1B6A22015

(Pages : 2)

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Sixth Semester B.Sc Chemistry Degree Examination, April 2022

BCH6B09 - Inorganic Chemistry IV

(2019 Admission onwards)

Time: 2 hours

Max. Marks : 60

Section A (Short answers)
(Answer questions up to 20 marks. Each question carries 2 marks)

1. What is the coordination number of the central metal ion in the following complexes:

   (i) $[Ni(en)_3]^{2+}$ (ii) $[Fe(C_2O_4)_3]^{3-}$

2. Name two scanning probe microscopes?

3. Cu(I) compounds are colourless and diamagnetic, while Cu(II) compounds are coloured and paramagnetic. Why?

4. Why do zirconium and hafnium have same size?

5. The absorbance of an iron thiocyanate solution containing 0.00500 mg Fe/mL was reported as 0.4900 at 540 nm. Calculate the specific absorptivity of iron thiocyanate assuming that a 1.00 cm cuvette was used.

6. Given the IUPAC names of (i) $[Co(NH_3)_6]Cl_3$ (ii) $K_4[Fe(CN)_6]$

7. What is an ambidentate ligand. Give one example.

8. When a coordination compound $CoCl_3.5NH_3$ is mixed with $AgNO_3$, 2 moles of AgCl are precipitated per mole of the compound. Write the structural formula of the complex and its IUPAC name.

9. What is Wilkinson's catalyst?

10. State whether $Fe_2(CO)_9$ obeys the 18electron rule or not. Justify your answer.

11. Draw the structure of Cis platin. Comment on the major limitation of its medicinal use?

12. Why is lead considered as a toxic metal?

(Ceiling of marks : 20)

Section B (Paragraph)

(Answer questions up to 30 marks. Each question carries 5 marks)

13. Explain Sodium- Potassium pump?

14. Give the Randles-Sevcik equation for 25^0C and discuss its application in cyclic voltammetry?

15. What is monazite sand? Explain a method to separate the group of lanthanides from the other ingredients of the monazite sand.

16. On the basis of VBT, account for the fact that $[Fe(CN)_6]^{2-}$ is weakly paramagnetic while $[Fe(CN)_6]^{4-}$ is diamagnetic?

17. Explain briefly how EDTA is useful in the determination of metal ions?

18. How is ferrocene prepared? Illustrate the Friedel-Crafts alkylation and acylation reactions of ferrocene.

19. Explain the principle and working of AFM?

(Ceiling of marks : 30)

Section C (Essay)

(Answer any one. Each question carries 10 marks)

20. Write an account on the MOT of octahedral complexes containing only sigma bonds?

21. Discuss the structures and functions of Haemoglobin and Myoglobin.

(1 x 10 = 10 marks)

36

(Pages : 2)

Reg. No:............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Sixth Semester B.Sc Chemistry Degree Examination, April 2022

BCH6B10 - Organic Chemistry III
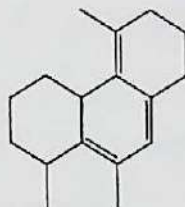
(2019 Admission onwards)

Time: 2 hours

Max. Marks : 60

Section A (Short Answers)

(Answer questions up to 20 marks. Each question carries 2 marks)

1. Using Woodward Fieser rules, calculate the UV λ_{max} of the following compound.

2. How can you differentiate benzaldehyde from acetophenone by IR spectroscopy? Discuss with the position of signals.

3. Discuss the principle and two applications of TLC.

4. Draw the *Haworth* structures of D (+) Glucose and D (-) Fructose.

5. Write the chemistry behind the Fehling's test used for differentiating a reducing sugar from non reducing one.

6. How will you prepare alanine by Strecker synthesis method?

7. Discuss the chemistry of Ninhydrin test.

8. How structurally testosterone is different from progesterone. Illustrate with both chemical structures.

9. Write any four biological functions of lipids.

10. Write the structure and uses of Limonene.

11 Give the mechanism of conversion of allyl phenyl ether in to o-allyl phenol.

12. Explain why in [4 + 2] cycloaddition reaction, diene is activated by electron donor substituents and dienophile by electron withdrawing substituents.

