C 21263 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
APRIL 2022

Chemistry

CHE 4C 04—PHYSICAL AND APPLIED CHEMISTRY

(2014—2018 Admissions)

Time : Three Hours Maximum : 64 Marks

Section A (One Word/Sentence)

Answer **all** *questions.*
Each question carries 1 *mark.*

1. The size range of colloidal particle is ————————.
2. Colloidal solution containing solid as dispersed phase and gas as dispersed medium is called
3. The unit of rate constant for a first order reaction is ————————.
4. In adsorption chromatography, the stationary phase is ————————.
5. The ratio of distance travelled by a component to the distance travelled by the solvent front thin layer chromatography is ————————.
6. Chemical substance used to reduce anxiety and tension is called ————————.
7. Paracetamol is an example for ———————— drug.
8. The minimum energy required for an effective collision which results in a chemical reaction is ————————.
9. Compound responsible for greenhouse effect is ————————.
10. The characteristic stretching frequency of free O--H bond is ————————.

(10 × 1 = 10 marks)

Section B (Short Answer)

Answer any **seven** *questions.*
Each question carries 2 *marks.*

11. Define gold number and write the importance of gold number
12. The first order reaction is completed by 20 % in 10 minutes. Calculate the time taken for the reaction in minutes for 75 % completion.
13. Write the selection rule for vibrational spectroscopy.
14. Draw the low resolution and high resolution ^{1}H NMR spectra of ethanol.

Turn over

15. What is Soap ? Mention the difference between hard and soft soap.
16. Differentiate between thermo plastic and thermosetting plastic.
17. Write the advantages and disadvantages of detergents over soap.
18. Briefly discuss the composition of talcum powder.
19. What do you mean by green house effect ?
20. Derive the integrated rate expression for first order reaction.

(7 × 2 = 14 marks)

Section C (Paragraph)

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

21. Discuss the origin of charge on colloidal particle.
22. Write the Arrhenius equation and explain the terms. The rate constant of a reaction at two temperatures 273 K and 303 K are $2.46 \times 10^{-5}\ S^{-1}$ and $1.63 \times 10^{-4}\ S^{-1}$. Calculate the activation energy of the reaction.
23. Explain the different types of electronic transitions.
24. Outline the structure and applications of Dacron polymer.
25. Give the sources and effects of the pollutant CO.
26. Write the composition and health effects of hair dye.

(4 × 5 = 20 marks)

Section D (Essay)

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

27. (a) Write any *five* applications of colloids.
    (b) What is the principle of TLC ? How does it work ?
28. (a) Describe the collision theory of reaction rate.
    (b) Explain how the temperature can affect the rate of a chemical reaction.
29. (a) Write the different steps involved in the manufacture of glass.
    (b) Explain the different type of glasses and mention their uses.
30. Write the source, effect and control measures of thermal pollution.

(2 × 10 = 20 marks)

C 21262 (Pages : 3) Name.....

Reg. No.....

FOURTH SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION, APRIL 2022

Chemistry

CHE4B04—ORGANIC CHEMISTRY—I

(2014—2018 Admissions)

Time : Three Hours Maximum : 80 Marks

Section A

Answer **all** *questions.*
Each question carries 1 *mark.*

1. Any two consecutive members of a homologous series differ in their molecular formula by ———— group.
2. Hybridization of carbon in benzene molecule is :
3. Meso tartaric acid is optically ————.(active/inactive)
4. Give any two examples of electrophiles.
5. The product obtained when acetylene gas is passed through 40% H_2SO_4 containing 1% $HgSO_4$ is Reductive ozonolysis of ethene yields.
6. Reductive ozonolysis of ethene yields.
7. Alkaline $KMnO_4$ is called ———— reagent.
8. Give any two examples of ring deactivating groups.
9. Hydrogenation of but-1-yne using Lindlar's catalyst yields.
10. Give any two groups having -I effect.

