



खण्ड-अ (व्याख्यात्मक)
Section-A (Descriptive)

For Office Use Only

CHE 507
M.Sc. IInd SEMESTER EXAMINATION, 2023
CHEMISTRY
(Analytical Chemistry)
Credit (4+0)
(CBCS Mode)

Important Instruction :	महत्वपूर्ण निर्देश :
The question paper is in two sections : Section-A (Descriptive) will be of 15 marks and Section-B (Objective) will be of 60 marks. Section-A will be deposited at the end of the examination and answer sheet (OMR) of Section-B will be deposited.	प्रश्न पत्र दो भागों में है : खण्ड-अ (व्याख्यात्मक) 15 अंकों का होगा एवं खण्ड-ब (बहुविकल्पीय) 60 अंक का होगा। खण्ड-अ परीक्षा के अन्त में जमा कर लिया जायेगा एवं खण्ड-ब का उत्तर पत्रिका (OMR) जमा होगा।

अनुक्रमांक (अंकों में) / Roll No. (In Figures) :

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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Time : 1 Hour
समय : 1 घण्टा

Max. Marks : 15
अधिकतम अंक : 15

3284

अनुक्रमांक (शब्दों में) :

Roll No. (In Words) :

अभ्यर्थी का नाम :

Student Name :

पिता का नाम :

Father Name :

कक्ष परिप्रेक्षक के हस्ताक्षर / Invigilator's Signature :

Note : (i) Total No. of Questions are Six.

(ii) Answer Three questions in all.

(iii) All Questions carry equal marks.

नोट : (i) कुल छः प्रश्न दिए गये हैं।

(ii) किन्हीं तीन प्रश्नों के उत्तर दीजिए।

(iii) सभी प्रश्नों के अंक समान हैं।

1. Discuss about applications of conductometric titration.
2. Write about basic principle of polarography with suitable diagram.
3. Write about different types of electrodes used in potentiometry.
4. What is Nephelometry ?
5. Describe about neutron activation technique.
6. Write short note on DTA and DSC and their applications.

खण्ड-ब (बहुविकल्पीय)
Section-B (Objective)

CHE 507

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CHEMISTRY

(Analytical Chemistry)

Credit (4+0)

(CBCS Mode)

AFFIX PRESCRIBED
RUBBER STAMP

Paper ID

(To be filled in the
OMR Sheet)

Date (तिथि) : _____

3284

अनुक्रमांक (अंकों में) :

Roll No. (In Figures) :

अनुक्रमांक (शब्दों में) :

Roll No. (In Words) : _____

Time : 1 Hour

समय : 1 घण्टा

Max. Marks : 60

अधिकतम अंक : 60

नोट : पुस्तिका में 40 प्रश्न दिये गये हैं, सभी प्रश्न करने होंगे। प्रत्येक प्रश्न 1.5 अंक का होगा।

Important Instructions :

1. The candidate will write his/her Roll Number only at the places provided for, i.e. on the cover page and on the OMR answer sheet at the end and nowhere else.
2. Immediately on receipt of the question booklet, the candidate should check up the booklet and ensure that it contains all the pages and that no question is missing. If the candidate finds any discrepancy in the question booklet, he/she should report the invigilator within 10 minutes of the issue of this booklet and a fresh question booklet without any discrepancy be obtained.

महत्वपूर्ण निर्देश :

1. अभ्यर्थी अपने अनुक्रमांक केवल उन्हीं स्थानों पर लिखेंगे जो इसके लिए दिये गये हैं, अर्थात् प्रश्न पुस्तिका के मुख्य पृष्ठ तथा साथ दिये गये ओ०एम०आर० उत्तर पत्र पर, तथा अन्यत्र कहीं नहीं लिखेंगे।
2. प्रश्न पुस्तिका मिलते ही अभ्यर्थी को जाँच करके सुनिश्चित कर लेना चाहिए कि इस पुस्तिका में पूरे पृष्ठ हैं और कोई प्रश्न छूटा तो नहीं है। यदि कोई विसंगति है तो प्रश्न पुस्तिका मिलने के 10 मिनट के भीतर ही कक्ष परिप्रेक्षक को सूचित करना चाहिए और बिना त्रुटि की दूसरी प्रश्न पुस्तिका प्राप्त कर लेना चाहिए।

