"Where Science Gets Exciting: Chemical Reactions!"

QUESTION BANK ON ANALYTICAL CHEMISTY

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CHROMATOGRAPHY

1. For the purification, isolation and separation of organic compounds, the latest technique followed is:
   a. Chromatography b. Steam distillation
   c. Fractional crystallization d. Sublimation
2. Two substances when separated out on the basis of their extent of adsorption by one material, the phenomenon is called:
   a. Chromatography b. Crystallisation
   c. Sublimation d. Steam distillation
3. A very common adsorbent used in coloumn chromatography is:
   a. Powdered charcoal b. Chalk
   c. Alumina d. Sodium carbonate
4. Paper chromatography is:
   a. Adsorption chromatography
   b. Partition chromatography
   c. Ion exchange chromatography
   d. All of these
5. In which Chromatography stationary phase is more polar than mobile phase?
   a. Ion exchange b. Liquid Chromatography
   c. Reversed chromatography d. None of the above
6. Which force is involved in the Chromatography?
   a. Hydrogen bonding b. London force
   c. Electric static force d. All of the above
7. Which technique is also known as colour writing?
   a. NMR b. Mass spectroscopy
   c. Chromatography d. All of the above
8. Chromatogram is?
   a. Solute concentration vs Elution time
   b. Solute concentration vs Elution volume

c. A and B
d. None of the above

9. Which compound is hold by stationary phase?
   a. Polar compound b. Non polar compound
   c. A and B d. None of the above
10. What is the Analyte?
   a. Substance for separation b. Substance for impurity
   c. A and B d. None of the above
11. What is Eluent?
   a. is a liquid solution.
   b. is a liquid solution that is a result from Elution.
   c. It is a solvent that used for separation of absorbed material from stationary phase.
   d. None of the above
12. What is the principle of TLC ?
   a. Partition b. Absorption
   c. Adsorption d. A and B
13. Which sentence is false about TLC ?
   a. It is very simple method
   b. It is less time consuming.
   c. Applied to all type of sample.
   d. It is very costly.
14. Which is not factor for choosing adsorbent?
   a. Nature of the adsorbent
   b. Solubility of the adsorbent
   c. Chemical nature
   d. Temperature
15. The mobile phase rises due to
   a. Capillary action b. Partition coefficient
   c. Temperature d. All of the above
16. The components with more affinity towards the stationary phases is

a. Travels slowly b. Travels fast
c. A and B d. None of the above

17. The components with less affinity towards the stationary phases is
a. Travels slowly b. Travels fastly
c. A and B d. None of the above

18. Which is not related to TLC development?
a. Sandwich method b. Horizontal
c. Two dimensional d. Column

19. Which is not an application of TLC?
a. TLC can be successful used for isolation of vitamin like A,D,and E using silica gel.
b. Identification of drug.
c. Neomycin sulphate can be isolating on activated compound.
d. It determine the moisture.

20. In Iodine chamber, which color spot are seen?
a. Red colour. b. Brown colour.
c. Yellow colour d. Green colour

21. Which temperature is required for activation of plate?
a. 110-120 C° b. 120-130 C°
c. 130-149 C° d. 150-160 C°

22. Which is not Requirement of mobile phase?
a. It should be not toxic.
b. It should be easily available.
c. It should be chemically inert.
d. It should be chemically active.

23. How much time is required to dry TLC plate?
a. 15 minutes b. 30 minutes
c. 10 minutes d. 7 minutes

24. Which type of mobile phase is used in paper chromatography ?

a. The mobile phase which gives Rf value range between 0.1-0.3
b. The mobile phase which gives Rf value range between 0.2-0.8
c. The mobile phase which gives Rf value range between 0.8-1
d. The mobile phase which gives Rf value range between 0.6.

25. When there are two complex mixture are separated which development technique of paper Chromatography is used?
a. Ascending b. Descending
c. Radiation d. Two dimensional

26. How much time is required to saturate of chamber?
a. 12 hour b. 24 hour
c. 6 hour d. 10 hour

27. Which force is responsible for the separation of the components in descending paper chromatography?
a. Partition b. Adsorption
c. Gravity d. All of the above

28.Which is not development technique of paper Chromatography?
a. Two dimensional b. Ascending
c. Descending d. HPLC

29. What is the principle of the paper chromatography ?
a. Partition b. Adsorption
c. A and B d. None of the above

30.Paper chromatography is a type of which chromatography?
a. Column chromatography
b. Thin layer chromatography
c. Adsorption chromatography
d. Partition chromatography

31. Principle of Column Chromatography:
    a. Separation based on mass
    b. Separation based on partitioning between stationary and mobile phases
    c. Separation based on electrical charge
    d. Separation based on boiling points
32. Types of Adsorbents in Column Chromatography:
    a. Only silica gel
    b. Only alumina
    c. Silica gel, alumina, and others
    d. Only glass beads
33. Preparation of the Column in Column Chromatography Involves:
    a. Pouring the sample on top of the column
    b. Packing the column with adsorbent
    c. Using a pre-made column
    d. Ignoring column preparation
34. Elution in Column Chromatography Refers to:
    a. The process of packing the column
    b. The process of loading the sample onto the column
    c. The process of washing the column to separate components
    d. The process of analyzing the sample
35. Recovery of Substances in ColumnChromatography:
    a. Is not possible
    b. Involves dissolving the sample in a solvent
    c. Requires high temperatures
    d. Only occurs in analytical chromatography
36. Applications of Column Chromatography Include:
    a. Purification of compounds
    b. Quantification of analytes
    c. Both a and b

d. Neither a nor b

37. Principle of TLC:
    a. Separation based on mass
    b. Separation based on partitioning between stationary and mobile phases
    c. Separation based on electrical charge
    d. Separation based on boiling points
38. Choice of Adsorbent and Solvent in TLC Depends on:
    a. Personal preference
    b. The weather conditions
    c. The nature of the sample and the desired separation
    d. The availability of equipment
39. Preparation of Chromatoplates in TLC Involves:
    a. Pouring the sample on top of the plate
    b. Applying a thin layer of adsorbent on a glass plate
    c. Ignoring plate preparation
    d. Washing the plate with solvent
40. Rf-Values in TLC Represent:
    a. The ratio of the distance traveled by the sample to the distance traveled by the solvent
    b. The rate of flow in chromatography
    c. The size of the TLC plate
    d. The concentration of the stationary phase
41. Factors Affecting Rf-Values in TLC:
    a. Humidity b. Temperature
    c. Both a and b d. Neither a nor b
42. Significance of Rf-Values in TLC:
    a. Determines the cost of the experiment
    b. Provides information about the sample's identity and purity
    c. Represents the size of the TLC plate
    d. Measures the rate of flow in chromatography

43. Principle of Paper Chromatography:
    a. Separation based on mass
    b. Separation based on partitioning between stationary and mobile phases
    c. Separation based on electrical charge
    d. Separation based on boiling points
44. Solvents Used in Paper Chromatography:
    a. Only water
    b. Only non-polar solvents
    c. A mixture of polar and non-polar solvents
    d. Only organic solvents
45. Development of Chromatogram in Paper Chromatography:
    a. Involves dissolving the sample in a solvent
    b. The movement of the solvent through the paper
    c. Applying a thin layer of adsorbent on paper
    d. Ignoring the paper
46. Types of Paper Chromatography Include:
    a. Ascending b. Descending
    c. Radial d. Both a and b

ANSWERS:

1.a,2,a,3.c,4.b,5.c,6.d,7.c,8.c,9.a,10.a,11.c,12.c,13.d,14.d, 15.a,16.a,17.b,18.d,19.d,20.b,21.b,22.d,23.b,24.b,25.d,26.b, 27.c,28.d,29.c,30.c,31.b,32.c,33.b,34.c,35.b,36.c,37.b,38.c,39. b,40.a,41.c,42.b,43.b,44.c,45.b,46.d

FIVE MARK QUESTIONS

1. Write methods of expressing accuracy
2. How will minimizing error?
3. What are the steps to calculate standard deviation
4. Write a note on (a) precipitation and (b) solvent extraction
5. Explain about soxhlet extractor

6. Write about crystallisation and fractional crystallisation?
7. Write about vaccum distillation and steam distillation?
8. Write detail notes about extraction by chemically active elements?
9. Explain about continuous extraction with an example?
10.What is mean by distillation? Write notes about fractional distillation with an example?
11. What is mean by determinate and indeterminate errors?

TEN MARK QUESTIONS

1. Write briefly about types of errors?
2. How will you purify solids?
3. What are the processes to purify liquid?
4.Explain
   (i) standard deviation
   (ii) Confidence limits
   (iii) Continuous extraction
5. Explain methods to minimizing errors
6. How is Soxhlet extractor method used for separating solids

THERMO ANALYTICAL METHOD

1. Thermal analysis is defined as _____
   a. Measurement of concentration of materials as a function of temperature
   b. Measurement of solubility of materials as a function of temperature
   c. Measurement of physical properties as a function of temperature
   d. Measurement of line positions of crystals as a function of temperature

2. What are the two main techniques for thermal analysis?
   a. FTG AND DGG b. MSP AND FCT
   c. TGA AND DTA d. TSA AND DGF

3. Dilatometry is also known as by which of the following names?
   a. TGA b. DTA
   c. DSC d. TMA

4. Which of the following statements given below is false?
   a. TGA, DTA and DSC are measured using same instrument
   b. TGA and DTA can be carried out simultaneously.
   c. TGA, DTA and DSC are measured using different instruments.
   d. TMA is a recent name of Dilatometry.

5. What is the range of the rate in ◦Cmin required during the heating process in TGA?
   a. 1-20 b. 25-50
   c. 100-200 d. 150-1000

6. Under conditions of_____heating,

decomposition usually take place in thermogravimetry. Fill up the suitable option from the choices given below.

a. First order b. Second order
c. Third order d. Dynamic

7. The T_I and T_f temperature depends on which of the following factor?
   a. Cooling rate
   b. Mechanical property of the material
   c. Thermal expansion coefficient
   d. Atmosphere above the sample

8. What is the temperature required for the decomposition of CaCO in degree Celsius?
   a. 200 b. 500
   c. 900 d. 1200

9. Which among the following elements has the highest thermal conductivity?
   a. Nitrogen b. Oxygen
   c. Hydrogen d. Chlorine

10. Which of the following bridges are used in thermal conductivity analyzers?
   a. Wheatstone bridge
   b. Kelvin's bridge
   c. Anderson's bridge

11. What is the primary principle behind Thermogravimetric Analysis (TGA)?
   a. Measurement of changes in electrical conductivity
   b. Analysis of changes in mass as a function of temperature
   c. Detection of changes in thermal radiation
   d. Examination of changes in magnetic susceptibility

12.Which of the following best defines Differential Thermal Analysis (DTA)?

a. Measurement of heat flow in a sample compared to a reference

b. Analysis of changes in mass as a function of temperature

c. Detection of changes in electrical conductivity

d. Examination of changes in magnetic susceptibility

13.Which component in a TGA system measures changes in sample weight with increasing temperature?

a. Thermocouple b. Balance

c. Furnace d. Recorder

14.In a DTA apparatus, what does the reference material serve as?

a. A control for temperature calibration

b. A sample for comparison with the unknown material

c. A detector for heat flow

d. A standard for electrical conductivity measurements

15.In a TGA curve, what does a steep decline in weight indicate?

a. Endothermic transition

b. Exothermic transition

c. Constant weight region

16. What is the significance of the TGA curve plateau region for a hydrated salt like $CuSO_4.5H_2O$?

a. Complete dehydration of the compound

b. Oxidation of the compound

c. Formation of a new compound

d. No change in the compound

17. In simultaneous DTA-TGA analysis, what does a simultaneous endothermic peak in DTA and a weight loss in TGA signify?

a. Dehydration b. Decomposition
c. Oxidation d. No reaction occurring

18. What does the comparison of TGA-TGA curves of a compound in different environments (air vs. CO2) help identify?

a. Changes in electrical conductivity
b. Changes in magnetic susceptibility
c. Effects of different atmospheres on decomposition
d. Formation of a new compound

19.Which factor primarily affects the shape and position of peaks in DTA curves?

a. Heating rate b. Sample mass
c. Atmosphere d. Material composition

20. How does the heating rate influence TGA curves?

a. Higher heating rates result in higher weight loss
b. Slower heating rates cause higher weight loss
c. Heating rates do not impact weight loss
d. Higher heating rates cause lower weight loss

21. What is the fundamental principle underlying thermometric titration?

a. Measurement of pH changes
b. Detection of conductivity changes
c. Monitoring temperature changes
d. Assessment of color changes

22. In thermometric titration, how is the endpoint of the titration determined?

a. By observing color changes
b. By tracking temperature changes
c. By monitoring pH changes

d. By measuring conductivity changes

23.Which of the following is an essential component in thermometric titration apparatus?

a. Buret b. pH meter
c. Thermocouple d. Conductivity meter

24. What is the function of a thermocouple in thermometric titration?

a. Measure conductivity changes
b. Monitor pH changes
c. Record temperature changes
d. Detect color changes

25. Which area commonly utilizes thermometric titration for analysis?

a. Food industry for pH determination
b. Environmental studies for conductivity measurement
c. Pharmaceutical industry for purity assessment
d. Petrochemical industry for colorimetric analysis

26. How does thermometric titration find its utility in determining reaction kinetics?

a. Through color changes during the reaction
b. By measuring temperature changes during the reaction
c. Via pH changes during the reaction
d. Through conductivity changes during the reaction

27. In what way does thermometric titration differ from conventional titration techniques?

a. It relies on visual endpoint detection
b. It measures volume changes during titration
c. It involves temperature monitoring for endpoint determination

d. It determines pH changes during titration

28. In which industry heavily relies on thermometric titration for quality control of chemicals?

a. Textile industry
b. Agricultural industry
c. Chemical manufacturing industry
d. Mining industry

29.What does the change in temperature during thermometric titration reflect?

a. Volume change in the solution
b. pH change in the solution
c. Heat released or absorbed during the reaction
d. Conductivity changes in the solution

30. How does thermometric titration aid in determining the concentration of a reactant?

a. By monitoring the color change of the solution
b. By measuring the amount of titrant used
c. By calculating the pH of the solution
d. By analyzing the temperature change during titration

31. Principle of TGA and DTA:

a. Measurement of mass changes and temperature changes, respectively.
b. Detection of color changes in the sample.
c. Analysis of conductivity variations.
d. pH monitoring during the thermal process.

32.Components of TGA and DTA:

a. What component is responsible for measuring mass changes in TGA?
b. In DTA, which component detects temperature changes?
c. Both a and b.

d. None of the above.

33. TGA & DTA Curves Interpretation:

a. TGA curves primarily show:

b. DTA curves provide information about:

c. Both a and b.

d. Neither a nor b.

34. Simultaneous DTA-TGA Curves in Different Environments:

a. Simultaneous DTA-TGA is useful for studying reactions in:

b. Differentiate the curves of $SrCO_3$ in air and $CaC_2O_4.H_2O$ in CO_2 based on:

c. Both a and b.

d. Neither a nor b.

35. Factors Affecting TGA & DTA Curves:

a. Which factor can influence TGA and DTA curves?

b. Changes in _____ can impact the thermal analysis.

c. Both a and b.

d. Neither a nor b.

36. Principle of Thermometric Titrations:

a. Thermometric titrations are based on the measurement of:

b. $_{P}^{H}$ changes.

c. Conductivity variations.

d. Temperature changes.

37. What instrument is commonly used to measure temperature changes in thermometric titrations?

a. Thermometric titrations are performed using a

b. Thermometric titrations are performed using b

c. Both a and b.

d. Neither a nor b.

38. Applications of Thermometric Titrations:
a. Thermometric titrations are commonly employed in:
b. They are particularly useful for reactions influenced by:
c. Both a and b.
d. Neither a nor b.

39.Advantages of Thermometric Titrations:
a. What is a notable advantage of thermometric titrations?
b. Thermometric titrations exhibit high:
c. Both a and b.
d. Neither a nor b.

