DPA – 510 CHE (F)

M.Sc. (Previous) Chemistry Examination, August/September 2008
Directorate of Correspondence Course
ANALYTICAL CHEMISTRY
DECCHEM – 1.01 : Chemistry – 1
(Freshers)

Time: 3 Hours | Max. Marks: 85

*Note : i) Answer **any ELEVEN** questions from Part A, **any THREE** questions from Part B, and **any THREE** questions from Part C.*
ii) Figures to the right indicate marks.

PART – A

1. Distinguish between absolute error and relative error.
2. Explain why in the complexometric titration of calcium with EDTA, ammonia – ammonium chloride buffer solution is used ?
3. With illustrative examples explain the terms 'normality' and 'molarity'.
4. Explain why generally gravimetric analysis is carried out in hot, dilute conditions with slow addition of the reagent with stirring.
5. Explain the causes and consequences of acid rain.
6. What is ion exchanger ? How is it classified ?
7. Calculate amount of sodium hydroxide required for the preparation of 250 ml of 0.1 N solution.
8. With illustrative examples, explain masking and demasking agents used in analysis.
9. Distinguish mobile phase from stationary phase.
10. What are the requirements of ideal carrier gas used in GC ?

P.T.O.

11. Explain the significance of RF values.

12. Explain the terms "Dissolved Oxygen" and Chemical Oxygen demand.

13. What is distribution ratio ?

14. Explain the role of syrupy phosphoric acid in the titration of Fe(II) against potassium dichromate.

15. Distinguish accuracy from precision. **(11×2=22)**

PART – B

16. a) Write short notes on gel filtration chromatography.

    b) Briefly discuss about the function of any two detectors used in GC. **(4+4=8)**

17. a) With illustrative examples, explain the principles involved in PFHS.

    b) What is precipitating agent ? What are the advantages and disadvantages of using organic precipitating agents ? **(4+4=8)**

18. a) The normality of a solution determined in replicate titrations are 0.2041, 0.2049, 0.2039 and 0.2043. Calculate the mean, median, standard deviation and coefficient of variation.

    b) Write notes on :

    i) Water pollution

    ii) GC – MS **(4+4=8)**

19. a) In an extraction of Ce (IV) with 2-thionyl trifluoroacetone in benzene, the distribution ratio was 999.0. If the organic phase has 10 ml, and that of aqueous phase was 25 ml, what was the percentage of extraction ?

    b) Explain briefly reactions in liquid ammonia. **(4+4=8)**

20. a) Explain the principle and applications of ion exchange chromatography.

    b) Discuss the factors influencing the solubility of the precipitation. **(4+4=8)**

PART – C

21. a) Explain the factors influencing the solvent extraction.

    b) Explain principle, methodology and applications of thin layer chromatography. **(7+6=13)**

22. a) Draw a neat diagram of gas chromatograph and explain the functions of each component.

    b) Discuss the theory and applications of affinity chromatography. **(7+6=13)**

23. a) Discuss the biochemical effects of Cd and Hg.

    b) Discuss the classification of chromatographic techniques. **(7+6=13)**

24. a) Briefly explain theory, applications and various visualization in paper chromatography.

    b) Explain the principles involved in acid base and complexometric titrations. **(7+6=13)**

25. a) Briefly discuss about the theory and applications of size exclusion chromatography.

    b) Explain origin and adverse effects of photochemical smog. **(7+6=13)**

DPA – 520 CHE (F)

M.Sc. (Previous) Chemistry Examination, Aug./Sept. 2008
Directorate of Correspondence Course
INORGANIC CHEMISTRY
DECHEM 1.02 : Chemistry – II
(Freshers)

Time : 3 Hours | Max. Marks : 85

*Note : 1) Answer **any ELEVEN** from Part A and **THREE** from Part **B** and **THREE** from Part C.*
*2) Figures to the **right** indicate marks.*

