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2M3N17024 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester M.Sc Degree Examination, November 2017

CH3C11 – Reagents & Transformations in Organic Chemistry

(2016 Admission onwards)

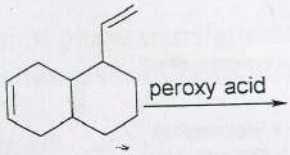
Max. Time: 3 hours Max. Weightage: 36

Section A

Answer all questions

Each question carries a weightage of 1.

1. Write down the product and explain the reason



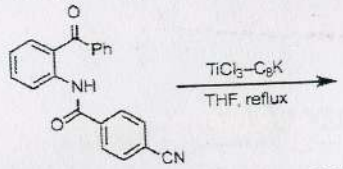
2. What is known as Riley reaction? How it is selective in the oxidation of butanone.
3. How Raney nickel catalyst is prepared? Give one of its use.
4. What is the use of hindered boranes in hydroboration reactions?
5. What is Lindlar catalyst? Mention its use in organic synthesis?
6. What is Gilman's reagent? How it is different from lithium reagents.
7. Write down the mechanism of ionic polymerization?
8. What are the differences between block and graft polymers.
9. Give the structure of azetidine.
10. Give the synthesis of uracil.
11. Show the mechanism of Favorskii reaction.
12. What is Orton rearrangement?

(12 x 1 = 12 weightage)

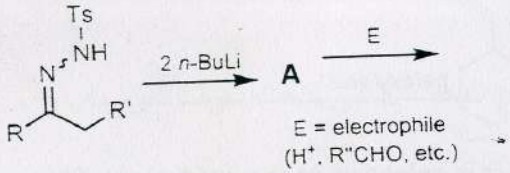
SECTION B

Answer any eight questions
Each question carries a weightage of 2.

13. Write a note on Sharpless asymmetric epoxidation. Show the mechanism with stereochemistry.
14. What is Baeyer–Villiger oxidation? Discuss the primary and secondary stereoelectronic effects in the product formation of Baeyer–Villiger oxidation.
15. Write a note on liquid ammonia reduction with alkali metals.
16. a) Give the product of the reaction?



b) Predict the products of the following reaction. Show its mechanism



17. Explain the role of following reagents in organic synthesis
    a) Ceric ammonium nitrate b) DABCO c) 9-BBN
18. Write a note on Synthetic applications of Crown ethers.
19. Discuss the structure of cellulose.
20. Explain any method for the sequence determination of peptides.
21. Discuss the synthesis of adenine and guanine.
22. Give the structure of caffeine? How it can be synthesized?
23. Give a short note on Woodward and Prevost hydroxylation reactions.
24. Show the mechanism of Stille coupling reaction.

(8 x 2 = 16 weightage)

SECTION C

Answer any two questions
Each question carries a weightage of 4.

25. Illustrate Merrifield solid phase peptide synthesis by taking the tripeptide Gly-Val-Ala as an example.
26. Write a note on the
    a) oxidation of alcohols using oxoammonium ions .
    b) Bouveault-Blanc reduction c) MPV reduction.
27. (a) Outline the synthesis of glutathione .
    (b) Mention one of DMAP in organic synthesis.
28. a) Give the synthesis and reactions of Indole .
    b) What are the synthetic use of Curtius rearrangement? Show the mechanism.

(2 x 4 = 8 weightage)

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1M3N17025 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester M.Sc Degree Examination, November 2017

CH3E01 – Synthetic Organic Chemistry

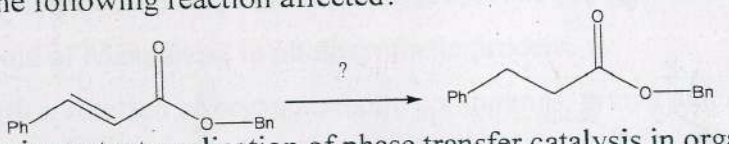
(2016 Admission onwards)

Max. Time: 3 hours Max. Weightage: 36

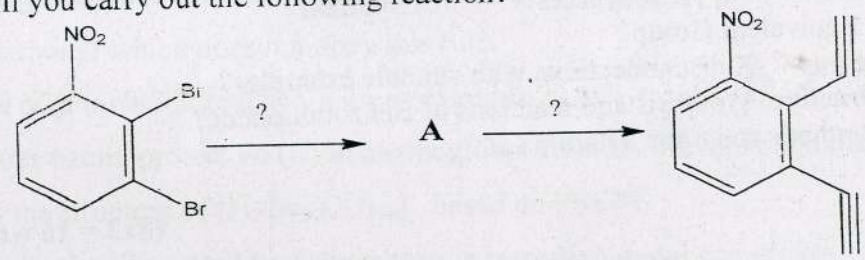
Section A

(Answer all questions. Each question has 1 weightage)

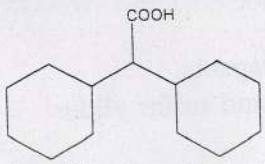
1. Explain the importance of Osmium tetroxide reagent in oxidation of alkenes? Write the mechanism of reaction?
2. How can be the following reaction affected?