40. Disadvantages of Thermometric Titrations:
a. What could be a potential disadvantage of using thermometric titrations?
b. They may lack precision in:
c. Both a and b
d. Neither a nor b.

ANSWERS:

1.d,2,c,3.d,4.c,5.a,6.a,7.a,8.c,9.c,10.a,11.b,12.a,13.b,14.a, 15.b,16.a,17.a,18.c,19.a,20.a,21.c,22.b,23.c,24.c,25.c,26.b, 27.c,28.c,29.c,30.d,31.a,32.c,33.c,34.c,35.c,36.d,37.c,38.c,39. c,40.c

FIVE MARK QUESTIONS

1. What is the application of solubility product principle in gravimetric analysis?
2. Explain with example of selective and specific precipitants?
3. Discuss the theories of precipitation?

4. What are the advantages of homogeneous precipitation techniques?
5. Write a note on
   (i)DMG
   (ii) Cupferon
   (iii) Oxine
6. Explain (a) salicyaldehydeoxime
   (b) ethylene diamine
   (c) Anthranilic Acid
7. How will you calculate Gf for the estimation of chlorine?
8. What are the methods to decrease co-precipitation?
9. What are the methods to reduce errors?
10. What are the conditions for precipitation?

TEN MARK QUESTIONS

1. Write a note on precipitation from homogeneous medium?
2. Explain co-precipitation and post precipitation.
3. Write the factors affecting solubility?
4. Explain briefly about the types of crucibles?
5. What are the advantages and disadvantages of organic precipitants?

ELECTRO ANALYTICAL METHODS

1. What is the fundamental principle of polarography?
   a. Measurement of conductivity changes
   b. Detection of color changes
   c. Monitoring current-potential relationship
   d. Measurement of ph changes
2. In polarography, what does the current-potential relationship represent?
   a. Electrode potential changes
   b. Concentration changes of electrolyte
   c. Ionization of the solution
   d. Redox reactions occurring at the electrode
3. What is a significant advantage of the Dropping Mercury Electrode (DME)?
   a. Stability over a wide potential range
   b. High selectivity for specific ions
   c. Inexpensive and easy maintenance
   d. Resistance to fouling and poisoning
4. Which of the following is a disadvantage associated with the Dropping Mercury Electrode (DME)?
   a. Incompatibility with most electrolytes
   b. Inability to measure low currents
   c. Environmental toxicity due to mercury usage
   d. Complexity in electrode preparation
5. What does the term "migration current" refer to in polarography?
   a. The steady-state current at a specific potential
   b. The current due to electrode movement
   c. The initial current at the start of the experiment
   d. The current generated by migration of ions to the electrode

6. Which type of current in polarography occurs due to electrochemical reactions?
   a. Migration current b. Residual current
   c. Limiting current d. Diffusion current
7. What is the primary purpose of using supporting electrolytes in polarography?
   a. To increase the current
   b. To decrease the current
   c. To prevent electrode fouling
   d. To enhance conductivity
8. Which factor does the choice of supporting electrolyte mainly depend on in polarography?
   a. Electrode material b. Sample concentration
   c. Desired current range d. Solution pH
9. What does the Ilkovic equation describe in polarography?
   a. Relationship between current and time
   b. Relationship between current and electrode area
   c. Relationship between current and electrode potential
   d. Relationship between current and electrolyte concentration
10. What is the significance of the Ilkovic equation in polarography?
   a. Determination of redox potentials
   b. Calculation of migration currents
   c. Estimation of diffusion coefficients
   d. Prediction of electrode lifespan
11. What does the current-voltage curve in polarography represent?
   a. Relationship between current and electrode potential

b. Relationship between electrode area and current
c. Relationship between current and time
d. Relationship between electrolyte concentration and current

12. Which parameter does the slope of the current-voltage curve indicate in polarography?
a. Electrode area b. Migration current
c. Rate of redox reactions d. Diffusion coefficient

13. In polarography, what characterizes the oxygen wave in the current-voltage curve?
a. Sharp increase in current at low potentials
b. Gradual decrease in current at high potentials
c. A plateau in the current at a specific potential
d. Sudden drop in current at specific intervals

14. What is the primary reason for the appearance of an oxygen wave in polarography?
a. Oxidation of the electrolyte
b. Reduction of oxygen at the electrode
c. Presence of supporting electrolyte
d. Electrode fouling

15. What does the Half Wave Potential (E½) signify in polarography?
a. Peak potential at half of the current maximum
b. Peak current at half of the potential maximum
c. Midpoint potential in a cyclic voltammogram
d. Inflection point in a current-voltage curve

16. Which term represents the electrode potential at which half of the analyte is oxidized or reduced?
a. Reversal potential b. Equilibrium potential
c. Standard potential d. Half wave potential

17.How does polarography contribute to qualitative analysis?

a. By measuring current at a specific potential
b. By determining electrode potential changes
c. By identifying compounds based on their reduction potentials
d. By calculating oxidation states of elements

18. What advantage does polarography offer in quantitative analysis compared to other methods?
a. High sensitivity
b. Fast analysis
c. Low cost of equipment
d. Minimal sample preparation

19. What is the primary principle behind amperometric titrations?
a. Measurement of conductance changes
b. Detection of color changes
c. Monitoring current changes
d. Determination of pH changes

20.Which type of titration involves constant potential measurements?
a. Potentiometric titration
b. Conductometric titration
c. Amperometric titration
d. Coulometric titration

21. In which type of amperometric titration does the current change abruptly at the equivalence point?
a. Potentiometric titration
b. Coulometric titration
c. Polarographic titration
d. Dead-stop end point titration

22. What distinguishes amperometric titrations from other titration methods?
a. Use of visual indicators

b. Detection of current changes
c. Measurement of electrode potential
d. Employing pH meters

23. What is an advantage of amperometric titration over traditional titration methods?
a. Requires less precision
b. Independent of electrode condition
c. Fast reaction times
d. Applicable only to redox reactions

24. What is a disadvantage associated with amperometric titrations?
a. High equipment cost
b. Limited to certain types of reactions
c. Complexity in endpoint determination
d. Inability to measure current changes

25. Which industry frequently utilizes amperometric titrations for analysis?
a. Food industry for pH determination
b. Pharmaceutical industry for purity assessment
c. Environmental studies for conductivity measurement
d. Petrochemical industry for colorimetric analysis

26. What specific type of compounds can be effectively analyzed using amperometric titrations?
a. Redox-active compounds
b. Non-polar compounds
c. Acid-base compounds
d. Aromatic compounds

27. What is the underlying principle of polarography?
a. Colorimetry b. Electrochemistry
c. Spectroscopy d. Chromatography

28.Which electrode is commonly used in polarography due to its unique characteristics?

a. Platinum electrode
b. Gold electrode
c. Glass electrode
d. Dropping mercury electrode (DME)

29.Advantages of Dropping Mercury Electrode (DME) include:

a. High sensitivity b. Low cost
c. Stable potential d. All of the above

30. What is the main disadvantage of using Dropping Mercury Electrode (DME)?

a. Limited sensitivity b. Environmental concerns
c. Mercury contamination d. Difficult maintenance

31.Migration current in polarography refers to:

a. Movement of ions toward the electrode
b. Flow of electrons in the circuit
c. Movement of the analyte in the solution
d. None of the above

32.The Ilkovic equation is associated with:

a. Polarography b. Chromatography
c. Spectroscopy d. Gravimetry

33. What is the significance of the Ilkovic equation in polarography?

a. Describes the diffusion of ions
b. Relates current to concentration and diffusion coefficient
c. Determines the electrode potential
d. Predicts the stability of mercury electrodes

34. Supporting electrolytes are used in polarography to:

a. Increase electrode potential
b. Improve sensitivity

c. Enhance ion mobility
d. Lower sample concentration

35. The oxygen wave in polarography is associated with the reduction of:
a. Oxygen to water b. Water to hydrogen
c. Hydrogen to oxygen d. Oxygen to ozone

36. Half wave potential ($E_{1/2}$) in polarography represents:
a. The potential at which half the analyte is oxidized
b. The potential at which half the analyte is reduced
c. The maximum electrode potential
d. The potential at the endpoint of titration

37. Polarography is used as an analytical tool in:
a. Organic chemistry
b. Inorganic chemistry
c. Quantitative and qualitative analysis
d. Physical chemistry

38.The basic principle of amperometric titrations involves:
a. Measurement of conductivity
b. Detection of color change
c. Monitoring current changes
d. Analysis of UV absorption

39. Types of titrations in amperometry include:
a. Acid-base titrations b. Redox titrations
c. Complexometric titrations d. All of the above

40. Advantages of amperometric titrations include:
a. High precision
b. Rapid analysis
c. Applicability to various titrations
d. All of the above

41. Disadvantages of amperometric titrations include:
a. Limited sensitivity

b. Interference from colored substances
c. Complex setup
d. Both a and c

42. Applications of amperometric titrations are commonly found in
a. Medicine b. Environmental analysis
c. Food industry d. All of the above

ANSWERS:

1.c,2.d,3.a,4.c,5.d,6.d,7.d,8.c,9.b,10.c,11.a,12.d,13.a,14.b ,15.a,16.d,17.c,18.a,19.c,20.c,21.d,22.b,23.c,24.d,25.b,26 .a,27.b,28.d,29.d,30.c,31.a,32.a,33.b,34.c,35.a,36.b,37.c, 38.c,39.d,40.b,41.b,42.d

FIVE MARK QUESTIONS:

1. Advantages and Disadvantages of DME:
2. Explain the advantages and disadvantages of using a Dropping Mercury Electrode (DME) in polarography.
3. Migration, Residual, Limiting, and Diffusion Currents:
4. Define and differentiate between migration, residual, limiting, and diffusion currents in polarography.
5. Use of Supporting Electrolytes:
6. Discuss the role of supporting electrolytes in polarography and their significance in achieving accurate results.
7. Ilkovic Equation - Significance:
8. Explain the Ilkovic equation in polarography, emphasizing its significance in relating current to concentration and diffusion coefficient

9. Describe the experimental assembly used in polarography, highlighting key components and their functions.
10. Discuss the characteristics of the current-voltage curve in polarography and the specific features associated with the oxygen wave.

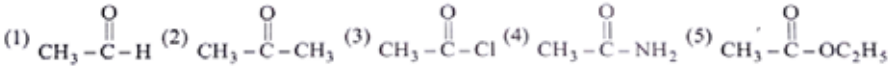
TEN MARK QUESTIONS

1. Elaborate on how polarography serves as an analytical tool in both quantitative and qualitative analysis.
2. Define the half wave potential ($E_{1/2}$) in polarography and explain its significance in determining the concentration of analytes.
3. Applications of Polarography:
4. Discuss real-world applications of polarography in various fields, such as environmental monitoring and pharmaceutical analysis.
5. Explain the basic principle underlying amperometric titrations, focusing on the measurement of current changes.
6. Describe different types of titrations that can be performed using amperometric techniques, such as acid-base and redox titrations.
7. Advantages, Disadvantages, and Applications:
8. Analyze the advantages and disadvantages of amperometric titrations and discuss their applications in analytical chemistry

UV & VISIBLE & IR SPECTROSCOPY

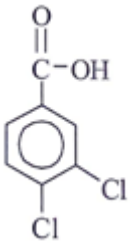
1. What is the wavelength range for UV spectrum of light?
   a. 400 nm – 700 nm b. 700 nm to 1 mm
   c. 0.01 nm to 10 nm d. 10 nm to 400 nm
2. Which of the following comparison is correct for solvent shift on the n –>π* transition of acetone?
   a. $H_20 = CH_30H = C_2H_50H = CHC1_3 = C_6H_{14}$
   b. $H_20 > CH_30H > C_2H_50H > CHC1_3 > C_6H_{14}$
   c. $H_20 < CH_30H < C_2H_50H < CHC1_3 < C_6H_{14}$
   d. $H_20 > CH_30H < C_2H_50H < CHC1_3 < C_6H_{14}$
3. What is the correct order of λmax for n –> σ* transition?
   a. R-OH > $R-NH_2$ > R-SH
   b. R-OH < $R-NH_2$ < R-SH
   c. R-OH > R-SH > $R-NH_2$
   d. R-OH < R-SH < $R-NH_2$
4. What is the correct order of λmax for n –> π* transition for the R-CN, $R-NO_2$, and R-N=N-R?
   a. R-CN < $R-NO_2$ < R-N=N-R
   b. R-CN = $R-NO_2$ = R-N=N-R
   c. R-CN > $R-NO_2$ > R-N=N-R
   d. R-CN > $R-NO_2$ < R-N=N-R
5. What is the correct order of λ_{max} for π –> π* transition for the following three compounds?
   a. R-C=C-R > $R_2C = CR_2$ > R-CHO
   b. R-C=C-R < $R_2C = CR_2$ < R-CHO
   c. R-C=C-R = $R_2C = CR_2$ = R-CHO
   d. R-C=C-R < $R_2C = CR_2$ >R-CHO
6. What is the correct order of λ_{max} for n–> π* transition for the following three compounds?

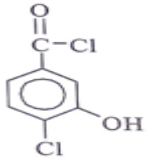
a. RCOOH > RCOOR' > $RCONH_2$
b. RCOOH = RCOOR' = $RCONH_2$

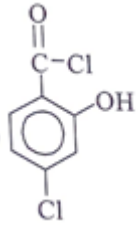


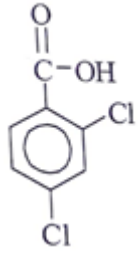
c. RCOOH = RCOOR' < $RCONH_2$
d. RCOOH = RCOOR' > $RCONH_2$

7. Which of the following is the correct order of λ_{max} for n–> π* transition for the given compounds?
   a. 1>2>3>4>5 b. 1<2<3<4<5
   c. 1>2<3>4<5 d. 1>2>3<4>5
8. The ultraviolet spectrum of benzonitrile shows a primary absorption band at 224 nm. If a solution of benzonitrile in water, with a concentration of $1x\ 10^{-4}$ molar, is examined at a wavelength of 224 nm, the absorbance is determined to be 1.30. The cell length is 1 cm. What is the molar absorptivity of this absorption band?
   a. 2.3×10^4 b. 3.3×10^4
   c. 1.3×10^4 d. 4.3×10^4
9. The ultraviolet spectrum of benzonitrile shows a secondary absorption band at 271 nm. If a solution of benzonitrile in water, with a concentration of 1×10^{-4} molar solution is examined at 271 nm, what will be the absorbance reading (Ɛ = 1000) and what will be the intensity ratio, I_O/I, respectively?
   a. 0.1, 1.26 b. 0.2, 2.26
   c. 0.3, 3.26 d. 0.4, 4.26
10. Which of the following structural formula that is consistent with the following observations: An acid, $C_7H_4O_2Cl_2$ shows a UV maximum of 242 nm?

a. 

b. 

c. 

d. 

11.Tungsten lamp filament has required how much temperature ?

a. 2000k b. 3000k
c. 4000k d. 5000k

12. How much range wavelength is transmit by silicate glass ?

a. 100 nm to 200 nm b. 200nm to 300 nm

c. 300 nm to 350 nm d.10nm to 40 nm

13. What is role of slit in uv-visible spectroscopy?

a. Monochromatic radiation to polychromatic radiation.

b. Polychromatic radiation to monochromatic radiation.

c. A and B

d. None of this

14.What is role of slit in uv-visible spectroscopy ?

a. Monochromatic radiation to polychromatic radiation.

b. Polychromatic radiation to monochromatic radiation.

c. A and B

d. None of this

15. Which device is used to isolate the radiation of the desired wavelength from wavelength of the continuous spectra?

a. Monochromator b. Radiation source

c. Recorder d. None of this

16. Diffraction grating is consists of a

a. Glass b. Quartz

c. Alkyl halide d. All of the above

17.The work of Entrance slit is?

a. To get narrow source

b. To render light parallel

c. To disperse radiation

d. To fall on sample cell

18.Collimator is used for?

a. To reform the image of the entrance slit.
b. To get narrow source
c. To fall on sample cell
d. To disperse radiation

19.Exit slit used for
a. To reform the image of the entrance slit.
b. To get narrow source
c. To fall on sample cell
d. To disperse radiation

20.Which type of vapour is stored in Mercury lamp ?
a. Mercury vapour b. Hydrogen vapour
c. Xe d. Ozone

21.Which sentence is false about UV SPECTROSCOPY?
a. Benzene is not used as solvent.
b. Low temperature is give better result in uv SPECTROSCOPY.
c. Chloroform is used as solvent in UV.
d. UV ray wavelength is 200- 400 nm.