(Ceiling of Marks : 20)

13. Explain the position of signal, spin-spin splitting pattern and hence draw the ^{1}H NMR spectrum of ethyl acetate and acetophenone.

14. Discuss the detailed steps of Killiani Fischer synthesis of epimeric hexoses from a pentose.

15. Discuss solid phase peptide synthesis with illustrative examples.

16. Explain (a) Iodine value and its calculation (b) HDL, LDL level and heart attack

17. Give the structure of natural rubber. Discuss vulcanization and its advantages.

18. Explain the electrocyclic ring closure of *cis-trans* hexa-2,4-diene and *trans-trans* hexa-2,4-diene under thermal and photochemical conditions, highlighting the stereochemistry involved.

19. Explain in detail how the photochemical synthesis of Vitamin D takes place in the human body.

(Ceiling of Marks : 30)

Section C (Essay)
(Answer any one. Question carries 10 marks)

20. (1)The spectral data of a compound shows following characteristics signals.

    (a) UV - λ_{max}–262 nm

    (b) IR- (i) 1618 cm^{-1}, 1470 cm^{-1} (ii) 1720 cm^{-1}(iii) 2810 cm^{-1}, 2730 cm^{-1}(iv)3060 cm^{-1}

    (c) NMR (i)δ- 7-8 ppm, *5H*, multiplet (ii) δ- 9.8 ppm, *1H*, singlet.   (7 Marks)
    Explain each and every peaks, position, spin-spin splitting pattern of signals and hence suggest a suitable structure for the compound.

    (2) Discuss the Woodward Hoffmann rules for electrocyclic reactions briefly. (3 Marks)

21. (1) Discuss primary, secondary, tertiary and quaternary structures of proteins. (6 Marks)
    (2) Discuss the chemical steps involved in the interconversions of glucose and fructose.

(4 Marks)

(1x10= 10 Marks)

(Pages : 2)

Reg. No:...................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
Sixth Semester B.Sc Chemistry Degree Examination, April 2022
BCH6B11 - Physical Chemistry III
(2019 Admission onwards)

Time: 2 hours

Max. Marks : 60

Section A (Short answers)
(Answer questions up to 20 marks. Each question carries 2 marks)

1. Explain Wien effect.

2. Define molar conductivity and equivalent conductivity.

3. Define single electrode potential. What are the factors influencing electrode potential?

4. For the cell: $Zn(s)/Zn^{2+}(aq) // Cu^{2+}(aq)/Cu(s)$, calculate the equilibrium constant at 25^0C. Given $E^0_{Zn/Zn^{2+}}= -0.76V$ and $E^0_{Cu/Cu^{2+}}= -0.37V$.

5. What is meant by buffer solution ? Define buffer index.

6. What are azeotropes? Give one example.

7. State and explain Boyle-Van't Hoff law for solutions.

8. Calculate the Miller indices of a plane which makes the intercepts ½ a on X- axis, ½ b on Y- axis and goes parallel to the Z- axis.

9. What are colligative properties? Give two examples.

10. Define the term space lattice and unit cell.

11. Why does ZnO appears yellow on heating?

12. Define coordination number. What is the coordination number of Cs^+ion in CsCl structure?

(Ceiling of Marks: 20)

Section B (Paragraph)
(Answer questions up to 30 marks. Each question carries 5 marks)

13. State and explain Kohlrausch's law. Mention any two applications of the law.

14. State and explain Raoult's law.

15. What are fuel cells? Explain the working of fuel cells.

16. Explain levelling solvent and differentiating solvent.

17. Explain the reasons for abnormal results obtained for molar masses of certain solutes when determined by measurement of the colligative properties of their solutions.

18. Differentiate n-type and p-type semiconductors.

19. Calculate the pH of a mixture containing 0.01 M acetic acid and 0.03 M sodium acetate solutions, pK_a of acetic acid is 4.8.

