. No	3571
Mobile. No	–
Email. Id	adhavatul@gmail.com

Give your Valuable feedback marking the appropriate option with

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus		✓		
3	Topics Taught		✓		
4	and Overall Management	✓			
5	Overall impression		✓		

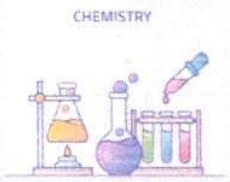
Suggestion for improving, if any

–

Rayat Shikshan Sanstha's,

D. P. Bhosale College, Koregaon

Department of Chemistry



Chromatographic Techniques(2019-2020)

Feedback

Name of Student	Mane vaishna vijay.
Roll. No	3607
Mobile. No	–
Email. Id	–

Give your Valuable feedback marking the appropriate option with

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus		✓		
3	Topics Taught	✓			
4	and Overall Management	✓			
5	Overall impression		✓		

Suggestion for improving, if any

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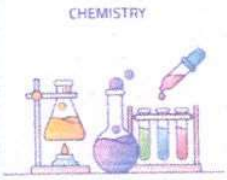
Department of Chemistry



Chromatographic Techniques(2019-2020)

Feedback

Name of Student	Ghodake Swapnali Dnyaneshwar
Roll. No	3588
Mobile. No	-
Email. Id	-

Give your Valuable feedback marking the appropriate option with

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus		✓		
3	Topics Taught	✓			
4	and Overall Management	✓			
5	Overall impression		✓		

Suggestion for improving, if any

—

RAYAT SHIKSHAN SANSTHA'S

D. P. BHOSALE COLLEGE, KOREGAON

DIST-SATARA, MAHARASHTRA, INDIA-415501

DEPARTMENT OF CHEMISTRY

SKILL BASED COURSE

Certificate

This is to certify that, Mr. ***Adhav Atul Manchindra*** *Class:* ***B.Sc.III*** *Subject:* ***Chemistry*** *Successfully completed One month* ***Skill Based Course*** *on* ***"Chromatographic Techniques"*** *with* ***B grade*** *Organized by Department of Chemistry, in November 2019.*

Mr. N. M. Gosavi
Course Coordinator

Prof. Dr. S. D. Jadhav
HoD Chemistry

Hon. Dr. V. S. Sawant
Principal

RAYAT SHIKSHAN SANSTHA'S

D. P. BHOSALE COLLEGE, KOREGAON

DIST-SATARA, MAHARASHTRA, INDIA-415501

DEPARTMENT OF CHEMISTRY

SKILL BASED COURSE

Certificate

This is to certify that, Mr. **Barge Sanket Subham** *Class:* **B.Sc.III** *Subject:* **Chemistry** *Successfully completed One month* **Skill Based Course** *on* **"Chromatographic Techniques"** *with* **B+ grade** *Organized by Department of Chemistry, in November 2019.*

Mr. N. M. Gosavi	**Prof. Dr. S. D. Jadhav**	**Hon. Dr. V. S. Sawant**
Course Coordinator	**HoD Chemistry**	**Principal**

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DIST-SATARA, MAHARASHTRA, INDIA-415501

DEPARTMENT OF CHEMISTRY

SKILL BASED COURSE

Certificate

This is to certify that, Miss. ***Belose Komal Ashok*** *Class:* ***B.Sc.III*** *Subject:* ***Chemistry*** *Successfully completed One month* ***Skill Based Course*** *on* ***"Chromatographic Techniques"*** *with* ***A grade*** *Organized by Department of Chemistry, in November 2019.*

Mr. N. M. Gosavi
Course Coordinator

Prof. Dr. S. D. Jadhav
HoD Chemistry

Hon. Dr. V. S. Sawant
Principal

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DEPARTMENT OF CHEMISTRY

SKILL BASED COURSE

Certificate

This is to certify that, Miss. ***Bhise Varsha Maruti*** *Class:* ***B.Sc.III*** *Subject:* ***Chemistry*** *Successfully completed One month* ***Skill Based Course*** *on* ***"Chromatographic Techniques"*** *with* ***B+ grade*** *Organized by Department of Chemistry, in November 2019.*

Mr. N. M. Gosavi
Course Coordinator

Prof. Dr. S. D. Jadhav
HoD Chemistry

Hon. Dr. V. S. Sawant
Principal

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DEPARTMENT OF CHEMISTRY

SKILL BASED COURSE

Certificate

This is to certify that, Miss. ***Bhosale Pranali Dnyndev*** *Class:* ***B.Sc.III*** *Subject:* ***Chemistry*** *Successfully completed One month* ***Skill Based Course*** *on* ***"Chromatographic Techniques"*** *with* ***A+ grade*** *Organized by Department of Chemistry, in November 2019.*

Mr. N. M. Gosavi	**Prof. Dr. S. D. Jadhav**	**Hon. Dr. V. S. Sawant**
Course Coordinator	**HoD Chemistry**	**Principal**