22.when absorption intensity of compound is decreased it is called
a. Red shift b. Blue shift
c. Hypochromic shift d. Hyperchromic shift

23.What is the relation between restoring force, f to the displacement q in Hooke's law?
a. $f = -kq$ b. $f = kq$
c. $f = kq2$ d. $f = -kq2$

24.The intensity of an absorption band is always proportional to which of the following factor?
a. Atomic population
b. Molecular population of the initial state
c. Molecular population of the final state

d. Temperature

25. On which factors the vibrational stretching frequency of diatomic molecule depend?

a. Force constant b. Atomic population
c. Temperature d. Magnetic field

26. In which unit Force constant is not expressed?

a. Dynes cm-1 b. dyne Å-1
c. Nm-1 d. kp

27. For HCI = 1.63 x 10-27 kg, the observed frequency = 2890 or v = 8.67 x 1013 Hz. What is the force constant K?

a. 4.83 m dyn Å-1 b. 8.43 dynes cm-1
c. 483 μm-1 d. 4.83 dyn Å-1

28. Since the nuclei in a polyatomic molecule do not always vibrate in a simple harmonic manner, there arises which of the following situation?

a. Harmonicity
b. Anharmonicity in molecular vibrations
c. Fundamental frequencies
d. Infrared

29. The vibrations, without a center of symmetry are active in which of the following region?

a. Infrared but inactive in Raman
b. Raman but inactive in IR
c. Raman and IR
d. Inactive in both Raman and IR

30. The frequency of vibration of a bond is a function of which factor?

a. Force constant of the bond
b. Masses of the atoms involved in bonding
c. Force constant of the bond and Masses of the atoms
d. Bond order

31. What is the order of decreasing vibrational frequency for C — Cl, C — Br, C — C, C — O and C — H?
    a. C-H, C-C, C-O, C- Cl, C-Br
    b. C- Cl, C-Br, C-C, C -H, C-O
    c.C-O, C-H, C-Br, C- Cl, C-C
    d. C-Br, C- Cl, C-C, C-O, C-H
32. What is the correct increasing order of stretching frequencies for C ≡ C, C = C and C — C?
    a. C — C > C = C > C ≡ C
    b. C ≡ C > C = C > C — C
    c. C — C > C = C < C ≡ C
    d. C ≡ C < C — C > C = C
33. Which of the following is not a source used in Mid Infrared Spectrophotometer?
    a. Nernst glower
    b. High pressure mercury arc lamp
    c. Globar
    d. Nichrome wire
34. Which of the following is the wave number of near infrared spectrometer?
    a. 4000 – 200 cm-1 b. 200 – 10 cm-1
    c. 12500 – 4000 cm-1 d. 50 – 1000 cm-1
35. Which of the following options are correct in terms of wavelength for the different types of IR spectrometer?
    a. Near IR: 0.8 – 2.5 mm b. Mid IR: 0.8 – 2.5 mm
    c. Far IR: 2.5 – 50 mm d. Mid IR: 50 – 100 mm
36. Which of the following is not a composition of Nernst glower or Nernst filament?
    a. Oxides of Zirconium b. Oxides of Barium
    c. Oxides of Yitrium d. Oxides of Thorium
37. What is the composition of Globar rod which is used as a source in Mid IR spectroscopy?

a. Silicon carbide b. Silver chloride
c. Silicon dioxide d. Silver carbide

38..Which of the following is not a technique for preparing solid samples in IR spectroscopy?

a. Solids run in solution b. Mull technique
c. Solid films d. Thin films

39. Which of the following is not used as pyroelectric material used in pyroelectric transducers in Infrared spectroscopy?

a. Triglycine Sulphate
b. DeutratedTriglycine Sulphate
c. Some Polymers
d. Tetraglycine sulphate

40. Which of the following is the principle of Golay cell which is used as a detector in IR spectroscopy?

a. Expansion of gas upon heating
b. Increase in resistance due to an increase in temperature and vice versa
c. Temperature difference gives rise to a potential difference in the material
d. Decrease in resistance due to an increase in temperature

41. In a solid sample treatment technique, the finely ground solid sample is mixed with mineral oil to make a thick paste which is then spread between IR transmitting windows. What is the name of this solid sample treatment technique?

a. Pressed pellet b. Mull technique
c. Solid films d. Solids run in solution

ANSWERS:

1.d,2,c,3.b,4.a,5.b,6.c,7.a,8.c,9.a,10.b,11.b,12.c,13.b,14.b, 15.a,16.d,17.a,18.a,19.c,20.a,21.c,22.d,23.a,24.b,25.a,26.d, 27.a,28.a,29.c,30.b,31.a,32.b,33.b,34.c,35.d,36.d,37.a,38.d,39. d,40.a,41.b

FIVE MARK QUESTIONS

1. Explain any four applications of UV spectroscopy
2. Write a note on Born-oppenheimer approximation?
3. Derive Beer's law and Lamberts law
4. Write a note about emission and absorption spectra.
5. Explain the term (i) Force constant (ii) Wave Number
6. Write the vibration for linear molecule.
7. Explain the expression for vibrational frequency
8. Explain the Non-Linear molecule.
9. Explain the various types of vibration
10. What is IR spectroscopy? Write an selective rule and types of vibrations?

TEN MARK QUESTIONS

1. Explain various types of electronic transition
2. Explain the term chromophore and auxochrome
3. Explain the instrumentation of UV spectroscopy
4. Explain the applications of UV spectroscopy
5. Explain the instrumentation of IR spectroscopy
6. Explain the sampling techniques.
7. Detail notes about application of IR spectroscopy
8. Explain given followings:

(i) Types of vibration
(ii) Expression for vibrational frequency
(iii)Selection rule

RAMAN SPECTRA

1.Raman effect is scattering of _____
a. Atoms b. Molecules
c. Protons d. Photons

2.The elastic scattering of photons is called as _____
a. Atmospheric scattering b. Rayleigh Scattering
c. Conserved Scattering d. Raman Scattering

3.Which of the following cannot be conserved during Raman scattering?
a. Total Energy b. Momentum
c. Kinetic Energy d. Electronic Energy

4.How many degrees of freedom does a chemical compound of N atoms have?
a. 2N b. 2N + 1
c. 3N d. 3N + 1

5.In Raman spectroscopy, the radiation lies in the _____
a. Microwave Region b. Visible Region
c. UV Region d. X-ray Region

6.The change in frequency is due to the transition between vibrational or rotational energy levels.
a. True b. False

7.The Raman spectrum is said to consist of Strokes lines when _____
a. $\Delta v > 0$ b. $\Delta v < 0$
c. $\Delta v = 0$ d. Does not depend on Δv

8. The Rama shift generally lies between _____
a. 100 – 1000 cm-1 b. 100 – 2000 cm-1
c. 100 – 3000 cm-1 d. 100 – 4000 cm-1

9.Raman lines are _____

a. Weak b. Strong
c. Curved d. Blurry

10.The transition zone for Raman spectra is _____
a. Between vibrational and rotational levels
b. Between electronic levels
c. Between magnetic levels of nuclei
d. Between magnetic levels of unpaired electrons

11.The criteria for electronic spin resonance is _____
a. Periodic change in polarisability
b. Spin quantum number of nuclei > 0
c. Presence of unpaired electron in a molecule
d. Presence of chromophore in a molecule

12.The resolving power of TEM is derived from _____
a. electrons b. specimens
c. power d. ocular system

13.The cathode of transmission electron microscope consists of a _____
a. tungsten wire b. bulb
c. iron filament d. gold wire

14.The resolution attainable with standard TEM is less than the theoretical value.
a. True b. False

15.During TEM, a vacuum is created inside the _____
a. room of operation b. specimen
c. column d. ocular system

16.Which of the following component of TEM focuses the beam of electrons on the sample?
a. ocular lens b. condenser lens
c. stage d. column

17.Image formation in electron microscope is based on _____

a. column length b. electron number
c. differential scattering d. specimen size

18.The biological materials have little intrinsic capability to _____

a. scatter electrons b. stain
c. remain viable d. be captured

19.In TEM, the tissue is stained by floating on drops of _____

a. hydrocarbons
b. slow-molecular weight stains
c. heavy metal soutions
d. oil immersion

20.Which of the following is used in electron microscope?

a. electron beams
b. magnetic fields
c. light waves
d. electron beams and magnetic fields

21.Electron Microscope can give a magnification up to _____

a. 400,000X b. 100,000X
c. 15000X d. 100X

22.Which of the following are true for electron microscopy?

a. specimen should be thin and dry
b. image is obtained on a phosphorescent screen
c. electron beam must pass through evacuated chamber

d. specimen should be thin and dry, image is obtained on a phosphorescent screen and electron beam must pass through evacuated chamber

23.Degree of scattering in transmission electron microscope is a function of _____

a. wavelength of electron beam used

b. number of atoms that lie in the electron path

c. number and mass of atoms that lie in the electron path

d. mass of atoms that lie in the electron path

24.Negative Staining is used for examining _____

a. virus particles

b. protein molecules

c. bacterial flagella

d. virus particles, protein molecules and bacterial flagella

25.Which among the following helps us in getting a three-dimensional picture of the specimen?

a. Transmission Electron Microscope

b. Scanning Electron Microscope

c. Compound Microscope

d. Simple Microscope

26.The secondary electrons radiated back in scanning microscope is collected by?

a. specimen b. anode

c. vacuum chamber d. cathode

27.On what factors do the intensity of secondary electrons depend upon?

a. shape of the irradiated object

b. chemical composition of the irradiated object

c. number of electrons ejected
d. size and chemical composition of the irradiated object, number of electrons ejected and on the number of electrons reabsorbed by surrounding

28.Where do we obtain the magnified image of the specimen in SEM?

a. cathode ray tube b. phosphorescent screen
c. anode d. scanning generator

29.Which of the following techniques are used in Transmission Electron Microscopy (TEM) for examining cellular structure?

a. Negative-Staining
b. Shadow Casting
c. Ultrathin Sectioning
d. Negative-Staining, Shadow Casting, Ultrathin

ANSWERS:

1.d,2.b,3.c,4.c,5.b,6.a,7.a,8.d,9.a,10.a,11.c,12.a,13.a,14.a, 15.c,16.b,17.c,18.a,19.c,20.d,21.c,22.a,23.d,24.c,25.d,26.a, 27.d,28.a,29.d.

FIVE MARK QUESTIONS

1. What is the difference between IR and Raman spectra.
2. Explain the principle of TEM and its applications
3. Explain about Rayleigh and raman scattering?
4. Discuss about strokes and antistrokes lines?

TEN MARK QUESTIONS

1. Detail about SEM & TEM studies
2. Discuss about instrument of RAMAN
3. Explain about SEM & TEM applications

NMR & MASS SPECTROSCOPY

1. What does NMR stand for?
   a. Non-Metallic Resonance
   b. Nuclear Magnetic Resonance
   c. Natural Magnetic Radiation
   d. Nanomaterial Magnetic Resonance
2. In NMR spectroscopy, which nuclei are commonly studied?
   a. Carbon-14 b. Hydrogen-1
   c. Oxygen-16 d. Nitrogen-14
3. The magnetic field strength in NMR is measured in:
   a. Hertz (Hz) b. Joules (J)
   c. Tesla (T) d. Newtons (N)
4. What is the principle behind NMR spectroscopy?
   a. Absorption of ultraviolet light
   b. Absorption of radiofrequency radiation
   c. Absorption of X-rays
   d. Absorption of infrared radiation
5. In NMR, the chemical shift is expressed in:
   a. Hertz (Hz) b. Parts per million (ppm)
   c. Tesla (T) d. Newtons (N)
6. Which of the following factors affects chemical shift in NMR?
   a. Magnetic field strength b. Temperature
   c. Both a and b d. Neither a nor b
7. The NMR signal is detected as:
   a. Absorption of radiation
   b. Emission of radiation
   c. Scattering of radiation
   d. Reflection of radiation

8. What is the role of a deuterated solvent in NMR experiments?

a. It enhances sensitivity
b. It reduces background noise
c. It serves as a reference peak
d. It provides an internal standard

9. Which region of the NMR spectrum is typically used for reference (standard)?

a. Left of the signal
b. Right of the signal
c. The signal itself
d. Far away from the signal

10. What does TMS stand for in the context of NMR spectroscopy?

a. Total Magnetic Shielding
b. Tetramethylsilane
c. Transverse Magnetic Sensitivity
d. Tuned Magnetic Source

11. Which NMR technique provides information about the number of hydrogen atoms attached to each carbon in a molecule?

a. 1D NMR b. 2D NMR
c. DEPT d. COSY

12.In a 1H NMR spectrum, what does the integration value represent?

a. Chemical shift b. Spin-spin coupling
c. Area under the peak d. Relaxation time

13. The phenomenon of spin-spin coupling in NMR is responsible for:

a. Broadening of peaks b. Splitting of peaks
c. Shifting of peaks d. Multiplying of peaks

14. Which NMR technique is useful for determining the connectivity of atoms in a molecule?

a. NOESY b. HMQC

c. COSY d. TOCSY

15. In NMR, what is the purpose of the pulse sequence?

a. To excite nuclear spins

b. To measure chemical shift

c. To detect the magnetic field strength

d. To create spin-spin coupling

16. Which type of NMR experiment is sensitive to the spatial arrangement of atoms in a molecule?

a. 1D NMR b. 2D NMR

c. NOESY d. COSY

17. In NMR, what is the purpose of the relaxation process?

a. To decrease sensitivity

b. To enhance spectral resolution

c. To restore equilibrium

d. To increase spin-spin coupling

18. The splitting pattern in a 13C NMR spectrum is typically observed as:

a. Doublet b. Triplet

c. Multiplet d. Singlet

19. Which of the following nuclei has a non-zero nuclear spin and can be studied by NMR?

a. 12C b. 14N

c. 16O d. 1H

20. What does the term "chemical equivalence" mean in NMR?

a. Similar chemical properties

b. Identical chemical shifts

c. Different chemical shifts
d. Same proton count

21. The NOE (Nuclear Overhauser Effect) is a phenomenon related to:
a. Relaxation processes b. Spin-spin coupling
c. Chemical shift d. Multiplicity

22.Which parameter is responsible for the frequency difference between the two spin states in NMR?
a. Chemical shift
b. Spin-lattice relaxation time
c. Spin-spin coupling
d. Gyromagnetic ratio

23. What information does the J-coupling constant provide in NMR?
a. Peak intensity b. Peak position
c. Spin-spin coupling strength d. Relaxation time

24.In 2D NMR, the diagonal peaks represent:
a. Cross-peaks
b. Homonuclear coupling
c. Heteronuclear coupling
d. NOE effects

25. Which of the following is a limitation of NMR spectroscopy?
a. Low sensitivity
b. Limited resolution
c. Inability to analyze complex mixtures
d. All of the above

26.What is the purpose of the magnet in an NMR spectrometer?
a. To generate radiofrequency pulses
b. To provide a strong, static magnetic field
c. To detect NMR signals

d. To measure chemical shifts

27.In NMR, what property of the sample is detected to generate a signal?

a. Density b. Mass

c. Nuclear spin d. Temperature

28. The unit of magnetic field strength in NMR is:

a. Hertz (Hz) b. Tesla (T)

c. Joules (J) d. Watts (W)

29. What is the purpose of shimming in NMR spectroscopy?

a. To adjust the magnetic field strength

b. To optimize the homogeneity of the magnetic field

c. To enhance the resolution of the spectrum

d. To measure the chemical shift

30.Which of the following is a common nucleus used for observing in NMR?