(Ceiling of Marks: 30)

Section C (Essay)
(Answer any one. Each question carries 10 marks)

20. (a) What are liquid crystals? How are they classified? Mention two of its applications.

(b) A face centered cubic crystal (atomic mass = 59) has a cell edge of 400 pm. Calculate its density.

21. (a) Explain the term transport number. Discuss the moving boundary method of determining transport numbers.

(b) Define potentiometric titrations. Explain the principle of potentiometric titration of an acid against a base.

(1× 10 =10 Marks)

Reg. No:.........................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Sixth Semester B.Sc Chemistry Degree Examination, April 2022

BCH6B12 - Advanced & Applied Chemistry

(2019 Admission onwards)

Time: 2 hours

Max. Marks : 60

Section A (Short Answers)
(Answer upto 20 marks. Each carries 2 marks)

1. Briefly explain any one method of synthesis of quantum dots.

2. Give any two applications of nano-materials in medicinal field.

3. What is meant by atom economy in green chemistry?

4. What is meant by operating systems? Give one example.

5. Differentiate addition polymers and condensation polymers with examples.

6. Define Cetane number. What is its significance?

7. Discuss linear and non-linear regression.

8. What is meant by rocket propellant?

9. What is meant by pharmacognosy?

10. What are the essential nutrients of plants ?

11. Explain any two common adulterants and their identification methods in milk?

12. What are anti-oxidants? Give examples.

(Ceiling of marks : 20)

Section B (Paragraph)
(Answer questions up to 30 marks Each question carries 5 marks)

13. Discuss various applications of colloids.

14. Explain the chemistry behind the setting of cement.

15. Compare molecular mechanics and *ab initio* methods in computational chemistry calculations

16. Define with examples of insecticides, herbicides, rodenticides and fungicides.

17. What are biodegradable polymers? Discuss the methods of preparation of PGA, PLA and PHBV.

18. Explain the raw materials and the chemistry involved in the TiO_2 pigment manufacturing in Tavancore Titanium products Ltd.

19. Explain the composition of chocolate, milk powder and soft drinks.

(Ceiling of marks : 30)

Section C (Essay)

(Answer any one. Each question carries 10 marks)

20. State and explain the twelve principles of green chemistry.

21. i) Discuss the preparation of paracetamol and aspirin. (5 marks)

    ii) Explain the preparation and use of Rosaniline and indigo dyes (5 marks)

1B6A22019   (Pages : 2)   Reg. No:................................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Sixth Semester B.Sc Chemistry Degree Examination, April 2022

BCH6B13(E2) - Polymer Chemistry

(2019 Admission onwards)

Time: 2 hours   Max. Marks : 60

Section A (Short answers)
(Answer questions up to 20 marks. Each question carries 2 marks)

1. What are Copolymers? Give an example.

2. Differentiate between chain and step growth polymerization.

3. What is ring opening polymerization?

4. Explain average molecular weight of polymers.

5. What is viscoelasticity of polymers?

6. What is meant by degree of polymerization?

7. Explain oxidative degradation of polymers.

8. What is calendering?

9. Explain compression in polymer processing.

10. What is meant by dopping?

11. Differentiate between HDPE and LDPE.

12. Give two examples and applications of polymers formed by aliphatic polyamides.

(Ceiling of marks: 20)

Section B (Paragraph type questions)
(Answer questions up to 30 marks. Each question carries 5 marks)

13. Explain branched chain and cross linked polymers with example.

14. Write short note on blow molding and thermoforming.

15. What is Zeigler-Natta polymerization? Give the mechanism.

16. What are free radical and ionic polymerizations? Give examples.

17. What is glass transition temperature? What are the factors affecting it?

18. Explain the determination of viscosity average molecular weight.

19. What are different plastic identification codes?

(Ceiling of marks: 30)

Section C (Essay)

(Answer any one question. Each question carries 10 marks)

20. Explain different polymerization techniques.

21. Explain preparation, properties and applications of

    (a) nylone 66   (b) Kevlar   (c) neoprene and   (d) Teflon.

$$(1 \times 10 = 10 \text{ marks})$$