1. The types of gas chromatography are :
 - (A) Gas-solid and gas-liquid
 - (B) Gas-solid and gas-gas
 - (C) Both (A) and (B)
 - (D) None of the above
2. Choose the incorrect statement about packed columns :
 - (A) They are typically made of stainless steel
 - (B) Their outer diameter is 0.32 to 0.64 cm
 - (C) Their length is 0.61 to 3.05 m
 - (D) None of the above
3. Which of the following materials can not be used in construction of capillary GC columns :
 - (A) Steel
 - (B) Glass
 - (C) Teflon
 - (D) None of the above
4. Choose the correct statement about capillary columns :
 - (A) Stationary phase is coated with the inner wall of the column
 - (B) Applicable only for GLC
 - (C) Liquid stationary phase is immobilized on the capillary tubing walls
 - (D) All of the above
5. Ideal detector must have :
 - (A) High sensitivity
 - (B) Low reproducibility
 - (C) Non-linear response
 - (D) All of the above
6. Hydrocarbons can be easily detected by :
 - (A) Flame ionization detector
 - (B) Thermal conductivity detector
 - (C) Photoionization detector
 - (D) Electron capture detector

7. Electron capture detector is used for :
- Compounds ionized by UV radiation
 - Hydrocarbons
 - Electronegative atoms
 - All of the above
8. Type of bond commonly used in commercial bonded phases is :
- (Si - C - Si - C)
 - (Si - O - Si - O)
 - (Si - O - Si - C)
 - All of the above
9. The species which can not be separated by gas-solid chromatography is :
- Hydrogen sulfide
 - Carbon disulfide
 - Carbon dioxide
 - None of the above
10. For better peak resolution a column requires :
- Variable length pathways
 - Small particle size of the stationary phase
 - Large plate height
 - All of the above
11. Choose the correct relationship between plate height (H), number of plates (N) and column length (L) :
- $H \propto \frac{1}{N}$
 - $L \propto H$
 - $H = \frac{L}{N}$
 - All of the above
12. In HPLC which one is used to remove dissolved gases in solvent :
- Heated stirring
 - Vacuum degassing
 - Helium sparging
 - All of the above

13. Which one is not the part of solvent delivery system ?
- (A) Pump
 - (B) Inlet filter
 - (C) Stator
 - (D) Solvent degassing system
14. In HPLC 'disk-shaped rotor' is a part of :
- (A) Solvent delivery system
 - (B) Sample injection system
 - (C) Column
 - (D) Detector
15. Choose the incorrect statement about HPLC when column temperature increases :
- (A) Diffusivity increases
 - (B) Carrier gas velocity increases
 - (C) Eluent viscosity increases
 - (D) Carrier gas flow rate increases
16. Which of the following is not a feature of smaller diameter particles in HPLC :
- (A) Higher back pressure
 - (B) Variable length pathways
 - (C) Faster separations
 - (D) All of the above
17. Xerogels are formed by :
- (A) Acidification of soluble silicates
 - (B) Acidification of insoluble silicates
 - (C) Halogenation of soluble silicates
 - (D) Halogenation of insoluble silicates

18. Ion exchange chromatography :
- (A) Is one of the forms of aqueous chromatography
 - (B) Uses ion exchange resin having positive and negative charges simultaneously
 - (C) Both (A) and (B)
 - (D) Neither (A) nor (B)
19. In thermogram of calcium oxalate the loss of CO and CO_2 is at :
- (A) $200^\circ C$ and $250^\circ C$
 - (B) $450^\circ C$ and $600^\circ C$
 - (C) $100^\circ C$ and $600^\circ C$
 - (D) $350^\circ C$ and $650^\circ C$
20. The general heating rate of TGA instrument is :
- (A) $1^\circ C / \text{min}$
 - (B) $3.5^\circ C / \text{min}$
 - (C) $6^\circ C / \text{min}$
 - (D) $10^\circ C / \text{min}$
21. Incorrect statement for DTA is :
- (A) Temperature difference between sample and reference material is recorded as function of temp/time
 - (B) Heating takes place in controlled atmosphere
 - (C) It gives endothermic and exothermic peaks
 - (D) The peak area of DTA thermogram state about the concentration change
22. DTA is useful in :
- (A) Environmental studies
 - (B) Cement industries
 - (C) Archaeological materials
 - (D) All of the above