PART – A

1. What are – σ and π– bonds ? Which bond is stronger and why ?
2. Which is more polar H_2O or H_2S ? Why ?
3. What are the limitations of CFT ?
4. Suggest the geometrics for the following molecules
   i) sp^2 ii) sp^3 iii) dsp^3 iv) d^2sp^3
5. What are high spin and low spin complexes ? Give examples.
6. What are electron deficient compounds ? Give example.
7. What are interhalogen compounds ? Give their classification.
8. Write the Born-Lande equation and indicate the terms involved.
9. What are chelates and chelating agents ? Give examples.
10. What is CFSE ? Obtain the CFSE for d^5 ion in strong and weak field.
11. Distinguish between Frankel and Schottky defects.
12. What are silicon polymers ? Why they are water repellents ?
13. Write the structure of polythizyl. How it is prepared ?
14. What are metallocarboranes ? Give examples.
15. Explain the significance of radius ratio rules. **(2×11=22)**

P.T.O.

PART – B

16. a) What are Fajans rules ? Explain.

    b) Write the semitopological structure of $B_{10}H_{14}$. Indicate the number of 2-centred and 3-centred bonds present in it. **(4+4=8)**

17. a) Give the characteristic reactions of pseudohalogens.

    b) How is S_4N_4 prepared ? Discuss its structure. **(4+4=8)**

18. a) What are n-and p-type semiconductors ? Explain.

    b) What is resonance ? Explain the resonance in CO_3^{-2}. **(4+4=8)**

19. a) What are silicates ? Give their classification with an example for each type.

    b) Borazene is called inorganic benzene. Justify. **(4+4=8)**

20. a) Write an account of experimental evidences for covalency.

    b) Discuss the factors affecting the magnitude of Δ_0. **(4+4=8)**

PART – C

21. a) What is Lattice energy ? How is it evaluated from Born-Haber cycle ? Explain with the suitable example.

    b) How does band theory explains electrical and thermal properties of metals ? **(7+6=13)**

22. a) Explain the principles of VSEPR theory and give the structures of BrF_3 and SF_4 based on VSEPR theory.

    b) Construct the MO energy level diagram for N_2 molecule. Comment on the bond order and magnetic properties. **(7+6=13)**

23. a) Illustrate the splitting of 'd' orbitals on going from one geometry to other geometrics.

    b) What are carbides ? How they are classified ? Give the preparation and properties. **(7+6=13)**

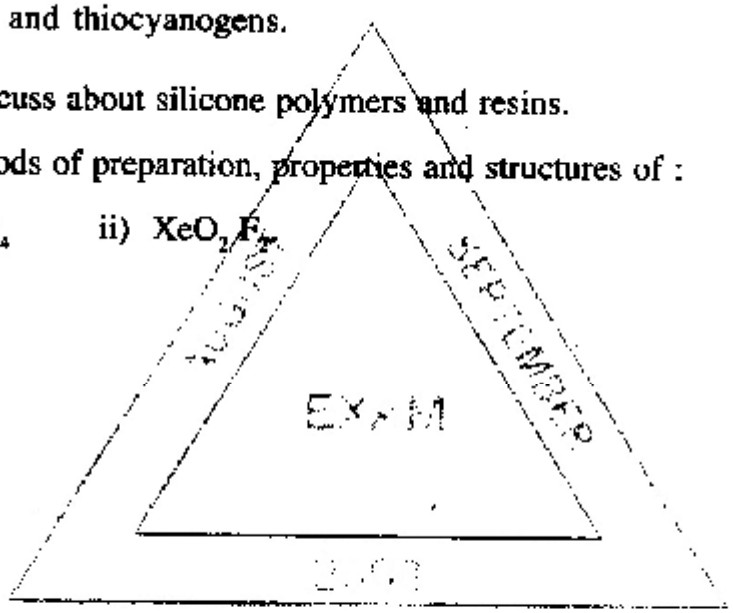
24. a) What is John-Tellar distortion ? Explain using d^1 and d^9 system.

    b) Give the comparative account of preparation, properties and structures of cyanogens and thiocyanogens. **(7+6=13)**