3. Write any two important application of phase transfer catalysis in organic synthesis?
4. Explain why organo silicon compounds gives bimolecular nucleophilic substitution reactions very easily?
5. Write the mechanism of Prins reaction?
6. Comment on the importance of 1,3-dithianes as Umpolung reagent?
7. How will you carry out the following reaction?



8. Write the catalytic cyclic steps in Hiyama coupling reaction?
9. Based on disconnection approach outline a convenient synthesis of following compound?



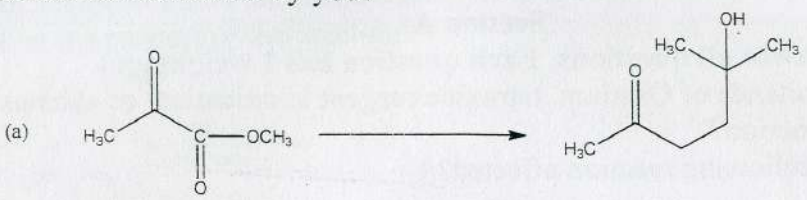
10. Explain a convenient method of synthesis and reaction of indole?
11. Explain Malaprade oxidation with suitable example?
12. Illustrate how 1,2,4 - triazole system can be prepared?

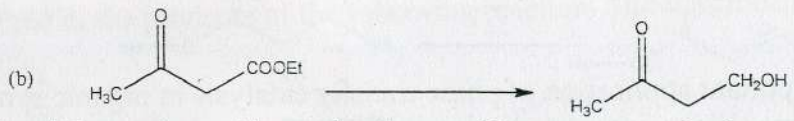
(12 x1= 12 weightage)

Section B

(Answer any 8 questions. Each question carries 2 weightage)

13. Explain sharpless asymmetric epoxidation reaction with mechanism and stereochemical outcome?
14. Discuss (a) Swern Oxidation (b) TEMPO Oxidation?
15. Discuss the synthetic utility of Tributyl tin hydride reagent in radical reactions?
16. What are the synthetic applications of aryl tricarbonyl chromium complex?
17. Derive a route to convert the given starting material to the product shown. Comment on the route devised by you?





18. Explain Mannich reaction with mechanism and important synthetic applications?
19. Explain the reaction, mechanism and applications of Negishi Coupling reaction?
20. Discuss the retrosynthesis and hence synthesis of Prelog-Djerassi lactone?
21. Illustrate the following terms used in synthesis with suitable examples?
    (a) Disconnection (b) Retrosynthesis (c) Synthon
    (d) Synthetic Equivalent Group
22. Discuss two group C-X disconnections with suitable examples?
23. Explain the structure, synthesis and reactions of Benzothiophene?
24. Discuss the synthetic route for Vitamin C?

(8x2 = 16 weightage)

Section C

(Answer any 2 questions. Each question carries 4 weightage)

25. Explain the following?
    (a) Reduction by hydride transfer reagents.
    (b) Synthetic utility of phosphorous and sulfur ylides.
26. Write
    (a) Applications of palladium catalysts for C-N bond formation.
    (b) Mechanism of Kumada and Suzuki Miyaura Coupling reactions.
27. (a) Discuss the requirement of functional group protection-deprotection in organic Synthesis.
    (b) Explain various methods for protection of (1) Carbonyl group
    (2) amino group
28. (a) Explain the retro synthetic analysis scheme of (1) Benzocain (2) Paracetamol
    (b) Concept of split and pool in combinatorial synthesis.

(2 x 4= 8 weightage)

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2M3N17023 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester M.Sc Degree Examination, November 2017

CH3C10 – Organometallic & Bio inorganic Chemistry

(2016 Admission onwards)

Max. Time: 3 hours Max. Weightage: 36

Section A

(Answer all questions. Each question has 1 weightage)

1. Comment on the structure and co-ordinating properties of peptides and amino acids.
2. Discuss the role of Manganese in photosynthetic process.
3. Explain insertion reaction of organometallic compounds, giving an example.
4. Calculate the number of metal-metal bonds in

   (a) $Os_4(CO)_{15}$ (b) $Ir_4(CO)_{12}$
5. What is chelation therapy? Explain with an example.
6. State 18-electron rule as applied to organometallic compounds. Give an example of a metal carbonyl which does not obey this rule.
7. Explain carbonylation reaction with an example.
8. How does nature protect Fe (II) in haemoglobin from its irreversible oxidation?
9. Predict the structure of $[H_2Os_5(CO)_{16}]$ based on PSEPT.
10. Discuss the bonding modes of dinitrogen in transition metal complexes.
11. What are Zintl ions?
12. Which catalyst is used in oxo process? Mention some important defects of this catalyst.

