2M4A22476

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

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Degree Examination, April 2022

MCH4C12 – Instrumental Methods of Analysis

(2019 Admission onwards)

Time: 3 hours Max. Weightage : 30

Section A-Short Answer

Answer 8 questions. Each question carries a weightage of 1

1. Distinguish between mean and median.
2. Mention the remedy for coprecipitation.
3. Explain nucleation.
4. Write *ilkovic* equation and explain the terms.
5. What is migration current? How is it minimized?
6. What are voltammetric sensors?
7. Explain the principle of fluorimetry.
8. Distinguish between SEM and TEM.
9. What is ESCA? Give its applications.
10. What are the differences between DTA & DSC?
11. What are thermometric titrations?
12. What do you mean by carrier gas?

(8 x 1= 8 weightage)

Section B- Short Essay

Answer 4 questions. Each question carries a weightage of 3

13. Write a note on organic precipitating agents.
14. Explain post precipitation with examples. What is the remedy to this problem?
15. What is the principle involved in amperometric titrations ? Give an account of the different types of amperometric titrations. Mention any 4 applications.
16. Write a note on chronopotentiometry.
17. Briefly discuss the instrumentation of nephelometry and turbidimetry.
18. Discuss the principle and applications of Auger electron spectroscopy.
19. Discuss the principle and applications of neutron activation analysis.

(4 x 3= 12 weightage)

Section C-Essay

Answer all questions. Each question carries a weightage of 5

20. a) Define precision. What are the different ways of expressing precision.

    b) Discus various statistical treatments of analytical data.

21. a) Describe polarography.

    b) Explain the terms migration current, diffusion current , limiting current and polarogram.

    c) Discuss the advantages of DME in polarography.

    d) Give important applications of polarography.

22. Explain the instrumentations of

    a) UV-visible spectrophotometry.

    b) IR spectroscopy.

23. a) Explain the principle and experimental technique involved in Gas chromatography.

    b) Write a note on detectors used in GC. What are the advantages of thermal conductivity detector over other detectors?

(2 x 5= 10 weightage)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Degree Examination, April 2022

MCH4E08 – Organometallic Chemistry

(2019 Admission onwards)

Time: 3 hours

Max. Weightage : 30

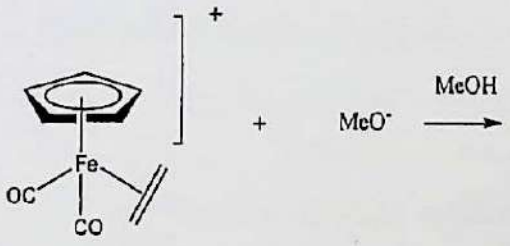
Section A: Short Answer

Answer 8 Questions out of 12

Each question carries one weightage

1. State 18 electron rule and calculate the total number of electrons in $[HMn(CO)_5]$ and $[Fe(CO)_4(PPh_3)_2]$.
2. Carbonyl complexes of Mn and Co are existing as dimers, whereas carbonyl complex of vanadium $[V_2(CO)_{12}]$ does not exist. Why?
3. What is Collmann's reagent? Give a synthetic application.
4. (a)Write the hybridisation and electron donation ability of linear and bent nitrosyl ligands.

   (b)Identify which type of nitrosyl ligands (linear or bent) are present in the following 18 electron complexes. (i) $[Co(CO)_3NO]$ (ii) $[Ni(\eta^5Cp)(NO)]$.
5. What are the characteristics of Fischer carbene complexes?
6. Comment on the statement 'NMR spectroscopy is an eminently suitable technique to study the fluxional behaviour of organometallic complexes.
7. What is Schwartz's reagent? Give its synthetic use.
8. Which mechanism is operating during the oxidative addition of CH_3I to Vaska's complex? Give the mechanism and stereochemistry.
9. Write the correct product of the following reaction and give reason.



10. What is syn gas? How the H_2/CO mole ratio can be changed to two. Name the reaction and give suitable catalysts.
11. What is hydrosilation reaction? Give its characteristics.
12. What are ferrocenophanes? Explain its significance.