(10 × 1 = 10 marks)

Section B

Answer any **ten** *questions.*
Each question carries 2 *marks.*

11. What are tautomers ?
12. Draw the Newman projection formula of staggered nnd eclipsed form of ethane molecule.

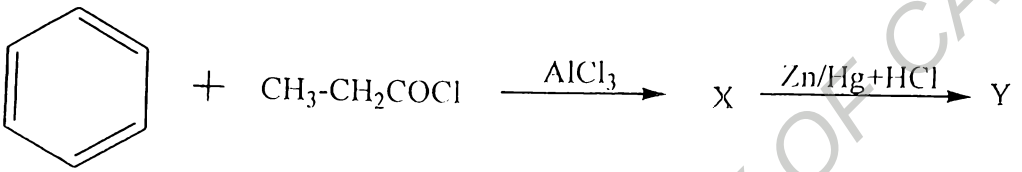
13. What are enantiomers ?

14. Maleic acid readily forms the anhydride compared to fumaric acid. Why?

15. What is meant by steric effect ?

16. Explain cis hydroxylation with asuitable reagent.

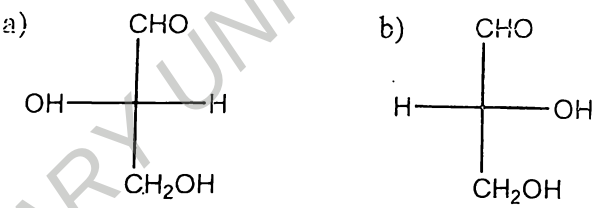
17. Predict A and B in the following reaction :



18. What are carbenes ?

19. Explain peroxide effect.

20. Assign R and S configuration of :



21. Explain ortho-para and meta directing groups.

22. What are anti-aromatic compounds ? Give an example.

(10 × 2 = 20 marks)

Section C

Answer any **five** *questions.*
Each question carries 6 *marks.*

23. Explain position isomerism, functional isomerism and metamerism.

24. Discuss the optical isomerism in allenes.

25. What is hyperconjugation ? Compare the stability of toluene and ethyl benzene.

26. What is meant by resolution ? Explain any two methods of resolution.

27. Discuss any three tests for unsaturation.

28. Explain the addition of hydrogen halide to buta-1, 3-diene.

29. Discuss Haworth synthesis of naphthalene ?

30. Give the mechanism of Friedel-Craft's alkylation and acylation.

(5 × 6 = 30 marks)

Section D

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

31. What are conformers ? Explain briefly the conformational analysis of ethane and *n*-butane.

32. Explain the formation and stability of carbocation, carbanion and free radicals.

33. What are hydrocarbons ? Explain any two general methods of preparation of alkane, alkene and alkyne.

34. a) Explain Huckel's rule of aromaticity with suitable examples. (4 marks)

    b) Explain the mechanism of halogenation and nitration of benzene. (6 marks)

[2 × 10 = 20 marks]

C 21517 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION, APRIL 2022

Chemistry

CHE 4C 04—PHYSICAL AND APPLIED CHEMISTRY

(2019 Admission onwards)

Time : Two Hours Maximum : 60 Marks

Section A (Short Answer)

Answer at least **eight** *questions.*
Each question carries 3 *marks.*
All questions can be attended.
Overall Ceiling 24.

1. Define Hardy-Schulz law.
2. What is critical micelle temperature ?
3. Define green chemistry.
4. Give two applications of nanomaterial in catalysis.
5. What is the principle of chromatography ?
6. Give the structure and monomer unit of neoprene.
7. What is the condition for a molecule to be microwave active ?
8. Define finger print region.
9. How is water purified for drinking purpose ?
10. Define pollutant and pollution.
11. What is Buna-N ?
12. Give any *two* examples of natural food preservatives and artificial sweeteners.

(8 × 3 = 24 marks)

Section B (Paragraph)

Answer at least **five** *questions.*
Each question carries 5 *marks.*
All questions can be attended.
Overall Ceiling 25.

13. Give an account of applications of colloids.

14. Explain the preparation of nanoparticles in detail.

15. Mention advantages and limitations of adsorption chromatography.

16. Give an account on biodegradable polymers.

17. What is greenhouse effect ? Explain its consequences and control measures.

18. Define and give an example of antibiotics, antipyretics and analgesics.

19. Calculate following for radiation of wavelength 200 nm : wavenumber. frequency, energy per photon and energy per mol.

(5 × 5 = 25 marks)

Section C (Essay)

Answer any **one** *question.*
The question carries 11 *marks.*

20. (a) What is the principle of NMR spectroscopy ?

    (b) How will you differentiate the two isomers C_2H_6O using NMR spectroscopy ?