25. a) Briefly discuss about silicone polymers and resins.

    b) Give methods of preparation, properties and structures of :

    1) $XeOF_4$ ii) XeO_2F_2 **(7+6=13)**

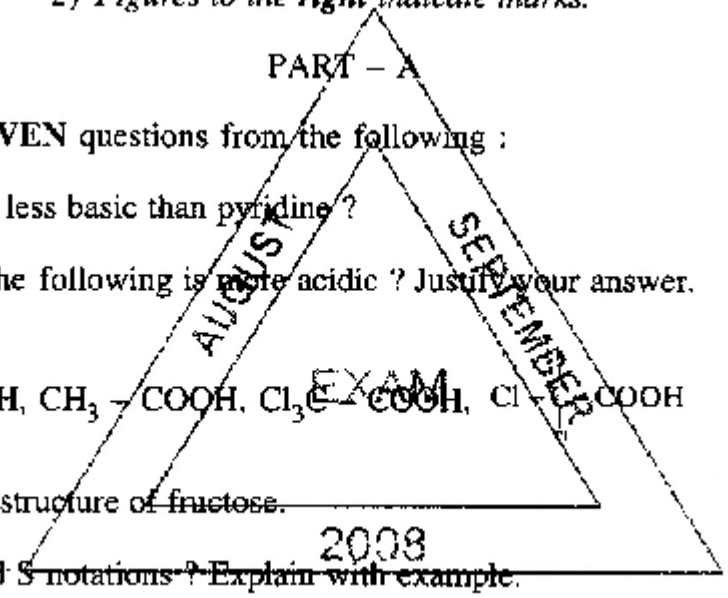


DPA – 530 CHE (F)

M.Sc. Previous (Chemistry) Degree Examination, Aug./Sept. 2008
Directorate of correspondence Course
DE CHEM – 1.03 – CHEMISTRY – III (Organic Chemistry)
(Freshers)

Time : 3 Hours Max. Marks : 85

*Notes : 1) Answer **any ELEVEN** questions from **Part – A**, **any THREE** questions from **Part – B** and **any THREE** questions from **Part – C**.*
*2) Figures to the **right** indicate marks.*



PART – A

Answer **any ELEVEN** questions from the following : **(11×2=22)**

1. Why is pyrrole less basic than pyridine ?
2. Which one of the following is more acidic ? Justify your answer.

   $Cl - CH_2COOH$, $CH_3 - COOH$, $Cl_3C - COOH$, $Cl - CH_2COOH$

3. Write furanose structure of fructose.
4. What are R and S notations ? Explain with example.
5. Distinguish between nucleophile and electrophile.
6. Give an example of SN1 reaction.
7. Write energy profile diagram for SN2 reaction.
8. What is Markownikoff's rule ? How is it useful ?
9. Write the mechanism of sulphonation of benzene.
10. Explain aromaticity of tropylium ion on the basis of molecular orbital theory.

P.T.O.

11. Which is more acidic ? CH_3 COOH or $H_3\overset{+}{N} - CH_2 - COOH$.

12. What are essential and non-essential amino acids ?

13. Discuss and compare the structure of benzyne with acetylene.

14. What are the differences between the mechanism of nitration and sulphonation ?

15. Give one method of synthesis of quinoline.

PART – B

Answer **any THREE** questions of the following : **(8×3=24)**

16. a) What are carbenes ? How are they generated ? Discuss two reactions involving carbanions. **5**

    b) Explain the mechanism of Fischer Indole synthesis. **3**

17. a) Chlorobenzene is deactivator towards electrophilic substitution reaction even though it is O, P – directing. **5**

    b) State and explain peroxide effect. **3**

18. a) Discuss Merrifield solid phase peptide synthesis. **5**

    b) State and explain Saytzelf rule of elimination with an example. **3**

19. Discuss the synthesis of any one dipeptide. **8**

20. Compare the basicity and aromaticity of pyrrole and pyridine. **8**

PART – C

Answer **any THREE** questions : **(13×3=39)**

21. a) Describe azalactone and hydantoin synthesis of amino acids. **7**

    b) What is aldol condensation reaction ? Explain with suitable example. **6**

22. a) Discuss the mechanism of E_1 CB reaction and predict the stereo chemistry involved in it ? **7**