a. 14C b. 16O

c. 1H d. 32S

31. What does RF stand for in the context of NMR instrumentation?

a. Radiofrequency b. Rapid Field

c. Rotating Frame d. Resonance Frequency

32. The RF pulses used in NMR are typically in the range of:

a. Milliseconds b. Seconds

c. Microseconds d. Nanoseconds

33. Which component is responsible for converting the NMR signals into electrical signals?

a. Magnet b. Probe

c. Transducer d. Receiver

34. The component that selects the frequency of the RF pulse is called:
    a. Magnet b. Transmitter
    c. Receiver d. Preamplifier
35. What is the purpose of the dewar in an NMR spectrometer?
    a. To cool the sample
    b. To shield the magnet
    c. To optimize the RF pulses
    d. To calibrate the detector
36. Which of the following is responsible for the generation of the FID (Free Induction Decay) signal?
    a. RF pulses b. Gradient pulses
    c. Radioactive decay d. Sample rotation
37. The function of the lock channel in NMR is to:
    a. Stabilize the magnetic field
    b. Measure the chemical shift
    c. Provide a reference standard
    d. Detect impurities in the sample
38. The process of Fourier transformation in NMR is used to convert:
    a. Time-domain data to frequency-domain data
    b. Frequency-domain data to time-domain data
    c. RF pulses to FID signals
    d. Homonuclear to heteronuclear coupling
39. The component responsible for detecting the NMR signals and converting them into an electrical signal is called the:
    a. Transmitter b. Receiver
    c. Preamplifier d. Gradient coil
40. The region where the sample is placed inside the magnet is known as the:

a. RF coil b. Sample chamber
c. Bore d. Probe

41. The purpose of the pulse programmer in NMR is to:
a. Generate RF pulses
b. Control the timing of pulse sequences
c. Optimize the shimming process
d. Calibrate the detector

42. The phase-sensitive detection in NMR is essential for:
a. Reducing spectral resolution
b. Enhancing sensitivity
c. Measuring chemical shifts
d. Minimizing background noise

43. The term "chemical shift" in NMR refers to the:
a. Movement of atoms in a molecule
b. Displacement of the NMR signal
c. Change in the frequency of an NMR signal
d. Splitting of NMR peaks

44. What is the purpose of the Z-gradient in NMR spectroscopy?
a. To select specific nuclei for excitation
b. To encode spatial information
c. To stabilize the magnetic field
d. To generate RF pulses

45. The decoupling process in NMR is used to:
a. Remove impurities from the sample
b. Simplify complex spectra
c. Enhance spectral resolution
d. Measure spin-spin coupling constants

46. The term "pulsed-field gradient" is associated with:
a. Shimming process
b. Homonuclear coupling

c. Diffusion measurements
d. NOE experiments

47.The term "receiver gain" in NMR refers to the:
a. Strength of the static magnetic field
b. Sensitivity of the RF coil
c. Amplification of the NMR signal
d. Frequency of the RF pulse

48.Which parameter is critical for achieving high resolution in NMR spectroscopy?
a. Relaxation time
b. Magnetic field strength
c. Spin-spin coupling constant
d. Pulse duration

49.The process of auto-shimming in NMR is used to:
a. Optimize the magnetic field homogeneity
b. Detect impurities in the sample
c. Adjust the RF pulses
d. Measure the chemical shift

50.The function of the power amplifier in an NMR spectrometer is to:
a. Generate RF pulses
b. Convert FID signals into frequency-domain data
c. Increase the sensitivity of the detector
d. Control the temperature of the sample

51. What is the primary factor that determines chemical shift in NMR?
a. Temperature b. Magnetic field strength
c. Sample concentration d. Pulse duration

52. In NMR, what unit is used to express chemical shift?
a. Hertz (Hz) b. Parts per million (ppm)
c. Tesla (T) d. Newtons (N)

53. Which of the following nuclei generally experiences the highest chemical shift in NMR?

a. 1H b. 13C

c. 15N d. 31P

54. What does the term "shielding" refer to in NMR?

a. Protection of the sample from external radiation

b. Reduction of the effective magnetic field at the nucleus

c. Enhancement of signal intensity

d. Calibration of the NMR instrument

55.How does electron density affect chemical shift in NMR?

a. High electron density leads to downfield shifts

b. High electron density leads to upfield shifts

c. Electron density has no effect on chemical shift

d. Electron density determines the coupling constant

56. Which of the following functional groups typically exhibits a downfield shift in 1H NMR?

a. Alkene b. Alkane

c. Aldehyde d. Alkyne

57. What is the chemical shift range for the reference compound Tetramethylsilane (TMS) in 1H NMR?

a. 0 ppm b. 1 ppm

c. 4 ppm d. 7 ppm

58. In 13C NMR, which type of carbon nuclei generally shows the highest chemical shift?

a. Methyl carbons b. Aromatic carbons

c. Alkene carbons d. Carbonyl carbons

59. What is the effect of electronegative substituents on chemical shift in NMR?

a. Upfield shift b. Downfield shift

c. No effect d. Indeterminate

60.The chemical shift of a proton is influenced by:

a. Its distance from the magnet
b. Its neighboring atoms
c. Its mass
d. Its temperature

61. In NMR, what is the origin of the coupling between adjacent protons?

a. Dipole-dipole interactions
b. Spin-lattice relaxation
c. Scalar coupling
d. Electron-nucleus interactions

62. The splitting pattern observed in a proton NMR spectrum is directly related to:

a. Chemical shift b. Spin-spin coupling
c. Relaxation time d. Shielding effect

63. In a doublet splitting pattern, how many equivalent neighboring protons are present?

a. 1 b. 2
c. 3 d. 4

64. The coupling constant in NMR measures:

a. The distance between coupled nuclei
b. The strength of spin-lattice relaxation
c. The separation between split peaks
d. The intensity of the NMR signal

65. What is the typical range of coupling constants (J values) in 1H NMR?

a. 0-1 Hz b. 1-10 Hz
c. 10-20 Hz d. 20-30 Hz

66. What effect does increasing the number of equivalent neighboring protons have on the coupling pattern in NMR?

a. It increases the number of peaks

b. It decreases the coupling constant
c. It broadens the peaks
d. It has no effect

67. In NMR, what is the purpose of the DEPT (Distortionless Enhancement by Polarization Transfer) experiment?
a. Measurement of coupling constants
b. Determination of multiplicity
c. Enhancement of signal intensity
d. Detection of impurities

68. What is the effect of an increase in the magnetic field strength on the chemical shift in NMR?
a. Downfield shift b. Upfield shift
c. No effect d. Decrease in coupling constant

69. Which factor influences the intensity of coupling in NMR?
a. Sample concentration b. Temperature
c. Magnetic field strength d. Pulse duration

70. The phenomenon where one proton's magnetic field influences another proton's resonance frequency is known as:
a. J-coupling b. Chemical shift
c. Shielding d. Relaxation

71. Which type of proton in a molecule typically experiences the lowest chemical shift?
a. Methyl protons b. Alkene protons
c. Aromatic protons d. Aldehyde protons

72. In NMR, what does the term "vicinal" refer to?
a. Protons on the same carbon
b. Protons on adjacent carbons
c. Protons separated by two carbons
d. Protons separated by three carbons

73. What is the primary reason for the different chemical shifts observed in NMR spectra?

a. Variation in sample temperature
b. Variation in sample concentration
c. Variation in magnetic field strength
d. Variation in electronic environment

74. How does the presence of a paramagnetic impurity affect NMR spectra?

a. It broadens the peaks
b. It narrows the peaks
c. It has no effect
d. It shifts the peaks downfield

75. Which region of an NMR spectrum is generally more shielded (experiences a lower chemical shift)?

a. Downfield
b. Upfield
c. No difference between regions
d. Depends on the magnetic field strength

ANSWERS:

1.b,2,b,3.c,4.b,5.b,6.c,7.a,8.c,9.b,10.b,11.c,12.c,13.b,14.c, 15.a,16.b,17.c,18.c,19.d,20.b,21.a,22.d,23.c,24.b,25.d,26.b, 27.c,28.b,29.b,30.c,31.a,32.c,33.b,34.b,35.a,36.a,37.a,38.a,39. c,40.c,41.b,42.b,43.c,44.b,45.b,46.c,47.c,48.b,49.a,50.a,51.b, 52.b,53.c,54.b,55.b,56.c,57.a,58.d,59.c,60.b,61.c,62.b,63.b, 64.c,65.b,66.a,67.b,68.b,69.c,70.a,71.c,72.b,73.d,74.a,75.b.

MASS SPECTROSCOPY

1. Mass Spectrometry Instrumentation:
   a. Electrospray Ionization (ESI)
   b. Electron Impact (EI)
   c. Matrix-Assisted Laser Desorption Ionization (MALDI)
   d. All of the above

2. In mass spectrometry, what is the purpose of the ion source?
   a. To generate ions from the sample
   b. To detect ions
   c. To separate ions based on mass
   d. To analyze isotopes

3. Which component of a mass spectrometer is responsible for accelerating ions into the mass analyzer?
   a. Ion Source b. Electron Beam
   c. Accelerator d. Detector

4. The mass analyzer separates ions based on their:
   a. Charge b. Energy
   c. Velocity d. Mass-to-charge ratio

5. Which type of mass analyzer uses a magnetic field to bend ions?
   a. Quadrupole
   b. Time-of-Flight (TOF)
   c. Fourier Transform Ion Cyclotron Resonance (FT-ICR)
   d. Magnetic Sector

6. What is the purpose of the detector in mass spectrometry?
   a. To generate ions
   b. To accelerate ions

c. To measure the abundance of ions
d. To separate ions

7. Which ionization technique is commonly used for large biomolecules and polymers in mass spectrometry?
a. Electron Impact (EI)
b. Matrix-Assisted Laser Desorption Ionization (MALDI)
c. Chemical Ionization (CI)
d. Fast Atom

8. What does the acronym "CID" stand for in the context of mass spectrometry?
a. Chemical Ionization Detector
b. Collision-Induced Dissociation
c. Charged Ion Detector
d. Continuous Ion Detection

9. In a mass spectrum, the x-axis typically represents:
a. Mass-to-charge ratio (m/z) b. Intensity of the ions
c. Time of flight d. Energy of the ions

10. Which type of mass spectrometer is known for its high mass accuracy and resolving power?
a. Quadrupole Mass Spectrometer
b. Time-of-Flight Mass Spectrometer
c. Orbitrap Mass Spectrometer
d. Ion Trap Mass Spectrometer

11. Molecular Ion Peak:
a. Corresponds to the molecular formula of the compound
b. Represents the base peak
c. Results from fragmentation of the molecular ion
d. Has a mass equal to the charge of the ion

12.Base Peak:
a. Represents the most stable ion in the spectrum

b. Has the highest intensity in the spectrum
c. Always corresponds to the molecular ion
d. Is unaffected by fragmentation

13. Metastable Peak:
a. Results from the ionization process
b. Represents an excited state of the molecular ion
c. Has lower energy compared to the base peak
d. Corresponds to the smallest fragment in the spectrum

14. Isotopic Peak:
a. Results from the presence of impurities
b. Represents different charge states of an ion
c. Arises due to the presence of isotopes in the sample
d. Always has a higher intensity than the molecular ion peak

15. Interpretation:
a. Identifying the compound based on its mass spectrum
b. Measuring the intensity of the base peak
c. Adjusting the magnetic field strength
d. Separating ions based on their charge

16. Which type of ionization technique in mass spectrometry is most suitable for analyzing volatile organic compounds?
a. Electron Impact (EI)
b. Atmospheric Pressure Chemical Ionization (APCI)
c. Matrix-Assisted Laser Desorption Ionization (MALDI)
d. Fast Atom Bombardment (FAB)

17. What information does the fragmentation pattern in a mass spectrum provide?
a. Molecular formula of the compound

b. Isotopic distribution
c. Structural information about the compound
d. Charge state of the ions

18. In mass spectrometry, what is the purpose of a tandem mass spectrometer (MS/MS)?
a. To increase the resolution of the mass spectrum
b. To measure the ionization efficiency
c. To perform multiple scans in a single run
d. To isolate and fragment specific ions for further analysis

19. Which of the following factors can affect the resolution of a mass spectrometer?
a. Magnetic field strength b. Detector sensitivity
c. Sample concentration d. Ionization efficiency

20. What is the primary advantage of using a MALDI ion source in mass spectrometry?
a. High sensitivity for small molecules
b. Compatibility with volatile compounds
c. Ability to analyze large biomolecules
d. Rapid ionization of the sample

21. What is the primary principle behind mass spectrometry?
a. Absorption of light
b. Measurement of magnetic fields
c. Measurement of mass-to-charge ratio
d. Nuclear decay

22. In mass spectrometry, which component is responsible for ionization of the sample?
a. Electron gun b. Ion source
c. Magnetic field d. Detector

23. What does the molecular ion peak represent in a mass spectrum?

a. The peak with the highest intensity
b. The peak with the lowest mass-to-charge ratio
c. The peak corresponding to the molecular ion
d. The peak formed due to isotopic effects

24. Which peak in a mass spectrum is indicative of the molecular weight of the compound?
a. Base peak b. Isotopic peak
c. Molecular ion peak d. Metastable peak

25. What is the base peak in a mass spectrum?
a. The peak with the highest intensity
b. The peak corresponding to the molecular ion
c. The peak with the lowest mass
d. The peak formed due to isotopic effects

26. Which term refers to the fragmentation of a molecular ion into smaller fragments?
a. Base peak b. Isotopic peak
c. Metastable peak d. Fragmentation peak

27. What does an isotopic peak in a mass spectrum represent?
a. A peak formed due to ionization
b. A peak caused by magnetic fields
c. A peak resulting from the presence of isotopes
d. A peak indicating molecular weight

28. Which instrument component is responsible for separating ions based on their mass-to-charge ratio?
a. Ion source b. Analyzer
c. Detector d. Electron gun

29. In mass spectrometry, what is the purpose of the detector?
a. To generate ions
b. To separate ions based on mass
c. To detect ions and measure their abundance

d. To focus ions in the mass analyzer

30. What is the base peak often used for in mass spectrometry interpretation?

a. Determining molecular weight
b. Identifying isotopic peaks
c. Quantifying the sample
d. Assessing ionization efficiency

31. Which compound would likely show a significant molecular ion peak in its mass spectrum?

a. Anisole b. Benzaldehyde
c. Ethyl acetate d. Ethylamine

32. In mass spectrometry, what is the primary factor influencing the position of isotopic peaks?

a. Ionization efficiency
b. Magnetic field strength
c. Presence of isotopes
d. Mass analyzer resolution

33. Which peak in a mass spectrum represents the most stable and long-lived fragment?

a. Base peak b. Molecular ion peak
c. Metastable peak d. Isotopic peak

34. What is the primary role of the ion source in mass spectrometry?

a. Separating ions
b. Producing ions from the sample
c. Detecting ions
d. Measuring mass-to-charge ratio

35. Which compound is expected to show a distinctive molecular ion peak in its mass spectrum?

a. Anisole b. Benzaldehyde
c. Ethyl acetate d. Ethyl Bromide

36. What does the term "mass-to-charge ratio" refer to in mass spectrometry?
    a. The mass of ions divided by their charge
    b. The charge of ions divided by their mass
    c. The total mass of the sample
    d. The total charge of the sample
37. Which compound is least likely to show a prominent molecular ion peak due to its high reactivity?
    a. Anisole b. Benzaldehyde
    c. Ethyl acetate d. Ethylamine
38. What is the role of the magnetic field in the mass spectrometer?
    a. To ionize the sample
    b. To detect ions
    c. To separate ions based on mass
    d. To measure ion abundance
39. Which of the following compounds would be expected to have multiple isotopic peaks in its mass spectrum?
    a. Anisole b. Benzaldehyde
    c. Ethyl acetate d. Ethylamine
40. Which term describes the phenomenon where ions with the same mass-to-charge ratio but different kinetic energies are separated?
    a. Ionization efficiency
    b. Isotopic effect
    c. Mass analyzer resolution
    d. Magnetic field strength
41. In mass spectrometry, what is the purpose of the electron gun?
    a. To generate ions
    b. To focus ions in the mass analyzer

c. To ionize the sample
d. To detect ions

42. Which peak in a mass spectrum corresponds to the molecular formula of the compound?
a. Base peak b. Isotopic peak
c. Molecular ion peak d. Metastable peak

ANSWERS:

1.d,2,a,3.c,4.d,5.d,6.c,7.b,8.b,9.a,10.c,11.a,12.b,13.b,14.c, 15.a,16.b,17.c,18.d,19.a,20.c,21.c,22.b,23.c,24.c,25.a,26.c, 27.c,28.b,29.c,30.c,31.d,32.c,33.a,34.b,35.d,36.a,37.c,38.c,39. b,40.c,41.c,42.c.