23. Which of the following statement is incorrect for heat compensated DSC ?
- (A) Reference and sample material is heated in different environment
 - (B) Temperature difference recorded between reference and sample is converted into power difference
 - (C) It is useful to study heat capacity of the material
 - (D) All of the above
24. Pressure DSC is useful in study of :
- (A) Pressure sensitive reaction
 - (B) Resolution of overlapping transitions
 - (C) Evolution of catalysts
 - (D) All of the above
25. Incorrect statement for Hyper DSC is :
- (A) This gives the high resolution for melting analysis
 - (B) Accurate measurement is done with heat flow with 500 k/min
 - (C) Both (A) and (B) are incorrect
 - (D) Both (A) and (B) are correct
26. Factor which does not effect TGA curve :
- (A) Furnace heating rate
 - (B) Particle size of sample
 - (C) Instrumental factors
 - (D) Flow of inert gas
27. Nephelometry is similar to :
- (A) Flurimetry
 - (B) Colorimetry
 - (C) UV-visible
 - (D) NMR

28. Turbidimetry is similar to :
- (A) UV visible
 - (B) NMR
 - (C) Fluorimetry
 - (D) Colorimetry
29. Which filter are used as secondary filter in Nephelometry ?
- (A) Absorption filter
 - (B) Visible filter
 - (C) Both (A) and (B)
 - (D) None of the above
30. Which filter is used in turbidimetry ?
- (A) Blue filter
 - (B) Visible filter
 - (C) Absorption filter
 - (D) All of the above
31. Which sentence is true about nephelometry ?
- (A) It is less sensitive
 - (B) Wavelength is more important
 - (C) Intensity of the light and concentration graph is linear
 - (D) It is not used in analysis of the colloidal systems
32. Which sentence is true about turbimetry ?
- (A) It is more sensitive
 - (B) Wavelength is not important
 - (C) Intensity of the light and concentration graph is linear
 - (D) It is similar to calorimetry

33. Which of the following statements best describes radiodilution analysis ?
- (A) A method of determining the ratio of unlabeled compound to labeled compound in a sample
 - (B) A method of determining how much the radioactivity of a sample has decreased with time
 - (C) A method of how the level of biosynthetic intermediate within a microbial cell
 - (D) A method of determining radiochemical purity
34. What is the process of using neutron activation analysis to determine the presence of trace elements in a sample ?
- (A) Trace analysis
 - (B) Isotopic analysis
 - (C) Elemental analysis
 - (D) None of the above
35. What is the process of determining the chemical composition of a sample using neutron activation analysis ?
- (A) Qualitative analysis
 - (B) Quantitative analysis
 - (C) Elemental analysis
 - (D) All of the above
36. What type of detector is commonly used in neutron activation analysis ?
- (A) Scintillation detector
 - (B) Geiger counter
 - (C) Proportional counter
 - (D) All of the above

37. Incorrect statement about conductametric titration is :
- (A) Ion which is replaced by other ion, differ in ionic conductivity
 - (B) The titration of a slightly ionized salt does not give good result
 - (C) The reaction must be stoichiometric
 - (D) None of the above
38. Whose potential varies with variation in the concentration of an analyte is called :
- (A) Reference electrode
 - (B) Indicator electrode
 - (C) Salt bridge
 - (D) Inner solution
39. Choose the correct statement about cyclic voltammetry :
- (A) It is a type of potentiodynamic measurement
 - (B) In CV electrode potential ramps linearly versus time in cyclic phases
 - (C) The analyte has to be redox active
 - (D) All of the above
40. Incorrect statement about polarography is :
- (A) It is used to determine concentration of electroactive species
 - (B) It measures mass transport limiting currents
 - (C) Quantitative information can be determined
 - (D) Qualitative information is determined using ilkovic equation