21. (a) Explain terms (a) Chromophore ; and (b) Auxochrome.

    (b) Discuss various theories of colour and constitution.

(1 × 11 = 11 marks)

C 21516 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION, APRIL 2022

Chemistry

CHE 4B 04—ORGANIC CHEMISTRY—I

(2019 Admission onwards)

Time : Two Hours Maximum : 60 Marks

Section A (Short Answers)

Answer at least **eight** *questions.*
Each question carries 3 *marks.*
All questions can be attended.
Overall Ceiling 24.

1. Distinguish between inductive effect and mesomeric effect.
2. Write a note on carbenes.
3. Which is the most acidic among chlorobutanoic acids ? Justify.
4. Predict the product formed by the catalytic hydrogenation of propyne and reduction of propyne by Lindlar's catalyst.
5. Account for the acidity of terminal alkynes.
6. What is dipole induced dipole interactions ?
7. Explain the aromaticity in furan.
8. What is azulene ?
9. Why cyclopentadienyl anion is aromatic while the corresponding cation is not ?
10. The C - C bond length in benzene is 1. 39 Å . Explain.
11. How is benzyne intermediate formed ?
12. How will you convert benzene to chloro benzene ?

(8 × 3 = 24 marks)

Section B (Paragraph)

Answer at least **five** *questions.*
Each question carries 5 *marks.*
All questions can be attended.
Overall Ceiling 25.

13. State Markovnikov's rule. Explain its mechanism.
14. Write a note on RS system of nomenclature for acyclic optical isomers with one asymmetric carbon atom.

Turn over

15. What are meso compounds ? Explain with an example. How is it different from a racemic mixture ?
16. Discuss the stability order of 1°, 2° and 3° alkyl free radicals.
17. Explain the term steric hinderance with suitable example.
18. Discuss the mechanism of Friedel Crafts acylation reaction.
19. Write a brief note on meta directing groups aromatic electrophilic substitution reactions.

(5 × 5 = 25 marks)

Section C

Answer any **one** *question.*
The question carries 11 *marks.*

20. Discuss Bayer's strain theory. Explain its merits and limitations.
21. a) Illustrate the application of ozonolysis in locating the position of the double bond in an alkene.
    b) Explain oxymercuration - reduction reaction with a suitable example.

(1 × 11 = 11 marks)

C 2172 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
APRIL 2021

Chemistry

CHE 4C 04—PHYSICAL AND APPLIED CHEMISTRY

Time : Three Hours Maximum : 64 Marks

Section A

Answer **all** *questions.*
Each question carries 1 *mark.*

1. Example for a lyophobic colloid is ————.
2. Electrical property of colloids can be explained by ————.
3. Rate constant of a reaction is 3.5×10^{-3} $dm^3 .mol^{-1}. s^{-1}$. The order of the reaction is ————.
4. Name a CFC pollutant.
5. How many normal modes of vibration may CO_2 molecule have ?
6. Integrated rate equation for a zero order reaction is ————.
7. Example for a thermosetting plastic is ————.
8. ———— is a green house gas.
9. Chemical name of antipyretic drug is ————.
10. What is a Herbicide ?

(10 × 1 = 10 marks)

Section B

Answer any **seven** *questions.*
Each question carries 2 *marks.*

11. In a first order reaction, it takes 2 minutes to complete 30% of the reaction. Calculate the rate constant for this reaction.
12. State and explain Hardy Schulze rule.
13. Explain the adsorption theory of catalysis.
14. State Beer-Lambert's law and explain its application.

Turn over

15. Define cetane number.
16. What is meant by radioactive pollution.
17. Calculate the energy of radiation that has a wave.
18. Draw the structures of Endosulphan and DDT.
19. Write one example for herbicide and fungicide.
20. What is COD ? Mention its significance.

(7 × 2 = 14 marks)

Section C

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

21 Explain the effect of temperature on rate of reaction.
22. Derive the rate equation for a second order reaction.
23. Explain any *two* methods used for the purification of colloids.
24. How can the two isomers of C_2H_6O be differentiated using NMR spectroscopy.
25. Distinguish between thermoplastics and thermosetting plastics.
26. Write important steps involved in the manufacture of glass.