FIVE MARK QUESTIONS:

1. Explain the principle of nuclear magnetic resonance (NMR) spectroscopy and how it is applied to study the structure of organic compounds.
2. Describe the key components of an NMR instrument and their roles in obtaining spectra.
3. Discuss the concept of chemical shift in NMR spectroscopy and its significance in determining molecular structure.
4. Analyze the NMR spectra of Anisole, Benzaldehyde, Ethyl acetate, Ethylamine, and Ethyl Bromide, focusing on chemical shift values and peak patterns.
5. Explain the phenomena of shielding and deshielding in NMR, and how they influence peak positions.
6. Discuss the role of spin-spin coupling and coupling constants in NMR spectra interpretation.

7. Outline the basic principles of mass spectrometry and how it is used to analyze the mass-to-charge ratio of ions.

8. Describe the instrumentation involved in mass spectrometry, highlighting the key components.

9. Explain the concepts of molecular ion peak, base peak, metastable peak, and isotopic peak in mass spectrometry.

10.Interpret the mass spectra of Anisole, Benzaldehyde, Ethyl acetate, Ethylamine, and Ethyl Bromide, focusing on molecular ion peaks, base peaks, and notable fragments.

11. Discuss the significance of isotopic peaks in mass spectrometry interpretation.

12. Explain how the information obtained from mass spectrometry complements NMR data in structural elucidation.

TEN MARK QUESTIONS:

1. Compare and contrast the principles of NMR spectroscopy and mass spectrometry in terms of the information they provide about molecular structure.

2. Discuss situations where one technique might be preferred over the other for structural analysis.

3. Provide examples of complementary information that can be obtained by combining NMR and mass spectrometry data.

4. Explore advanced NMR concepts such as NOE (nuclear Overhauser effect) and how they contribute to structural elucidation.

5. Discuss the influence of solvent effects on NMR spectra and strategies for mitigating these effects.

6. Explain the principles behind 2D NMR techniques and their applications in resolving complex spectra.

7. Explore advanced mass spectrometry techniques, such as tandem mass spectrometry (MS/MS) and ion mobility spectrometry.

8. Discuss the use of mass spectrometry in high-resolution applications and its role in proteomics and metabolomics.

9. Evaluate the challenges and advancements in mass spectrometry for studying biomolecules.

POLMER CHEMISTRY
BASIC CONCEPTS OF POLYMERS

1. Polymers that consist of identical monomers are called
   a. Bio polymer b. Organic polymer
   c. Homo polymer d. Co- polymer
2. Which of the following polymer is biodegradable?
   a. –(CH2-C=CH-CH2-)-n
   | CN
   Cl |
   b. –(-CH2-CH=CH-CH2-CH2-CH-)-n
   c. –(-O-CH-CH2- C -O-CH-CH2- C -)-n
   | || | ||
   CH3 OCH2CH3 O
   H H O O
   | | || ||
   d. –(-N- (CH2)6 – N - C -(CH2)4- C–)-n
   | | || ||
   H H O O

3. Which of the following statements is not true about low density polythene?
   a. Tough
   b. Hard
   c. Poor conductor of electricity
   d. Highly branched structure
4. Which of the following polymer can be formed by using the following monomer unit? H
   |
   N
   H2C C=O

H2C CH2

H2C CH2

a. Nylon 6,6 b. Nylon2-nylon 6
c. Melamine polymer d. Nylon

5. Which of the following polymer, need at least one di ene monomer for their preparation?
a. Dacron b. Buna-s
c. Neoprene d. Novolac

6. A mixture of more than one type of polymer is Called
a. Homo polymer b. Co-polymer
c. Organic polymer d. Inorganic polymer

7. Which of the following are characteristics of thermosetting polymer?
a. Heavily branched cross linked polymers.
b. Linear slightly branched long chain molecules.
c. Become infusible on moulding so cannot be reused
d. Soften on heating and harden on cooling, can be reused

8. Which of the following polymers are thermoplastic?
a. Teflon b. Natural rubber
c. Neoprene d. Polystyrene

9. Which of the following polymers are used as fiber?
a. Poly tetra fluroethane b. Poly chloroprene
c. Nylon d. Terylene

10. Which of the following are addition polymers?
a. Nylon b. Melamine formaldehyde
c. Orlon d. Polystyrene

11.–A—A –A – is example for

a. Linear polymer b. Co- polymer
c. Homo polymer d. Organic polymer

12. Which of the following polymers are condensation polymer?
    a. Bakelite
    b. Teflon
    c. Butyl rubber
    d. Melamine formaldehyde resin

13. Which of the following monomers form biodegradable polymers?
    a. 3-hydroxybutanoic acid+3-hydroxypentanoic acid
    b. Glycine + amino caproic acid
    c. Ethylene glycol+ phthalic acid
    d. Caprolactum

14. Which of the following are example of synthetic rubber?
    a. Polychloroprene b. Polyacrylonitrile
    c. Buna-N d. Cis-polyisoprene

15. –A –A –A –A –B—B –B –B –A—A—A—A is example for
    a. Co-polymer b. Homo polymer
    c. Organic polymer d. Inorganic polymer

16. Which of the following polymers can have strong intermolecular forces?
    a. Nylon b. Polystyrene
    c. Rubber d. Polyesters

17. Which of the following polymers have vinylic monomer units?
    a. Acrilan b. Polystyrene
    c. Nylon d. Teflon

18. Vulcanization makes rubber ----------

a. More elastic
b. Soluble in inorganic solvent
c. Crystalline
d. More stiff

19. Bakelite is obtained from phenol by reacting with
a. HCHO b. (CH2OH)2
c. CH3CHO d. CH3COCH3

20. What is the purpose of collagen?
a. Protein in skin b. Calcium in skin
c. Vitamin in skin d. Calcium in bones

21. Example for co- polymer
a. PVC b. Polyethylene
c. Nylon 6,6 d. Nylon 6

22.What is the range of molecular weight?
a. 500-5000 dimers b. 300-3000 dimers
c. 550-5500 dimers d. 200-2500 dimers

23. What is the example for natural polymer?
a. Cellulose b. Starch
c. PVC d. Both a and b

24.What is the example for inorganic polymer ?
a. Nylon b. Rubber
c. Ethylene d. Silicone rubber

25.Give an example for identical monomer
a. –A—A –A –A –
b. –A—B—A—B—
c. –A—C—B—C—
d. –A—B—B—A—

26. Non- sticky nature in panswer are due to which polymer?
a. Bakelite b. Poly ethylene oxide
c. Teflon d. Melamine

27. Nylon is not a

a. Condensation polymer b. Co-polymer
c. Poly amide d. Homo polymer

28. Which of the following is a chain growth polymer?
a. Nucleic acid b. Polystyrene
c. Protein d. Starch

29. Bakelite is an example of
a. Elastomer b. Fiber
c. Thermoplastic d. Thermosetting

30. Arrange the following polymers in an increasing order of intermolecular forces fiber, Plastic, elastomer
a. Elastomer < fiber < plastic
b. Plastic < elastomer < fiber
c. Elastomer < plastic < fiber
d. Fiber < elastomer < plastic

31.Which of the following polymers does not have vinylic monomer units?
a. Acrilan b. Nylon
c. Polystyrene

32. PVC is used for
a. Manufacture of cosmetics
b. Manufacture of tires
c. Manufacture of nonstick pan
d. Manufacture of plastic pipes

33. The polymer used for making contact lenses for eyes is
a. Poly methyl methacrylate b. Poly ethylene
c. Poly ethyl acrylate d. Nylon –6

34.Bakelite is obtained from phenol by reacting with
a. Ethanol b. Methanol
c. Vinyl chloride d. Ethylene glycol

35. Which is not a polymer?
a. Sucrose b. Enzyme

c. Starch d. Teflon

36. The polymer used in making hair synthetic hair wigs is made up of

a. $CH_2 = CHCL$ b. $CH_2 = CHCOOCH_3$

c. $C_6H_5CH = CH_2$ d. $CH_2 = CH—CH = CH_2$

37. The S in buna –S refers to

a. Sulphur b. Styrene

c. Sodium d. Salicylate

38. Heating rubber with Sulphur is known as

a. Galvanization b. Bessemerization

c. Vulcanization d. Sulphonation

39. Dacron is an example of

a. Poly amides b. Poly propenes

c. Poly acryl d. Polyester

40. Which of the following is used in paints

a. Nylon b. Terylene

c. Glyptal d. Chlroprene

41. Example for oligomer

a. Keratin b. Protein

c. Starch d. Collogen

42. Polymer containing inorganic and organic compounds called

a. Homo polymer b. Hybrid polymer

c. Co polymer d. Graft co polymer

43. Nylon –6 made from

a. Chloroprene b. Adipic acid

c. Butadiene d. Caprolactum

44. Expanswerion of HDPE

a. Higher density poly ethylene

b. High density poly ethylene

c. High density poly amine

d. High density poly amide

45. Example for branched polymer
    a. HDPE b. PAN
    c. PVC d. LDPE
46. Which among the following polymers have lowest solubility
    a. Epoxy resin b. Poly ethylene
    c. Poly styrene d. Nylon 6
47. Range of high polymer molecule is
    a. 20,000 to 50,000 b. 30,000 to 1,00,000
    c. 10,000 to 2,00,000 d. 10,000 to 1,00,000
48. Which of the following polymer of glucose is stored by animal
    a. Cellulose b. Amylose
    c. Amylopectin d. Glycogen
49. Which of the following is not a semi –synthetic polymer?
    a. Cis-Polyisoprene b. Cellulose nitrate
    c. Cellulose acetate d. Vulcanized rubber
50. The commercial name of poly acrylonitrile is
    a. Dacron b. Orlon(acrilan)
    c. PVC d. Bakelite

ANSWERS:

1.c,2,d,3.c,4.a,5.b,6.b,7.a,8.a,9.c,10.c,11.c,12.a,13.a,14.a, 15.a,16.a,17.c,18.a,19.a,20.a,21.c,22.c,23.d,24.d,25.a,26.a, 27.d,28.b,29.d,30.c,31.b,32.a,33.a,34.b,35.a,36.a,37.b,38.c,39. d,40.c,41.d,42.b,43.d,44.b,45.d,46.a,47.c,48.d,49.a,50.b.

FIVE MARK QUESTIONS:

1. Discuss about backbone of the chain and its types?
2. Write some differences between thermosetting and thermo plastics polymer.

3. Write about arrangement monomer?
4. Write some differences between addition and condensation polymer.
5. Explain cross linked polymer.
6. Write about elastic polymer.
7. How polyamide is formed.
8. Explain a tactic polymer with example.
9. What is termination and explain their types.
10. What are the disadvantages of thermosetting polymer.

TEN MARK QUESTIONS

1. What are the classification of a polymer?
2. Explain in detail on the classification of co-polymer?
3. Discuss upon the stereochemistry of polymer?
4. Explain glass - transwerition temperature and factors affecting Tg

STRUCTURE OF POLYMERS

1. The simplest form of polymer is_____
   a. Branched polymer b. Crossed polymer
   c. Linear polymer d. None of the above
2. The basis on their formation, the polymer can be classified_____
   a. As addition polymer only
   b. Both as addition and condensation polymer
   c. As copolymer
   d. As condensation polymer
3. Cellulose acetate is a _____
   a. Natural polymer b. Plasticizer
   c. Semisynthetic polymer d. Synthetic polymer
4. Which among the following polymers have lowest solubility?
   a. Polyethylene b. Nylon 6
   c. Polystyrene d. Epoxy resin
5. The polymer in which steric placements of the substituent are arranged in such a way to give alternated d and I configuration is known as _____
   a. Isotactic polymer b. Atactic polymer
   c. Syndio-tactic polymer d. None of the above
6. Which of the following scientist won noble prize for their work in polymer stereo chemistry?
   a. Kurt Alder & Richard Abegg
   b. Peter Agre & Agricola
   c. Zeigler & Natta
   d. Friedrich Accum
7. Atactic dyad has a segment of the polymer chain consisting of _____ monomer units.
   a. 5 b. 2

c. 3 d. 4

8. The polymer in which alternative chiral centers have the same configuration is called_____

a. Syndio tactic b. Atactic
c. Isotactic d. Multitactic

9. Teflon and neoprene are the examples of

a. Copolymer b. Monomers
c. Homopolymers d. Condensation polymer

10. Syindiotactic polymer prepared by using caprolaction is known as

a. Terylene b. Teflon
c. Nylon 6 d. Neoprene

11. Polymer which has a amide linkage is

a. Nylon 6 b. Terylene
c. Teflon d. Bakelite

12. Gradient polymer comers which of the following copolymer category?

a. Linked polymer b. Branched polymer
c. Terepolymer d. Brush copolymer

13. A glass transwerition is a property of only_____ portion of the semi crystalline solid.

a. Crystalline b. Amorphous
c. Both a and b d. None of the above

14. Polymers that are formed by free radical mechanism are usually_____

a. Syndiotactic b. Atactic
c. Isotactic d. Multitactic

15. Polymeric structure of polymers are of_____ types

a. 5 b. 4
c. 3 d. 6

16. _____ is a macromolecule made out of many monomer arranged in straight line.
    a. Linear polymer b. Branched polymer
    c. Both a and b d. None of the above
17. Have a straight polymer chain that may or may not composed of _____
    a. Carbonyl group b. Pendant group
    c. Aliphatic group d. None of the above
18. Linear polymer have _____ tensile strength
    a. Low b. High
    c. Moderate d. All the above
19. Unbranched form of starch is called_____
    a. Polysaccharides b. Thermosetting
    c. Amylose d. Amylopectin
20. _____ polymer molecule consist of a main chain with two or more three way branch points
    a. Dendrimers b. Star polymer
    c. Brush d. Comb
21. Branched polymers have_____ tensile strength
    a. High b. Low
    c. Moderate d. None of the above
22. Short chains that are connected different polymer chains into network is_____
    a. Linear b. Branched
    c. Cross linked d. None of the above
23. The process of cross linking between rubber and sulphur is called ____
    a. Vulcanization b. Grafting
    c. Amide linkage d. None of the above
24. Isotactic polymers are usually ____ in forms
    a. Crystalline b. Semi crystalline
    c. Amorphous d. None of the above

25. _____ is made by metallocene catalyst
    a. Polyvinyl b. Polyester
    c. Polystyrene d. Silicones
26. Polymers ____ electricity
    a. Conduct b. Conduct in colloidal state
    c. Do not conduct d. Conduct in aqueous state
27. _____ enables the side chain polymers for high flexibility
    a. Dipole b. Vanderwaals force
    c. Intermolecular forces d. None of the above
28. Choose the correct Ziegler natta composition
    a. (Et3)3Al. Ticl2 b. (Et)3 Al. Ticl4
    c. (Et)2 Al. Ticl4 d. (Et)3 Ticl4
29. Crystalline melting point of -ch2-ch2- is _____
    a. 410k-419k b. 340k
    c. 395k d. 675k-635k
30. Introduction of oxygen to backbone of chain gives _____ to the polymer chain
    a. Density b. Flexibility
    c. High melting point d. None of the above

ANSWERS:

1.c,2.b,3.c,4.d,5.c,6.c,7.b,8.a,9.c,10.c,11.a,12.a,13.b,14.b, 15.c,16.a,17.b,18.b,19.c,20.d,21.b,22.c,23.a,24.b,25.c,26.c, 27.a,28.d,29.a,30.b.

