

## FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester B.Sc Degree Examination, March/April 2020

## BCHE4C04 – Physical and Applied Chemistry

(2018 Admission onwards)

Time: 3 hours

Max. Marks: 64

**Section A (One word)***Answer all questions. Each question carries 1 mark*

1. The random erratic zig-zag motion of colloidal particles is called.....
2. The unit of rate constant for a first order reaction is.....
3. The number of peaks in the NMR spectrum of acetone is .....
4. ....is an example of thermosetting plastic.
5. The main causative agent of global warming is.....
6. Name a natural polymer
7. The term .....represents a class of drugs that relieve pain.
8. The main constituent of CNG is.....
9. The shelf life of food materials is increased by the addition of .....
10. ....is a nitrogenous fertilizer.

**(10 x 1 = 10 Marks)****Section B (Short answer)***Answer any seven questions. Each question carries 2 marks*

1. What is meant by coagulation of sols?
2. Prove that half life period of a second order reaction is inversely proportional to the initial concentration of the reactant.
3. Write Arrhenius equation and explain the terms.
4. Sketch the vibrational modes of CO<sub>2</sub> that are observed in of IR spectrum.
5. Distinguish thermoplastics and thermosetting plastics.
6. What are the different types of glasses?
7. Pesticides are essential for increasing the agricultural production. But their use should be controlled. Why?
8. Distinguish hard and soft soaps.
9. What are the important constituents of toothpaste?
10. Explain the cleansing action of soaps and detergents.

**(7 x 2 = 14 Marks)**

### Section C (Paragraph)

*Answer any four questions. Each question carries 5 marks*

21. Explain the applications of colloids.
22. How can we calculate the Arrhenius parameters?
23. Explain the principle and the technique of adsorption column chromatography.
24. State and explain Beer-Lambert's law. What are the possible electronic transitions in molecules?
25. Write a note on depletion of ozone layer and its impacts.
26. What are dyes? Give examples. What are the requirements of a dye?

**(4 x 5 = 20 Marks)**

### Section D (Essay)

*Answer any two questions. Each question carries 10 marks*

27. (i) Explain any two methods used for the purification of colloids.  
(ii) Derive the integrated rate equation for a second order reaction of the type  $2A \rightarrow \text{products}$ .
28. (i) Briefly explain the principle and applications of thin layer chromatography.  
(ii) Explain the terms chemical shift and spin-spin coupling with reference to NMR spectroscopy.
29. Why biodegradable polymers are preferred over non-biodegradable polymers? Write the preparation and applications of PHBV, PGA and PLA.
30. (i) Briefly explain the water quality parameters-DO, BOD and COD.  
(ii) What are drugs? Write the important classes of drugs with suitable examples.

**(2 x 10 = 20 Marks)**



FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester B.Sc Degree Examination, March/April 2020

BCHE4B04 – Organic Chemistry – I

(2018 Admission onwards)

Time: 3 hours

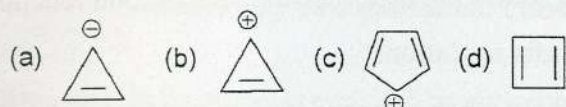
Max. Marks: 80

**Section A (One word)***Answer all questions. Each question carries 1 mark*

1. In the presence of U.V light, alkanes generally undergo .....reactions.

- (a) Electrophilic substitution      (b) Electrophilic addition  
 (c) free radical substitution      (d) Nucleophilic substitution

2. Which of the following possess aromaticity?

3. When propyne is passed through hot dilute sulphuric acid in the presence of  $\text{Hg}^{2+}$  catalyst, the product is.

- (a) Acetone (b) acetaldehyde (c) acetic acid (d) vinyl alcohol

4. Ethene reacts with Baeyer's reagent to give.....

5. The suitability of alkyl free radicals follow the order.....

6. 2-butyne on reduction with sodium in liquid ammonia gives.....

7. The attacking electrophile in an aromatic sulphonation reaction is.....

8. How many carbon-carbon  $\sigma$  bonds are present in But- 1- yne .....

9. An equimolar mixture of two enantiomers of a substance is known as .....

10. Write the structure of an optically active allene compound.

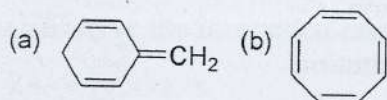
**(10 × 1 = 10 marks)**



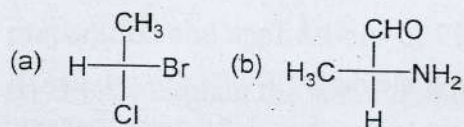
Section B (Short Answers)

Answer any ten questions. Each question carries 2 marks

11. Give two reactions to illustrate the acidity of acetylene. Give equations.
12. Explain why pyridine is more basic compared to pyrrole?
13. When 3,3-dimethyl-2-butanol undergoes dehydration, the major product is 2, 3-dimethyl-2-butene. Explain this observation.
14. Arrange the following in increasing order of basicity. Justify your choice.  
aniline ; *p*-nitroaniline and *p*-anisidine
15. What are carbenes? Give a reaction involving the formation of a carbene.
16. Explain why the following systems are not aromatic?



17. Write down the reagents and products of the following electrophilic substitution reactions of benzene: (a) Nitration; and (b) Friedel-Crafts acylation.
18. Explain why alkyl groups act as electron donors when attached to a  $\pi$  system?
19. Assign *R* or *S* configuration to the following compounds :-



20. Draw the preferred conformation of methylcyclohexane and give reason for your choice.
21. Write a note on chemical method of resolution.
22. What are the demerits of Wurtz reaction.

(10 × 2 = 20 marks)

Section C (Paragraphs)

Answer any five questions. Each question carries 6 marks

23. Explain the Molecular orbital concept of the structure of benzene.
24. Explain with equations the Haworth's synthesis of naphthalene.



25. a) Electrophilic substitution in Naphthalene takes place preferentially at C<sub>1</sub> rather than at C<sub>2</sub>. Justify (4 marks)  
b) Starting from C and H how is acetaldehyde synthesized. (2 marks)
26. Discuss the stability of substituted benzyl.
27. What happens when 2-bromo-2-methyl butane is heated with alcoholic KOH? Give the mechanism for the formation of the major product in the reaction.
28. Discuss the various conformations and their relative stabilities by taking the example of *n*-butane.
29. Explain ozonolysis with one example. What are its applications.
30. Discuss with examples the different kinds of structural isomerism exhibited by organic compounds.

(5 × 6 = 30 marks)

#### Section D (Essays)

*Answer any two questions. Each question carries 10 marks*

31. Addition of HBr to propene yields 2-bromopropane, while in the presence of benzoyl peroxide, the reaction yields 1-bromopropane. Explain and give mechanism.
32. Write an essay about Inductive effect in covalent bonds. Discuss how these effects influence the acidity of substituted alkyl carboxylic acids take by suitable examples.
33. a) Compare the Electrophilic substitution rates of Toluene, chlorobenzene, Phenol and nitro benzene. Justify your answer.  
b) Using Resonance concept discuss the orientation effect of substituent group in the above molecules.
34. (i) Explain the terms enantiomers, diastereomers and meso compounds using tartaric acid as an example. (6 Marks)  
(ii) Explain geometrical isomerism taking But-2-ene-1,4-dioic acid. (4 Marks)

(2 × 10 = 20 marks)