(12 × 1 = 12 weightage)

Section B

(Answer any 8 questions. Each question carries 2 weightage)

13. Write a note on Fluxional organometallics.
14. What is transmetallation reaction? Explain the synthetic uses of this reaction.
15. Discuss the role of ferritin and trasferrin in iron metabolism.
16. Describe the structure and functions of metal nitrosyls.
17. Give an account of biological nitrogen fixation by nitrogenase.
18. Explain Bloomington Shuffle with an example.
19. Discuss the special features of vitamin B_{12} which differentiates it from other vitamins.
20. What is asymmetric hydrogenation?
21. Write a note on anticancer drugs.
22. Explain Oxidative addition process.
23. What is Collman's regent? Explain its applications.
24. Differentiate between oxidative addition and reductive elimination.

(8 × 2 = 16 weightage)

Section C

(Answer any 2 questions. Each question carries 4 weightage)

25. (a) Comment on the structure and functions of Hemerythrin and hemocyanin.

    (b) Explain the terms co-operativity and Bohr Effect in haemoglobin.
26. Explain isolobal concept with suitable examples.
27. How is ferrocene synthesised? Discuss its structure and reactivity.
28. Describe the catalytic cycle and mechanism of the reactions involved in Wacker process.

(2 × 4 = 8weightage)

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1M3N17022 (Pages : 2) Reg. No:.....

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester M.Sc Degree Examination, November 2017

CH3C09 – Molecular Spectroscopy

(2016 Admission onwards)

Max. Time: 3 hours Max. Weightage: 36

Part A
(Answer all questions. Each question carries 1 weightage)

1. Explain transition moment integral in spectroscopy. How does it help in predicting the transitions in spectroscopy?
2. Explain Doppler broadening.
3. What is the effect of substituting a hydrogen atom by a deuterium atom in hydrogen molecule on rotational constant B?
4. Define normal mode of vibration.
5. Explain Fermi resonance.
6. Explain Predissociation.
7. Explain the reason for applying RF radiation perpendicular to the external magnetic field in magnetic resonance spectroscopy?
8. Predict the EPR spectrum of naphthalene negative ion?
9. m- nitrophenol in neutral solution absorbs at 330nm while in alkaline solution absorbs at 380nm, in contrast p-nitrophenol has absorption maximum at 320nm in neutral solution and 400 nm in alkaline solution. Explain.
10. Predict the number of proton NMR signals in N,N Dimethyl formamide. Explain?
11. Explain ORD with example
12. How IR spectroscopy can be used to distinguish between
    1) o- and m- methoxy benzyl alcohol
    2) phenyl acetate and methyl benzoate.

(12 x 1 = 12 weightage)

Part B

(Answer any eight questions. Each carries 2 weightage)

13. In a given organic compound two kinds of protons exhibit signals at 50Hz and 200Hz using a 60MHz instrument. What will be their relative position using 90MHz instrument? Also convert the position of signals into delta scale.

14. Explain how IR spectroscopy can be applied to predict the product formation at each step in the following reaction series.

    Benzaldehyde → Benzoin → Benzil → Benzilic acid.

15. Derive an expression for Jmax for the rigid rotor at which there is maximum population.

16. The fundamental and first overtone transition of $^{14}N^{16}O$ are centred at 1876.06 cm-1 and 3724.20 cm-1 respectively. Calculate the force constant , zero point energy, anharmonicity constant and equilibrium vibration frequency of the molecule.

17. Explain the various factors affecting the width of spectral line.

18. Explain how Octant rule and Axial haloketone rule are useful for the determination of conformation and configuration of 3-methylcyclohexanone.

19. Explain zero field spitting and Kramer Degeneracy.

20. Explain Frank-Condon principle for explaining the intensity of electronic transition.

21. Explain Nitrogen rule and Rule of Thirteen in mass spectrometry.

22. What are the applications of 2D-COSY spectra?

23. Explain the origin of spin-spin coupling in NMR spectroscopy.

24. Explain with energy level diagram, the magnetic hyperfine interaction in Mossbauer spectroscopy.

(8 x 2 = 16 weightage)

Part C

(Answer any two questions. Each carries 4 weightage)

25. Discuss a) Relaxation methods in NMR spectroscopy and its determination using FTNMR

    b) Nuclear Overhauser Effect and its use in structure elucidation.

26. a)Discuss the use of spin-spin coupling constant values in obtaining stereochemical information in NMR.

    b) Predict the structure of the compound with the following spectral characteristics:

    UV: 290 nm

    IR : 2980, 1718, 1440 cm^{-1}

    1H NMR : 2.3ppm (q), 2.15ppm(s), 1.1ppm(t)

    Mass (m/z) : 72(M+), 43 (base peak), 29

27. How would you understand the electronic spectra of conjugated molecules using particle in a one dimensional box model? Discuss.

28. Define Mossbauer effect. How it is made use of in structural elucidation of co-ordination complexes? Discuss.

(2 x 4 = 8 weightage)