FIVE MARK QUESTIONS:

1. Classify the polymer on the basis of this stereochemistry.
2. Explain the how crystallinity affect the properties of polymer.
3. Explain a) linear polymer b)cross linked polymer

4. Write note on Tg
5. Write a short note on copolymers
6. Write a note on Tm.
7. Describe linear polymer and branched polymer
8. Briefly explain tacticity with their types.
9. Differentiate thermoplastic and thermosetting plastic
10. Explain the methods of synthesis
11. Give an explanation of steps involved in free radical polymerization

TEN MARK QUESTIONS:

1. Explain the structure of polymer
2. Write the difference between linear and branched polymer
3. Discuss the importance of the glass transwerition temperature and bring out the relation between Tg and Tm.
4. Write a note on a) tacticity b) copolymer
5. Write difference between linear and branched polymer
6. Write a note on tacticity and its type
7. Write the general notes on the properties of polymer
8. Write about crystalline melting point and its effect of chemical structure on Tm
9. Discuss about the copolymer and its type

MOLECULAR WEIGHT OF POLYMERS

1. What does the number average molecular weight represent?
   a. Average weight of polymer chains
   b. Average molecular weight of polymer repeat units
   c. Most common molecular weight in a polymer sample
   d. Weighted average of molecular weights
2. Weight average molecular weight takes into account the:
   a. Smallest polymer chains
   b. Largest polymer chains
   c. Both small and large polymer chains equally
   d. Polymer chain composition
3. Which method is commonly used to determine the number average molecular weight of a polymer?
   a. Viscosity measurement
   b. Osmometry
   c. Gel permeation chromatography (GPC)
   d. Infrared spectroscopy
4. In the Mark-Houwink equation, how is viscosity related to molecular weight?
   a. Inversely proportional b. Directly proportional
   c. No correlation d. Exponential relationship
5. Osmometry is a technique used to measure the:
   a. Viscosity of polymers
   b. Solubility of polymers
   c. Molecular weight of polymers
   d. Refractive index of polymers
6. Calendaring is a processing method used for:
   a. Extruding fibers b. Producing sheets and films

c. Injection molding d. Blow molding

7. Die casting is a process commonly employed for:
   a. Forming thermosetting polymers
   b. Producing intricate shapes in metal molds
   c. Extrusion of polymers
   d. Calendaring films

8. Blow molding is a technique primarily used for manufacturing:
a. Tubes and pipes b. Thin-walled containers
c. Sheets and films d. Injection-molded products

9. Injection molding involves:
   a. Forcing polymer through a shaped die
   b. Forming polymer sheets between rollers
   c. Melting polymer and injecting it into a mold
   d. Stretching and orienting polymer fibers

10. Extrusion molding is commonly used for producing:
a. Injection-molded parts b. Films, sheets, and pipes
c. Blow-molded containers d. Calendared products

11. Wet spinning is a process associated with the production of:
a. Fibers from a polymer solution b. Extruded films
c. Injection-molded parts d. Die-cast products

12. Which polymer processing method involves the elimination of a solvent during the shaping process?
a. Injection molding b. Extrusion molding
c. Wet spinning d. Calendaring

13. The primary purpose of calendaring is to:
a. Produce fibers b. Create intricate shapes
c. Form thin sheets and films d. Mold complex parts

14. What is the key characteristic of die casting in polymer processing?
   a. High pressure injection of molten polymer

b. Slow cooling of polymer melt
c. Stretching and orienting of polymer chains
d. Production of hollow shapes

15. In blow molding, what is the typical starting form of the polymer material?
a. Powder b. Granules
c. Sheets d. Preforms or parisons

16. The injection molding process is suitable for the mass production of:
a. Thick sheets b. Thin films
c. Complex and intricate shapes d. Fibers

17. Extrusion molding is often used for the continuous production of:
a. Injection-molded parts
b. Thin sheets and films
c. Blow-molded containers
d. Calendared products

18. Wet spinning is a process used to produce:
a. Thermosetting polymers
b. Fibers from a polymer solution
c. Injection-molded parts
d. Extruded films

19. Which polymer processing method involves the use of a mold cavity to shape molten polymer?
a. Extrusion molding b. Injection molding
c. Calendaring d. Blow molding

20. In the context of polymer processing, what is a preform?
a. A precursor to the final product
b. An injection-molded part
c. A sheet or film before calendaring
d. A die used in die casting

21. Which of the following is NOT a typical application of blow molding?
    a. Producing bottles
    b. Creating hollow containers
    c. Forming sheets and films
    d. Shaping automotive components
22. What is the primary purpose of a die in polymer processing?
    a. Provide pressure for injection molding
    b. Shape and form molten polymer
    c. Control the speed of extrusion
    d. Produce preforms for blow molding
23. The main advantage of injection molding is its ability to:
    a. Produce long continuous fibers
    b. Create intricate and complex shapes
    c. Form thin sheets and films
    d. Stretch and orient polymer chains
24. What is the primary difference between blow molding and injection molding?
    a. The starting form of the polymer material
    b. The use of molds in shaping polymer
    c. The pressure applied during processing
    d. The cooling rate of the polymer melts
25. In extrusion molding, the polymer material is forced through a:
a. Mold cavity b. Die with a specific shape
c. Calendering machine d. Injection molding machine
26. Wet spinning is a technique often used in the production of:
    a. Fibers from a polymer solution
    b. Thin sheets and films

c. Blow-molded containers
d. Injection-molded parts

27. The term "calendering" is most closely associated with the production of:

a. Fibers b. Sheets and films
c. Injection-molded parts d. Extruded products

ANSWERS:

1.c,2.b,3.c,4.b,5.c,6.b,7.b,8.b,9.c,10.b,11.a,12.c,13.c,14.a, 15.d,16.c,17.b,18.b,19.b,20.a,21.c,22.b,23.b,24.a,25.b,26.a, 27.b.

FIVE MARK QUESTIONS:

1. Discuss blow moulding process.
2. How is molecular weight of a polymer determined by osmometry method?
3. How would you determine the molecular weight of a polymer by viscometric method?
4. How is molecular weight of a polymer determined by osmometry method?
5. Describe die casting process.
6. Describe blow moulding process.
7. Describe wet spinning process.

TEN MARK QUESTIONS:

1. a) How is molecular weight of a polymer is determined by viscosity method?
   b) Describe Die casting process.
2. Write a note on polymer processing methods.
3. Calculate the number average & weight average molecular weight when equal masses of polymer molecules with M1=10,000 and M2=1,00,000 are mixed

NATURAL AND SYNTHETIC RUBBERS

1. Addition of _____ results in the vulcanization of rubber.
   a. nitrogen b. sulphur
   c. carbon monoxide d. particulate matter
2. Low density polyethene exists as a partially _____ solid.
   a. Amorphous b. Crystalline
   c. Both a and b d. None of the these
3. Which one of the following is not a condensation polymer?
   a. Dacron b. neoprene
   c. Melamine d. Glyptal
4. Polystyrene is _____ at room temperature.
   a. Ductile b. Brittle
   c. Malleable d. None of the above
5. The catalyst used for the polymerization of olefins is _____.
   a. Ziegler-Natta catalyst b. Wilkinson's catalyst
   c. Pd catalyst d. Zeises salt complex
6. Polypropylene is not used in _____.
   a. Clothes b. ropes
   c. Heat resistance plastics d. Parachute ropes
7. Liquid materials that are added to PVC formulation is_____.
   a. Kerosene b. Hydrogen
   c. Plasticizers d. Water
8. What are the temperature and pressure conditions when natural rubber is hydrogenated in the presence of nickel catalyst?
   a. 5-10 atm and 180°-200°C

b.15-20 atm and 180°-200°C
c.30-35 atm and 100°-120°C
d.15-20 atm and 100°-120°C

9. Which of the following properties does not correspond to butyl- rubbers
a. poor resistance b. low heat buildup
c. high internal viscosity d. none

10. Synthetic rubbers are produced from_____.
a. Petroleum b. Natural gas
c. Carbon earth metals d. both a and b

11. Freons has _____ boiling point and _____ surface tension.
a. high, high b. low, high
c. low, low d. Low, normal

12. PTFE is used in the manufacture of _____.
a. Hydrogen b. semi-conductors
c. Toxic d. fluoropolymers

13. The Principle linkage of polyurethane is _____.
a. -NHCOO- b. -COONH-
c. -CONOH- d. none of these

14. Which of the following is used to make non-stick cookware
a. Polystyrene b. PVC
c. PTFE d. PETE

15. Which of the following polymers does not involve cross linkages
a. Vulcanized rubber b. Bakelite
c. Melamine d. Teflon

16. Which of the following has a higher glass transwerition temperature
a. polyethylene b. polypropylene
c. polyvinyl chloride d. Polystyrene

17. The presence of additional oxygen in the chain increases its _____.
a. Flexibility b. ductility
c. durability d. none of the these

18. Silicone rubbers are made from _____.
a. poly dimethyl siloxanes
b. poly dimethyl silanes
c. dimethyl dichlorosilanes
d. octamethyl cyclotera siloxane

19. _____ is the simplest unsaturated hydrocarbon but its polymerization was exceptionally difficult.
a. pentene b. butene
c. propene d. ethylene

20. Styrene at room temperature is _____.
a. solid b. liquid
c. gas d. colloidal solution

21. Nylon threads are made of _____.
a. polyester polymer b. polyamide polymer
c. polyethylene polymer d. polyvinyl polymer

22. $–(-CH_2-C(CH_3)_2-CH_2-C(CH_3)_2-)n-$ is a polymer having monomer units of _____.
a. $CH_2=C(CH_3)_2$ b. $CH_3- CH=CH_2$
c. $CH_3-CH=CH-CH_3$ d. $(CH_3)_2-C=C-(CH_3)_2$

23. The temperature at which the ionic polymerization carried out is ____.
a. 100°C b. 50°C
c. -100°C d. 0°C

24. How many stages do the bulk polymerization of styrene passes through
a. two b. one
c. three d. four

25. Thiocol is nothing but _____.

a. Polysulphide rubber b. polyamide fibre
c. engineering plastic d. expanded polystyrene

26. Traces of oxygen initiate the _____ of ethylene readily
a. Polymerization b. Addition
c. Condensation d. oxidation

27. The unit of tensile strength is _____.
a. N/m b. kg/cm
c. Mpa d. %

28. Polyolefins are _____.
a. white b. colorless
c. yellow d. green

ANSWERS:

1.b,2.b,3.b,4.b,5.a,6.c,7.c,8.b,9.b,10.d,11.c,12.b,13.a,14.c, 15.d,16.d,17.a,18.a,19.d,20.b,21.b,22.a,23.d,24.a,25.a,26.a, 27.c,28.b.

FIVE MARK QUESTIONS:

1. Write the preparation, properties and uses of polypropylene?
2. Write a note on silicone rubber?
3. Write a note on Buna rubber?
4. Write the preparation, properties and uses of thiocol?
5. Write the preparation, properties and uses of neoprene?
6. Write the preparation, properties and uses of PVC?
7. Write the preparation, properties and uses of polystyrene?
8. Write the preparation, properties and uses of polyurethane?
9. Write a note on PTFE

TEN MARK QUESTIONS:

1. A) Write the preparation, properties and uses of polyethylene, B) Write a note on Buna -N rubber
2. Write the basic structure of polyurethane. Explain its preparation, properties and uses
3. Discuss the constitution of natural rubber.
4. Write the preparation, properties and uses of freons.
5. Write a note on
   a) Natural rubber
   b) Synthetic rubber

PLASTICS AND RESINS

1. Which of the following polymers are thermoplastics?
   a. Teflon b. Natural rubber
   c. Neoprene d. polystyrene
2. Which of the following polymers can have strong intermolecular forces?
   a. Nylon b. polystyrene
   c. rubber d. polyesters
3. Which of the following polymers are addition polymers?
   a. nylon b. PVC
   c. orlon d. Polystyrene
4. Plastics are the materials obtained by mixing the _____with the other ingredients which impart special engineering properties.
   a. Resin b. Monomer
   c. Catalyst d. Any polymer
5. Plastics are ____in weight
   a. very heavy b. light
   c. negligible d. heavy
6. How many types of plastic resins are there?
   a. two b. three
   c. four d. five
7. Most plant resins are composed to _____
   a. derivative b. terpenes
   c. carvacrol d. terpiene
8. Plastics are usually classified by the backbone, sidechain, structure
   a. backbone b. sidechain
   c. structure d. all the above

9. Which of the following includes the common thermoplastic resins used today?
   a. epoxy b. bakelite
   c. duroplast d. polyethylene
10. The thermoplastic is _____in nature
   a. amorphous b. insoluble
   c. cross linked d. powder
11. Which of the following is not an example of thermoplastics?
   a. nylon b. polyester
   c. PVC d. vulcanized rubber
12. Polyethene is prepared by the process of _____
   a. addition b. condensation
   c. living d. free- radical
13. LDPE is prepared by polymerizing ethylene at a pressure of _____
   a. 100-200 atm b. 1000-5000 atm
   c. 10-100 atm d. 2-10 atm
14. Thermoplastic polymer chains are hold together by _____
   a. Vander wall's force b. electromagnetic force
   c. London force d. dispersion force
15. In thermoplastic, monomer chains are linked by _____
   a. hydrogen bond b. sigma bond
   c. covalent bond d. dipole-dipole bond
16. The crystallinity of LDPE is ___
   a. 10% b. 30%
   c. 55% d. 33%
17. Oleo gum resins are mixture of _____
   a. volatile oil+ gum+ resins b. Gum+ resins
   c. Fixed oil+ gum+ resins d. Fats+ resins+ gum

18. Resins are insoluble in____
    a. alcohol b. water
    c. ethanol d. ether
19. Lubricants are classified into____ types
    a. four b. two
    c. six d. three
20. Dyes are____ in water
    a. insoluble b. partially insoluble
    c. soluble d. partially soluble
21. Organic pigments contain _____
    a. hydrogen b. oxygen
    c. nitrogen d. carbon
22. Thermosetting polymers are _____polymers.
    a. linear chain b. cross linked
    c. branched d. straight chain
23. _____is used in the products such as microwave, dishwasher and carpets
    a. polypropylene b. PVC
    c. acrylic acid d. polyethylene
24. What is the amount used of plasticizers in comment by weight?
    a. 0.12 to 1.12% b. 1 to 2%
    c. 1to 4% d. 2 to 5%
25. Which of the following is the properties of lubricant? high viscosity, thermal stability and corrosion prevention
    a. high viscosity b. thermal stability
    c. corrosion prevention d. all the above
26. Plasticizers are mostly_____
    a. ethers b. esters
    c. alcohols d. carbonyl groups
27. _____is a great substitute of glass
    a. acrylic acid b. PVC

c. polyethylene d. polystyrene

28. _____are a class of polymers which contains epoxide groups
a. duroplast resin b. Bakelite
c. epoxy resin d. urea

29. The thermosetting resin which is produced by formaldehyde is ____
a. duroplast resin b. Bakelite
c. epoxy resin d. urea

30. _____are added to paints to provide elasticity
a. lubricants b. catalysts
c. pigments d. plasticizers

31. _____are usually used in surface coating
a. paints b. dyes
c. pigments d. colours

32. Chemical plasticizers are mostly _____
a. ester b. ethanol
c. carboxyl group d. nitryl group

33. CD and DVD cases are manufactured by thermoplastic resin of _____
a. Teflon b. acrylic group
c. PVC d. polystyrene

34. A high temperature lubricants may undergo _____
a. vulcanization b. volatilization
c. lubrication d. combustion

35. Thermosetting plastics are formed by _____ process
a. addition polymerization
b. copolymerization
c. condensation polymerization
d. isomerism polymerization

36. The softening temperature of HDPE is ____

a. 20°C b. 85°C

c. 135°C d. 150°C

37. Select the incorrect statement from the following potion

a. LDPE is chemically inert and has excellent chemical resistance

b. LDPE is tough and flexible

c. LDPE is used for making films in general packaging, carrier bags etc

d. LDPE has high rigidity and is suitable for load bearing applications

38. Select the incorrect statements from the following option

a. phenolic resins are hard, rigid and strong

b. phenolic resins have good abrasion resistance

c. phenolic resins are usually dark coloured, pinkish brown

d. phenolic resins have poor chemical resistance

39. Plasticizers ___ the strength of the plastics

a. increase b. decrease

c. do not affect d. both a and b

40. Triphenyl phosphate, dibutyl phosphate are used as _____

a. pigments b. paints

c. dyes d. plasticizers

ANSWERS:

1.b,2,a,3.d,4.a,5.b,6.a,7.d,8.d,9.d,10.a,11.d,12.a,13.b,14.a, 15.c,16.c,17.a,18.b,19.d,20.c,21.c,22.b,23.a,24.c,25.d,26.b,

27.a,28.c,29.d,30.d,31.c,32.a,33.d,34.b,35.c,36.c,37.d,38.d, 39.b,40.a.

