

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. Figures to the right indicate full marks.
 3. Use of log table/non programmable calculator is allowed.

Q.1 Answer **any three** of the following.

15

- A) Draw a labelled polarogram and explain any two terms involved in it.
- B) Determine the concentration of Pb^{2+} ions, which produces a diffusion current of $21.64 \mu\text{A}$ in 0.1M KCl at 298K , with the rate of flow of mercury drops and drop time as 3.4 mg s^{-1} and 4 s respectively.
Given: $D = 9.8 \times 10^{-6} \text{ cm}^2 \text{ s}^{-1}$.
- C) In a polarographic determination of lead, the wave heights determined for a series of solution were as follows.

Concentration of Pb^{2+} (mM)	0.25	0.40	0.50	0.65
Height of wave (mm)	31.2	49.5	62.5	79.9

A sample solution containing unknown amount of lead gave a wave height of 46.3 mm , under the identical condition. Find the concentration of lead in the sample solution.

- D) Discuss the nature of potentiometric titration curve from the graph of:
 - i) $\frac{\Delta E}{\Delta V}$ vs. V , and
 - ii) $\frac{\Delta^2 E}{\Delta V^2}$ vs. V
- E) Explain the basic principle of amperometric titrations. Discuss the nature of amperometric titration curve when titrand alone is reducible, with suitable example.
- F) Mention the advantages and limitations of rotating platinum electrode.

Q.2 Answer **any three** of the following.

15

- A) What is food processing and food preservation? Why is it necessary to preserve food?
- B) Discuss any one method for the estimation of reducing sugars in honey.
- C) Explain the estimation of boric acid as a food preservative.
- D) Give a brief account of different types of milk.
- E) What are deodorants and antiperspirants? Mention any two properties of each.
- F) What is the composition of face powder? How is calcium estimated in face powder?

(TURN OVER)

Q.3 Attempt **any three** of the following.

15

- With the help of a labelled diagram, explain the working thermal conductivity detector, giving any two of its advantages.
- The following data was obtained on using chromatographic column of length 20 cm. The unretained species had retention time of 1.30 min. Retention time for the two components A and B were 10.5 min and 12.2 min respectively. The corresponding peak width at the base for components A & B were 1.25 min and 1.30 min respectively. Calculate the number of plates in each peak and plate height for the column.
- Mention any two factors which affect the choice of carrier gas in GC. Give any three of its applications.
- What are the requirements of an ideal ion-exchange resin?
- Define ion exchange capacity. Discuss the determination of capacity of an anion exchanger.
- What are the applications of size exclusion chromatography?

Q.4 Answer **any three** of the following.

15

- Discuss various factors influencing the TG curve.
- Draw a neat labelled diagram of DTA instrument and explain any three of its components.
- What is DTA? Discuss the nature of DTA curve for decomposition of $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$.
- Distinguish between TGA and DTA.
- Discuss the theory of neutron activation analysis.
- What are thermometric titrations? Discuss the application of thermometric titration in the titration of Zn^{2+} against disodium tartarate.

Q.5 A Fill in the blanks.

04

- Three electrode system consist of working electrode, _____ electrode and a reference electrode.
- The dissolved oxygen present in experimental solution in acidic medium, finally gets reduced to _____ at DME.
- _____ equation forms the basis of quantitative analysis in polarography.
- Potentiometric titrations involve the measurement of potential as a function of _____ of titrant.

OR

A State true or false.

04

- Polarography can be used as a basis of amperometric titration.
- Excess of maxima suppressor in polarography tends to reduce the diffusion current.

(TURN OVER)

- r) Potentiometric titrations cannot be applied to non-aqueous solution.
- s) Electrolyte added to polarographic solution to eliminate diffusion current is supporting electrolyte.

Q.5 B Fill in the blanks.

04

- a) _____ is used as a preservative in poultry.
- b) Irradiation of food products is carried out by exposing them to _____ rays.
- c) Chicory gives _____ taste to coffee.
- d) Kaolin is used in face powder for _____.

OR

Q.5 B State true or false.

04

- p) LTLT method involves heating of the milk to 72°C for at least 15 sec.
- q) Tannin in tea is estimated by determining its oxidizability by potassium permanganate solution.
- r) Dyes like fluorescein are used in lipsticks.
- s) Fermentation is a process where pathogenic microorganisms promote chemical changes in food.

C Fill in the blanks:

04

- a) As the number of theoretical plates in the GC column increases, the efficiency of the column _____.
- b) In ion-exchange chromatography, higher the concentration of ions in solution, _____ is its exchange.
- c) In ion-exchange chromatography, larger the value of selectivity coefficient, _____ is the affinity of the ions for the resin.
- d) Size exclusion chromatography involves the separation of molecules based on their _____.

OR

Q.5 C State true or false.

04

- p) Molecular sieves are used as adsorbents in open tubular GC column.
- q) The rate of solute migration in a GC column is a function of its partition coefficient.
- r) Clays can be used as natural ion-exchangers.
- s) Swelling of the resin is due to high proportion of non- polar groups.

Q.5 D Fill in the blanks.

03

- a) Horizontal plateau in TG curve indicates the regions where there is no _____ loss.
- b) Silicon carbide is used as a _____ material in DTA.

(TURN OVER)

c) Thermometric titration graph of HCl versus NaOH gives _____ end point.

OR

Q.5 D State true or false.

03

- p) NAA is used for the detection of trace impurities in Si and Ge samples used in transistor.
- q) NAA is a highly sensitive technique and permits the estimation of elements up to picogram level.
- r) Chemical reactions, particularly those of oxidative nature are predominantly endothermic.

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