    b) Discuss the any two reaction given by pyridine. **6**

23. a) How can be cis and trans isomers distinguished by physical and chemical method ? Explain. **7**

    b) What are enantiomers and diastereomers ? Disouss with example. **6**

24. a) Discuss the primary and secondary structures of proteins. **7**

    b) Discuss the structure of sucrose. **6**

25. a) Discuss the optical activity exhibited by biphenyl and allenes by taking suitable example. **7**

    b) Explain pyrolytic elimination. Discuss the Cope and Chugaev reaction with suitable example. **6**

DPA – 540 CHE (F)

M.Sc. First Year (Chemistry) Examination, Aug./Sept. 2008
Directorate of Correspodence Course
Paper : PHYSICAL CHEMISTRY – I
DECHEM – 1.04
(Freshers)

Time : 3 Hours

Max. Marks : 85

*Note : 1) Answer any **ELEVEN** questions from **Part – A**, **THREE** questions from **Part – B**, and any **THREE** questions from **Part – C**.*

*2) Figures to the **right** indicate marks.*

PART – A

1. Give the mathematical form of de-Broglie's relationship. **(11×2=22)**
2. Differentiate between reversible and irreversible processes.
3. How do you compare isothermal and adiabatic expansions ?
4. Give the differential form of the I law of thermodynamics.
5. What is meant by ionic product of water ?
6. Explain acid-base catalysis.
7. Distinguish between enzyme catalysis and general heterogeneous catalysis.
8. Calculate the half-life period for the I order reaction whose rate constant is 1.05×10^{-3}/sec.
9. Write the Henderson's equation for weak acid and weak base.
10. What is a galvanic cell ? Explain.
11. Define activity and activity coefficient.
12. What are ion-selective electrodes ?
13. Explain the term 'overvoltage'.
14. Give the relation between K_G, K and K_W.
15. Give the significance of electrochemical series.

P.T.O.

PART – B

16. a) Differentiate between exact and inexact differentials. 4

b) What are the drawbacks in the Rutherford's atomic model ? 4

17. a) Give the effects of substituents on the strength of acid and bases. 4

b) Calculate the workdone in expanding of an ideal gas from 2L to 5L at 273°C. 4

18. a) Discuss the Arrhenius concept of acid and bases. 4

b) Explain reaction rate, rate constant and order of a reaction. 4

19. a) Write a note on amperometric titrations. 4

b) Explain Heisenberg's uncertainty principle. How does it influence concept of electron ? 4

20. a) Discuss the principle and applications of coulometric titrations. 4

b) The rate constant of a zero order reaction is 0.2 (moles/litre) hour^{-1}. What will be the initial concentration of the reactant, if after half an hour its concentration is 0.05 moles/litre. 4

PART – C

21. a) What is Joule-Thomson effect and obtain an expression for Joule-Thomson coefficient for an ideal gas ? Comment on the result, 8

b) Derive Nernst equation for an electrochemical cell reaction. 5

22. a) Predict the order of the following reaction between ethyl acetate and sodium hydroxide.

$CH_3\ COO\ C_2H_5 + NaOH \rightarrow CH_3\ COONa + C_2\ H_5OH$

Derive the rate equation for the above reaction. 8

b) Explain HSAB concept. 5

23. a) What are concentration cells ? Obtain the expression for EMF of concentration cell with and without transference. 8

b) Write Jikovic equation and give its significance. 5

24. a) Discuss the theory, instrumentation and applications of cyclic voltametry. 8

b) How is qualitative and quatitative estimations are done using polarography ? 5

25. a) Discuss the basic principle, instrumentation and applications of electrogravimetry. 8

b) Formulate the Schrondinger wave equation for a particle in one dimensional box. 5