FIVE MARK QUESTIONS:

1. Write a short note on plasticizers
2. Write a short note on pigments
3. Write the uses of thermoplastics & thermosetting resins
4. Write a note on dye and pigments
5. Differentiate thermoplastics and thermosetting plastics
6. Write about constituents of lubricants and dyes
7. Write the uses of thermosetting plastics
8. Write the uses of thermoplastics
9. Explain the two types plastics
10. Explain the uses of polyethylene

TEN MARK QUESTIONS:

1. Write a note on the following
   i. filter
   ii. catalyst
2. Discuss the constituents of plastics
3. Write the preparation, properties and uses of polyethylene
4. What are pastics ?. Explain briefly about two types of arrangement of units are in plastics.
5. i. Why plastics are not eco friendly ? Explain in briefly
   ii. Do all plastics have same type of arrangement of units ? Explain it briefly
6. State some of the ways to reduce the use of plastic in our day to day life.
7. Differentiate thermoplastics and thermosetting plastics

8. Explain the advantages and disadvantages of plasticizers
9. What is catalyst ? Explain their types
10. Write a note on following
    i. dyes
    ii. pigments

AGRICULTURAL CHEMISTRY

1. What are the three main categories of nutrients in fertilizers?
   a. Macro, Micro, Nano
   b. Primary, Secondary, Tertiary
   c. Nitrogen, Phosphorus, Potassium
   d. Major, Minor, Trace
2. Which nutrient is considered a micronutrient for plant growth?
   a. Nitrogen b. Phosphorus
   c. Iron d. Potassium
3. Which of the following is a secondary nutrient in fertilizers?
   a. Nitrogen b. Phosphorus
   c. Calcium d. Potassium
4. The primary function of phosphorus in plants is related to:
   a. Photosynthesis b. Energy transfer
   c. Root development d. Protein synthesis
5. Which of the following is a micronutrient essential for chlorophyll synthesis?
   a. Nitrogen b. Magnesium
   c. Zinc d. Phosphorus
6. Which nitrogenous fertilizer is commonly used as a white crystalline solid in agriculture?
   a. Urea b. Ammonium Nitrate
   c. Ammonium Sulphate d. Nitric Acid
7. The Haber-Bosch process is used for the production of:
   a. Urea b. Ammonium Nitrate
   c. Ammonium Sulphate d. Nitric Acid

8. Ammonium nitrate is widely used as a fertilizer and also as:

a. Explosive b. Insecticide

c. Herbicide d. Fungicide

9. Which nitrogenous fertilizer contains both nitrogen and sulfur?

a. Urea b. Ammonium Nitrate

c. Ammonium Sulphate d. Nitric Acid

10. Urea is synthesized through a reaction between ammonia and:

a. Oxygen b. Carbon dioxide

c. Water d. Sulfuric acid

11. Which of the following is a common use of ammonium nitrate?

a. Food preservation b. Fertilizer

c. Antiseptic d. Fuel

12. In the context of fertilizers, what does the term "nitrogen fixation" refer to?

a. Conversion of atmospheric nitrogen to a usable form

b. Absorption of nitrogen by plant roots

c. Decomposition of organic matter releasing nitrogen

d. Application of nitrogen-rich fertilizers

13. What is the primary role of nitrogen in plant growth?

a. Root development b. Flower formation

c. Photosynthesis d. Protein synthesis

14.Which nitrogenous fertilizer is commonly used in explosive manufacturing?

a. Urea b. Ammonium Nitrate

c. Ammonium Sulphate d. Nitric Acid

15. Ammonium sulphate is a source of both nitrogen and:
    a. Phosphorus b. Sulfur
    c. Potassium d. Calcium
16. Which of the following is a benefit of using urea as a nitrogenous fertilizer?
    a. Rapid release of nitrogen
    b. Low cost
    c. Reduced environmental impact
    d. Long-lasting effect
17. What is the primary use of ammonium sulphate in agriculture?
    a. Acidifying soil b. Promoting flowering
    c. Controlling weeds d. Enhancing root growth
18. Which of the following is true about the solubility of ammonium nitrate?
    a. Highly soluble in water
    b. Insoluble in water
    c. Soluble in organic solvents
    d. Soluble only in acidic solutions
19. The nitrogen content in urea is in the form of:
    a. Nitrate b. Ammonium

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22. What is the primary disadvantage of using ammonium nitrate as a fertilizer?
   a. High cost b. Low nitrogen content
   c. Risk of explosion d. Environmental pollution

23.Which of the following fertilizers is known for its slow-release of nitrogen?
   a. Urea b. Ammonium Nitrate
   c. Ammonium Sulphate d. Nitric Acid

24. Ammonium sulphate is often recommended for crops that require both nitrogen and:
   a. Phosphorus b. Sulfur
   c. Potassium d. Magnesium

25. Which nitrogenous fertilizer is commonly used for topdressing in agriculture?
   a. Urea b. Ammonium Nitrate
   c. Ammonium Sulphate d. Nitric Acid

ANSWERS:

1.b,2,c,3.c,4.c,5.c,6.a,7.a,8.a,9.c,10.b,11.b,12.a,13.d,14.b, 15.b,16.c,17.a,18.a,19.b,20.a,21.b,22.c,23.d,24.b,25.a.

FIVE MARK QUESTIONS:

ain the role of primary nutrients (nitrogen, s, and potassium) in plant growth and ent.

uss the significance of secondary nutrients magnesium, and sulfur) for plant health.

orate on the essential functions of ents (such as iron, zinc, and manganese) in iology.

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4. Outline the steps involved in the commercial preparation of urea through the Haber-Bosch process.
5. Compare and contrast the production methods of ammonium nitrate and ammonium sulfate.
6. Analyze the environmental impact of nitrogenous fertilizers and propose sustainable practices in their use.

TEN MARK QUESTIONS:

1. Provide a detailed chemical equation for the synthesis of urea, highlighting the key reactants and conditions.
2. Explore the various uses of urea in agriculture, including its advantages and potential drawbacks.
3. Compare the advantages and disadvantages of ammonium nitrate and ammonium sulfate as nitrogenous fertilizers.
4. Assess the economic and agricultural implications of choosing one nitrogenous fertilizer over another.
5. Define and explain the concept of Integrated Nutrient Management (INM) in the context of sustainable agriculture.
6. Discuss how INM combines the use of chemical fertilizers, organic manures, and biofertilizers for optimal plant nutrition.
7. Evaluate the long-term benefits of adopting an INM approach, considering soil health, crop yield, and environmental sustainability.
8. Describe the symptoms of common micronutrient deficiencies in plants and their impact on crop productivity.

9. Discuss strategies for diagnosing and correcting micronutrient deficiencies in agricultural soils.

10.. Analyze the importance of micronutrients in enhancing the nutritional quality of crops and their role in human health.

MANURES - ORGANIC MANURES, BULKY ORGANIC MANURES, FARM YARD MANURE

1. What is the primary source of organic manures?
   a. Minerals
   b. Synthetic compounds
   c. Plant and animal residues
   d. Inorganic salts
2. Which of the following is an example of bulky organic manure?
   a. Urea b. Compost
   c. Superphosphate d. Ammonium nitrate
3. Farm Yard Manure (FYM) is derived from:
   a. Industrial by-products
   b. Forest residues
   c. Livestock excreta and crop residues
   d. Synthetic chemicals
4. What is the primary purpose of adding farm yard manure to the soil?
   a. Weed control
   b. Pest management
   c. Improving soil fertility and structure
   d. Enhancing water absorption
5. Which statement best describes the difference between fertilizers and manures?
   a. Fertilizers are organic, and manures are inorganic.
   b. Fertilizers provide nutrients, while manures improve soil structure.
   c. Fertilizers are bulky, and manures are concentrated.
   d. Fertilizers are liquid, and manures are solid.

6.What distinguishes bulky organic manures from other types of manures?

a. High nutrient content
b. Low volume and weight
c. Decomposition rate
d. Large volume and weight

7. Which organic manure undergoes anaerobic fermentation?

a. Green manure b. Compost
c. Vermicompost d. Biogas slurry

8. The term "Green Manure" refers to:

a. Manure with a green color
b. Organic matter derived from plants that are plowed into the soil
c. Fertilizers with a high nitrogen content
d. Manure produced by herbivores

9.Which of the following is a characteristic of well-prepared compost?

a. Unpleasant odor b. High salt content
c. Dark, crumbly texture d. Rapid decomposition

10.What is the primary nutrient content in organic manures?

a. Nitrogen b. Phosphorus
c. Potassium d. Organic matter

11. Which organic manure is rich in nitrogen and is obtained from fish processing waste?

a. Vermicompost b. Bone meal
c. Fish meal d. Poultry manure

12. What role does farm yard manure play in soil structure improvement?

a. It increases soil acidity.
b. It enhances soil compaction.

c. It improves soil aeration and water-holding capacity.

d. It promotes soil erosion.

13. Which of the following is a disadvantage of using bulky organic manures?

a. Rapid nutrient release

b. Increased risk of nutrient leaching

c. High cost

d. Low organic matter content

14. How does composting contribute to the effectiveness of organic manures?

a. It reduces the volume of organic matter.

b. It increases nutrient concentration.

c. It accelerates the decomposition process.

d. It eliminates the need for soil incorporation.

15. Which factor is crucial for the efficient decomposition of organic manures?

a. Low temperature b. High humidity

c. Adequate aeration d. Minimal microbial activity

ANSWERS:

1.c,2.b,3.c,4.c,5.b,6.d,7.d,8.b,9.c,10.d,11.c,12.c,13.b,14.c, 15.c.

FIVE MARK QUESTIONS:

1. Explain the composition of organic manures and how they contribute to soil fertility.

2. Discuss the importance of organic manures in sustainable agriculture practices.

3. Provide examples of commonly used organic manures and their nutrient content.

4. Define bulky organic manures and discuss their significance in soil improvement.
5. Compare and contrast the characteristics of bulky organic manures with other forms of organic amendments.
6. Evaluate the challenges and benefits associated with the application of bulky organic manures.
7. Detail the process of preparing farm yard manure and its role in enhancing soil structure.
8. Explain the nutrient composition of FYM and how it influences plant growth.
9. Discuss the potential drawbacks and limitations of using farm yard manure in agriculture.

TEN MARK QUESTIONS:

1. Outline the distinctions between fertilizers and manures in terms of composition, nutrient release, and impact on soil health.
2. Discuss the environmental implications of using fertilizers compared to the use of manures.
3. Evaluate the long-term effects on soil fertility and ecosystem sustainability when relying predominantly on fertilizers or manures.
4. Elaborate on how organic manures contribute to the improvement of soil physical, chemical, and biological properties.
5. Discuss the role of organic manures in mitigating soil erosion and promoting water retention.
6. Assess the overall impact of organic manures on creating a conducive environment for beneficial soil microorganisms.

7. Identify the challenges associated with the production and application of organic manures in large-scale agriculture.

8. Propose strategies to overcome the challenges and enhance the adoption of organic manure practices.

9. Discuss the potential economic and environmental benefits of widespread organic manure usage in modern agriculture.

PESTICIDES CLASSIFICATION AND GENERAL METHODS

1. What is the primary purpose of pesticides in agriculture?
   a. Enhancing soil fertility
   b. Controlling pests and diseases
   c. Improving water quality
   d. Promoting plant growth

2.Which of the following is a common classification of pesticides based on their target organisms?
   a. Fertilizers b. Herbicides
   c. Irrigants d. Mulches

3. In the classification of pesticides, what is the role of fungicides?
   a. Control insects b. Control fungi
   c. Control weeds d. Control rodents

4.Organophosphates and pyrethroids are examples of which type of pesticides?
   a. Herbicides b. Insecticides
   c. Fungicides d. Rodenticides

5.Which pesticide type is specifically designed to control unwanted plant growth?
   a. Herbicides b. Insecticides
   c. Fungicides d. Miticides

6.What is the general method of application for systemic pesticides?
   a. Foliar spray b. Soil drenching
   c. Seed treatment d. Fumigation

7. Which statement is true about contact pesticides?
   a. They are absorbed by plant roots.

b. They act only on pests that come into direct contact.

c. They are effective against systemic diseases.

d. They have a prolonged residual effect.

8. What is the primary concern when using pesticides with a broad-spectrum activity?

a. Increased cost

b. Potential harm to non-target organisms

c. Limited effectiveness

d. Rapid degradation in the environment

9. Which type of pesticide application is suitable for controlling soil-dwelling pests?

a. Foliar spray b. Fumigation

c. Seed treatment d. Space treatment

10.Selective herbicides are designed to:

a. Control a wide range of plant species

b. Control only specific types of weeds

c. Control insect pests

d. Act systemically in plants

11.What is the primary target of insecticides?

a. Fungi b. Insects

c. Weeds d. Bacteria

12. Which is a common method to reduce the environmental impact of pesticide application?

a. Increasing pesticide dosage

b. Frequent application throughout the year

c. Integrated Pest Management (IPM)

d. Use of broad-spectrum pesticides

13. Which type of insecticides mimic the action of insect hormones and disrupt their normal development?

a. Contact insecticides

b. Systemic insecticides

c. Insect growth regulators
d. Organophosphates

14.What is the primary advantage of using systemic pesticides?
a. Rapid knockdown effect
b. Long-lasting protection
c. Selective targeting of pests
d. Low environmental persistence

15.Which term describes the phenomenon where pests develop resistance to a particular pesticide over time?
a. Pest resurgence
b. Pesticide persistence
c. Pesticide resistance
d. Pesticide resurgence

16.Which plant-derived substance is used as an insecticide in tobacco crops?
a. Caffeine b. Nicotine
c. Pyrethrin d. Neem oil

17. Pyrethrin, a natural insecticide, is obtained from which source?
a. Chrysanthemum flowers b. Tobacco plants
c. Neem tree seeds d. Eucalyptus leaves

18. Borates are commonly used as inorganic pesticides for controlling:
a. Insects b. Fungi
c. Weeds d. Rodents

19. Which of the following is an example of an organic pesticide used against mosquitoes and other insects?
a. Nicotine b. Pyrethrin
c. D.D.T. d. BHC

20. Dichlorodiphenyltrichloroethane (D.D.T.) belongs to which class of pesticides?

a. Organophosphates b. Organochlorines
c. Carbamates d. Pyrethroids

21. What is the primary drawback of using D.D.T. as a pesticide?
a. Rapid degradation in the environment
b. High cost
c. Persistence and bioaccumulation
d. Selective targeting of pests

22.Which pesticide is commonly used against agricultural pests and disease vectors?
a. Nicotine b. Pyrethrin
c. D.D.T. d. BHC

23.Which of the following is a safety measure to minimize pesticide exposure?
a. Application during windy conditions
b. Application without protective clothing
c. Mixing pesticides without proper knowledge
d. Discarding empty pesticide containers in water bodies

24.Why is it important to follow recommended dosage guidelines when using pesticides?
a. To save costs
b. To reduce environmental impact
c. To enhance pesticide effectiveness
d. To minimize risks to human health and the environment

25.Which statement is true regarding the disposal of pesticide containers?
a. They can be discarded in regular trash.
b. They should be burned to eliminate residues.
c. They should be triple-rinsed and recycled.
d. They can be buried in agricultural fields.