(8 x 1 = 8 weightage)

Section B: Short Essay
Answer 4 Questions out of 7.
Each question carries three weightage

13. How IR spectroscopy can be used as a tool to study the structure and symmetry of metal-carbonyl complexes.
14. Account the importance of photochemical substitution and microwave assisted carbonyl substitution with suitable examples.
15. Outline the fluxional isomerism of allyl, cyclopentadienyl and allene systems.
16. What is metal-carbyne complexes? Give its characteristics and bonding.
17. Define the term oxidative coupling. Explain it with a suitable example and give the driving force of the reaction.
18. What is hydroformylation reaction? Draw the catalytic loop using $Co_2(CO)_8$ and also mention the disadvantages of the catalyst.
19. Briefly explain the characteristics, different types of catalyst used and catalytic cycle for the hydrosilation of alkenes.

(4 x 3 = 12 weightage)

Section C: Essay
Answer 2 Questions out of 4.
Each question carries five weightage

20. Discuss the structure and bonding of transition metal complexes with chain π ligands
21. (i) Discuss the synthesis, structure, bonding and characteristics of metal carbenes and metal carbyne complexes.

    (ii) Explain the bonding in dihydrogen complexes.
22. Draw the catalytic cycle of the following reactions

    (a)Homogeneous hydrogenation by $[(pph_3)_2RhCl]$

    (b)Wacker process

    (c)Monsanto Acetic acid synthesis.
23. (a) How organometallic polymer dendrimers are classified?

    (b)Discuss in detail the convergent and divergent methods of preparation of organometallic polymer dendrimers.

(2 x 5 = 10 weightage)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Degree Examination, April 2022

MCH4E06 – Natural Products and Polymers

(2019 Admission onwards)

Time: 3 hours

Max. Weightage : 30

Section A- Short Answer
Answer any 8 questions. Each question carries 1 weightage

1. What are the major constituents of lemon grass oil?
2. Write the structure of corticosterone and progesterone with attention to stereochemistry
3. What is Androsterone? How the presence of a hydroxyl group is confirmed in Androsterone?
4. What are the products obtained by the alkali fusion of flavones?
5. Write two chemical degradation method employed in alkaloid chemistry
6. Rank all the supramolecular interactions according to their relative strength.
7. What technique would you choose for producing a polymer of acrylonitrile
   a) Anionic or b) Cationic? Give appropriate reason in favour of your answer
8. Explain the polymer characterisation with GPC.
9. What is glass transition temperature (Tg)? How you can change the Tg without changing the polymer composition?
10. Write the commercial importance of polycarbonate.
11. What are the factors depend upon the amount of swelling of polymers? How to correlate swelling and solubility of polymers?
12. What is the attraction of using polymer supported reagents in reactions?

[8 x 1 = 8 weightage]

Section B -Short Essay
Answer any 4 questions. Each question carries 3 weightage

13. Discuss the nature and position of side chain in Cholesterol
14. How will you arrive at the structure of steroids?
15. Give a brief account of cyanine dyes?
16. Explain the product obtained by the action of KOH and oxalic acid/ethanol on chlorophyll-a and chlorophyll-b. What inference you obtain from these reactions?

17. What is chain transfer reaction? Establish the relation of chain transfer constant C with K_{tr} and K_p.

18. Write a short note on Spherullites and Lammellac.

19. Derive Flory-Huggins equation.

[4 x 3 = 12 weightage]

Section C -Essay

Answer any 2 questions. Each question carries 5 weightage

20. Give a brief account of the following:

    a) Isolation and separation of carotenoids.

    b) General method for the elucidation of the constitution of carotenoids.

21. Discuss the biosynthesis of flavonoids and isoflavones.

22. Write a note on the following:

    a) Free radical addition polymerization.

    b) Kinetics and mechanism of free radical polymerization.

23. a) Explain polymeric liquid crystals and their applications.

    b) Discuss the application of polymers in Lithography.

[2x5=10 weightage]