ANSWERS:

1.b,2,b,3.b,4.b,5.a,6.c,7.b,8.b,9.b,10.b,11.b,12.c,13.c,14.b, 15.c,16.b,17.a,18.a,19.b,20.b,21.c,22.d,23.a,24.d,25.c.

FIVE MARK QUESTIONS:

1. Explain the classification of pesticides into insecticides, fungicides, and herbicides.
2. Discuss the distinction between organic and inorganic pesticides, providing examples of each.
3. Highlight the significance of categorizing pesticides based on their target organisms.
4. Outline the general methods of pesticide application in agriculture.
5. Discuss factors influencing the choice of application method for different types of pesticides.
6. Explain the importance of timing in pesticide application for optimal effectiveness.
7. Define toxicity in the context of pesticides and its importance in risk assessment.
8. Discuss factors influencing the toxicity of pesticides, including chemical properties.
9. Evaluate the role of regulatory agencies in establishing safety guidelines for pesticide use.

TEN MARK QUESTIONS:

1.Enumerate and explain the essential safety measures when handling and applying pesticides.
2. Discuss the importance of using personal protective equipment (PPE) and its specific components.
3. Analyze the role of education and training in minimizing risks associated with pesticide use.

4. Provide an overview of the insecticidal properties of nicotine derived from plant sources.

5. Explain the mode of action of pyrethrin as an insecticide and its applications.

6. Discuss the advantages and limitations of using plant-derived insecticides in pest control.

7. Explore the characteristics and applications of borates as inorganic pesticides.

8. Discuss the mode of action of borates in pest control and their environmental impact.

9. Evaluate alternative options and considerations for sustainable pest management.

10. Provide a historical perspective on the use of D.D.T. as an organic pesticide.

11. Discuss the environmental and health concerns associated with the use of D.D.T.

12. Analyze the properties and applications of BHC (Benzene hexachloride) as an organic pesticide

13. Define Integrated Pest Management (IPM) and explain its principles.

14. Discuss the advantages of adopting IPM strategies in agriculture.

15. Evaluate the role of IPM in reducing reliance on chemical pesticides and promoting sustainable pest control.

16. Explore emerging trends in pest control, such as biopesticides and precision agriculture.

17. Discuss the advantages and challenges of incorporating technology into modern pest management.

18. Evaluate the potential impact of these trends on the future of agriculture and environmental sustainability.

19. Describe the regulatory framework governing pesticide use at national and international levels.

20. Discuss the role of regulatory agencies in assessing and approving new pesticides.

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20. Discuss the role of regulatory agencies in assessing and approving new pesticides.

21. Analyze the challenges and opportunities in developing and implementing effective pesticide regulations.

FUNGICIDES AND HERBICIDES

1. Which type of fungicide is commonly used in organic farming and is known for its broad-spectrum activity?
   a. Copper compounds b. Bordeaux mixture
   c. Sulphur compounds d. Neem oil
2. What is the primary role of sulphur compounds in fungicides?
   a. Inhibiting photosynthesis
   b. Disrupting cell membranes
   c. Interfering with metabolic processes
   d. Blocking energy transfer reactions
3. Copper compounds are effective fungicides due to their ability to:
   a. Act as growth hormones for plants
   b. Inhibit DNA replication in fungi
   c. Enhance soil fertility
   d. Promote water absorption in plant roots
4. Bordeaux mixture is a fungicide that contains:
   a. Copper sulfate and lime
   b. Sulphur and pyrethrin
   c. Neem oil and garlic extract
   d. D.D.T. and BHC
5. What is the purpose of lime in Bordeaux mixture?
   a. Enhance fungicidal activity
   b. Increase solubility of copper sulfate
   c. Provide essential nutrients to plants
   d. Improve soil structure
6. Which fungicide component is known for its role in preventing and treating powdery mildew on plants?
   a. Copper compounds b. Sulphur compounds
   c. Bordeaux mixture d. Neem oil

7. What is a potential drawback of using copper-based fungicides in agriculture?

a. High cost
b. Rapid degradation
c. Soil acidification
d. Development of resistance in pathogens

8. Which type of fungi is commonly targeted by sulphur-based fungicides?

a. Rust fungi b. Downy mildews
c. Phytophthora species d. Powdery mildews

9. What role does copper play in preventing fungal infections in plants when used in fungicides?

a. Inhibiting spore germination
b. Promoting fungal growth
c. Neutralizing soil pH
d. Stimulating plant immune responses

10. Which statement is true about the mode of action of Bordeaux mixture?

a. It directly kills fungal spores on contact.
b. It creates a protective barrier on plant surfaces.
c. It disrupts the metabolic pathways in fungi.
d. It enhances the growth of beneficial microbes in the soil.

11.Acaricides are specifically designed to control:

a. Weeds b. Insects
c. Mites and ticks d. Fungi

12.Which term describes substances used to control rodents?

a. Herbicides b. Insecticides
c. Acaricides d. Rodenticides

13.What is the primary purpose of attractants in pest management?

a. Repel pests from treated areas
b. Kill pests on contact
c. Lure pests to a specific location
d. Disrupt pest mating behaviors

14. Repellants are commonly used to:

a. Attract insects to specific areas
b. Deter pests from feeding on plants
c. Enhance the effectiveness of acaricides
d. Encourage pests to reproduce

15. Which substance is commonly used as a rodenticide to control rat populations?

a. Neem oil b. Zinc phosphide
c. Pyrethrin d. Copper sulfate

16. What is the primary advantage of using attractants in pest control?

a. Immediate pest mortality
b. Targeted pest control
c. Minimal environmental impact
d. Long-lasting residual effect

17.Which of the following is an example of an acaricide?

a. Glyphosate b. Zinc phosphide
c. Pyrethrin d. Abamectin

18. The preservation of seeds involves the use of:

a. Fungicides b. Herbicides
c. Insecticides d. Rodenticides

19. What is the purpose of using rodenticides in agriculture?

a. Enhance crop growth
b. Control weed populations
c. Manage rodent infestations

d. Increase soil fertility

20.Which substance is commonly used as a repellent in protecting crops from herbivorous pests?

a. Sulphur b. Nicotine
c. Capsaicin d. Copper sulfate

21.What is the primary concern when using rodenticides in agricultural settings?

a. Effectiveness against non-target organisms
b. Development of resistance in rodents
c. Accumulation of residues in crops
d. Secondary poisoning of predators

22.Acaricides are commonly used in the prevention of diseases transmitted by:

a. Mites and ticks b. Aphids
c. Fungi d. Nematodes

23.Which term describes substances that selectively kill or inhibit the growth of plants?

a. Herbicides b. Fungicides
c. Insecticides d. Miticides

24. What is the primary function of attractants in the context of pest management?

a. Induce rapid pest mortality
b. Repel pests from treated areas
c. Lure pests to a specific location
d. Inhibit pest reproduction

25.Which substance is commonly used as an attractant for trapping certain insect pests?

a. Capsaicin b. Neem oil
c. Pheromones d. Copper sulfate

ANSWERS:

1.c,2.c,3.b,4.a,5.b,6.b,7.c,8.d,9.a,10.b,11.c,12.d,13.c,14.b, 15.b,16.b,17.d,18.a,19.c,20.c,21.d,22.a,23.a,24.c,25.c.

FIVE MARK QUESTIONS:

1. Explain the mode of action of sulphur compounds in fungicides and their impact on fungal pathogens.
2. Discuss the role of copper compounds as fungicides, highlighting their specific mechanisms in disease control.
3. Evaluate the advantages and potential drawbacks of using Bordeaux mixture as a fungicidal treatment in agriculture.
4. Differentiate between acaricides and rodenticides, providing examples of each and their applications in pest control.
5. Discuss the significance of attractants and repellants in integrated pest management, emphasizing their role in sustainable agriculture.
6. Evaluate the potential environmental and ecological impacts of using rodenticides in agricultural settings.

TEN MARK QUESTIONS:

1. Explain the concept of seed preservation and its significance in ensuring agricultural sustainability.
2. Discuss various methods of seed preservation, including the use of fungicides and other treatments.
3. Evaluate the challenges and solutions associated with seed preservation, considering factors like genetic diversity and long-term storage.
4. Define Integrated Pest Management (IPM) and elaborate on its principles.

5. Discuss how the use of herbicides, acaricides, and rodenticides fits into an integrated approach to pest management.

6. Analyze the benefits and challenges of implementing IPM strategies in modern agriculture, considering economic and environmental factors.

7. Assess the environmental impact of using sulphur compounds and copper compounds as fungicides.

8. Discuss alternative and sustainable approaches to fungicide use in agriculture, considering organic practices and biological control methods.

9. Evaluate the broader implications of pesticide use, including effects on non-target organisms and long-term ecological consequences.

10. Explain the potential ecological consequences of using rodenticides in controlling rodent populations.

11. Discuss alternative methods for managing rodent infestations that minimize harm to non-target species.

12. Evaluate the role of biodiversity conservation in maintaining a healthy and balanced ecosystem in agricultural landscapes.

13. Define the role of repellants in protecting crops from herbivorous pests.

14. Discuss the mechanisms by which repellants deter pests and their effectiveness in sustainable pest management.

15. Analyze the challenges and considerations in the strategic use of repellants in different agricultural systems.

16. Explore emerging trends in pesticide development, focusing on environmentally friendly alternatives.

17. Discuss the potential of biotechnology, precision agriculture, and genetic engineering in reducing the reliance on chemical pesticides.

18. Analyze the ethical and regulatory considerations associated with the adoption of new pesticide technologies.

OIL COMPOSITION, CLASSIFICATION, AND PROPERTIES

1. What percentage of soil is typically composed of minerals?
   a. 10% b. 25%
   c. 50% d. 75%
2. Which of the following is an inorganic constituent of soil?
   a. Humus b. Clay
   c. Peat d. Silt
3. The classification of soil based on particle size is known as:
   a. Soil taxonomy b. Soil composition
   c. Soil texture d. Soil structure
4. What is the primary function of humus in the soil?
   a. Enhancing water drainage
   b. Providing aeration
   c. Improving soil fertility
   d. Increasing soil pH
5. Which soil property is influenced by the arrangement of soil particles into aggregates?
   a. Soil color b. Soil structure
   c. Soil texture d. Soil porosity
6. The term "loam" refers to a soil type that has a balanced mixture of:
   a. Sand, silt, and clay b. Sand and peat
   c. Clay and humus d. Silt and gravel
7. Which soil horizon is commonly known as the topsoil, rich in organic matter and nutrients?
   a. A horizon b. B horizon
   c. C horizon d. O horizon

8.The process of soil formation is known as:

a. Erosion b. Weathering

c. Leaching d. Decomposition

9. Which soil property is influenced by the mineral composition of the soil?

a. Soil color b. Soil pH

c. Soil structure d. Soil texture

10. What is the primary role of soil organisms in the biological system of the soil?

a. Enhancing soil erosion

b. Aiding in nutrient cycling

c. Decreasing soil porosity

d. Inducing soil compaction

11. Which function of water in plant growth involves the movement of water from the soil into the roots?

a. Transpiration b. Capillarity

c. Imbibition d. Absorption

12. Water plays a crucial role in photosynthesis by serving as a:

a. Solvent b. Catalyst

c. Electron donor d. Carbon source

13. The process by which water is lost from plant leaves to the atmosphere is called:

a. Absorption b. Transpiration

c. Imbibition d. Infiltration

14. What is the term for the movement of water within the soil due to the cohesive and adhesive properties of water molecules?

a. Transpiration b. Capillarity

c. Imbibition d. Absorption

15.Water absorption by plant roots is facilitated by the process of:

a. Osmosis b. Diffusion
c. Filtration d. Evaporation

16. The term "soil microbiome" refers to:
a. The study of soil erosion
b. The community of microorganisms in the soil
c. Soil mineral content
d. Soil pH levels

17. Which of the following is a macroscopic soil organism?
a. Bacteria b. Fungi
c. Nematodes d. Actinomycetes

18.The role of mycorrhizal fungi in the soil is primarily associated with:
a. Decomposition of organic matter
b. Nitrogen fixation
c. Enhancing plant nutrient absorption
d. Soil structure improvement

19. Soil analysis is crucial for assessing:
a. Soil color b. Soil temperature
c. Soil texture d. Soil fertility

20.The pH of soil is a measure of its:
a. Temperature b. Acidity or alkalinity
c. Color d. Porosity

21.Electrical conductivity (EC) in soil analysis is a measure of:
a. Soil temperature b. Soil salinity
c. Soil texture d. Soil organic matter content

22.Which macronutrient is essential for plant growth and is often included in soil analysis?
a. Iron b. Calcium
c. Magnesium d. Boron

23.Micronutrient deficiency in plants can be diagnosed through soil analysis, focusing on elements such as:

a. Nitrogen and phosphorus
b. Iron and zinc
c. Potassium and sulfur
d. Calcium and magnesium

24.Estimation of macronutrients in soil analysis includes determining levels of:

a. Iron and zinc
b. Nitrogen and phosphorus
c. Calcium and magnesium
d. Potassium and sulfur

25. Which soil analysis parameter is crucial for assessing nutrient availability to plants?

a. Soil color
b. Soil porosity
c. Cation exchange capacity (CEC)
d. Soil temperature

ANSWERS:

1.d,2,b,3.c,4.c,5.b,6.a,7.a,8.b,9.b,10.b,11.d,12.a,13.b,14.b, 15.a,16.b,17.c,18.c,19.d,20.b,21.b,22.b,23.b,24.b,25.c.

FIVE MARK QUESTIONS

1. Explain the difference between organic and inorganic constituents in soil.
2. List and briefly describe the major soil horizons in a soil profile.
3. Define soil texture and its significance in agriculture.

4. Discuss the importance of soil structure in relation to plant growth.
5. Explain the process of soil formation and factors influencing it.
6. Define soil porosity and permeability. How do they influence water movement in soil?
7. Discuss the factors affecting soil water retention and drainage.
8. Explain the significance of soil temperature in plant growth.
9. Describe the concept of soil fertility and its components.
10. Briefly outline the role of soil color in indicating soil properties.
11. Enumerate the essential functions of water in plant growth.
12. Define soil microbiota and explain their role in nutrient cycling.
13. How does water availability in soil influence nutrient uptake by plants?
14. Discuss the importance of mycorrhizal associations in plant-soil interactions.
15. Explain the significance of beneficial soil organisms in organic farming.
16. Define soil pH and its importance in nutrient availability.
17. Explain the concept of electrical conductivity in soil analysis.
18. List the macronutrients commonly analyzed in soil testing.
19. Discuss the significance of micronutrients in plant nutrition.

20. Briefly explain the methods used for soil nutrient estimation.

TEN MARK QUESTIONS:

1. Elaborate on the classification of soils based on particle size and provide examples of each class.
2. Discuss the role of soil colloids in nutrient availability and water retention.
3. Describe the properties of loamy soil and explain why it is considered ideal for plant growth.
4. Compare and contrast the characteristics of arid and tropical soils.
5. Evaluate the impact of soil erosion on agricultural productivity and suggest preventive measures.
6. Elaborate on the physical properties of soil and their impact on crop production.
7. Discuss the importance of soil pH in nutrient availability and microbial activity.
8. Evaluate the relationship between soil moisture and plant growth, considering different soil types.
9. Explain the principles of soil water management in agriculture.
10. Assess the impact of soil pollution on the environment and propose remediation strategies.
11. Elaborate on the different forms of water in the soil-plant system and their relevance to plant growth.
12. Evaluate the impact of water stress on plant physiology and productivity.

13. Discuss the role of nitrogen-fixing bacteria in soil fertility.
14. Describe the symbiotic relationships between plants and beneficial soil microorganisms.
15. Assess the effects of soil microbial activity on soil structure and nutrient availability.
16. Describe the procedure for determining soil pH and its implications for crop management.
17. Explain the factors influencing electrical conductivity in soil and its interpretation.
18. Compare and contrast the methods for estimating macronutrients in soil.
19. Discuss the role of micronutrients in specific plant metabolic processes and growth.
20. Evaluate the importance of routine soil analysis in sustainable agriculture practices.

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ISBN 978-93-340-1966-7