(4 × 5 = 20 marks)

Section D

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

27. Write notes on :
    a) Chemical shift.
    b) Gold number.
    c) Synthetic fibres.
28. Describe the principle and applications of different chromatographic methods.
29. Explain the effects of water pollution.
30. Write notes on a) Dyes ; and b) Soaps and detergents.

(2 × 10 = 20 marks)

C 2171 (Pages : 3) Name.....

Reg. No.....

FOURTH SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
APRIL 2021

Chemistry

CHE 4B 04—ORGANIC CHEMISTRY—I

Time : Three Hours Maximum : 80 Marks

Section A (One Word)

Answer **all** *questions.*
Each question carries 1 *mark.*

1. A tertiary carbocation is ———————— stable than primary carbocation.
2. 1-butene and 2-butene are ———————— isomers.
3. Represent the functional group of ether.
4. Baeyer's reagent is ————————.
5. Give one example for non-benzenoid aromatic compounds ?
6. Draw the two flipped cyclohexane structure in chair form.
7. Which isomer is having zero dipole moment ? Cis -2-butene or trans-2-butene ?
8. Draw the stable conformation of ethylene glycol.
9. Hybridization of carbene (triplet) intermediate————————.
10. 1-Butyne is ———————— acidic than 2-Butyne.

(10 × 1 = 10 marks)

Section B (Short Answers)

Answer any **ten** *questions.*
Each question carries 2 *marks.*

11. Define specific rotation ?
12. Represent tartaric acid in Fischer projection.
13. "Ortho-nitro phenol is more acidic than meta-nitro phenol". Justify your answer ?
14. Discuss ring flipping with suitable examples ?

Turn over

15. Explain Anti-Markownikov addition reaction.

16. Arrange the compounds in order of decreasing reactivity toward aromatic electrophilic substitution : Benzene, phenol, toluene, nitrobenzene.

17. Explain Keto-enol tautomerism with proper examples.

18. What are Anti-aromatic compounds ? Give examples.

19. Arrange the carbocation given in their increasing stability order CH_3^+, $C_2H_5^+$, $(CH_3)_3C^+$. Justify.

20. Write the products obtained on sulphonation of naphthalene at different temperatures.

21. Write the products when 2-Butyne reacts with H_2/Lindlar catalyst.

22. Explain the term enantiomeric excess.

(10 × 2 = 20 marks)

Section C

Answer any **five** *questions.*
Each question carries 6 *marks.*

23. Give the mechanism of halogenation of benzene.

24. What are Carbanions ? Discuss the stability of carbanions.

25. Explain the mechanism of dehydration of alcohols.

26. Discuss the conformations of n-butane with proper energy profile diagram.

27. Define Hyperconjugation. How it can be used to compare stability of 1-butene and 2-butene ?

28. Discuss the mechanism of addition of water into alkene with proper examples.

29. State Huckel's $(4n + 2)$ rule. Explain the aromatic character of indole and quinoline.

30. Write a short note on 1, 4 addition of 1, 3-butadiene and Diels Alder reaction.

(5 × 6 = 30 marks)

Section D

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

31. a) Write a brief note on :

1) Freund reaction ; and 2) Ozonolysis reaction.

b) Discuss Haworth synthesis of naphthalene ?

(6 + 4 = 10 marks)

32. a) Discuss the definition, structure, hybridization of carbocation intermediate.

b) Discuss the stereochemistry of addition of halogens into alkene with proper examples.

(6 + 4 = 10 marks)

33. a) Write a detailed comparison note on basicity of pyrrole and pyridine.

b) Discuss in detail about ring activating and deactivating group with proper examples.

(5 + 5 = 10 marks)

34. a) Define mesomeric effect ? Give examples for + M and – M groups and also compare the basicity of aniline and p-nitroaniline.

b) Discuss the structure and stability of benzene based on M O concepts ?

(5 + 5 = 10 marks)

[2 x 10 = 20 marks]

C 3519 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION
APRIL 2021

Chemistry

CHE 4C 04—PHYSICAL AND APPLIED CHEMISTRY

Time : Two Hours Maximum : 60 Marks

Section A (Short Answers)

Answer at least **eight** *questions.*
Each question carries 3 *marks.*
All questions can be attended.
Overall Ceiling 24.

1. Why are lyophilic sols more stable than lyophobic sols ?
2. Define Gold number.
3. Write note on green solvent.
4. What is the significance of surface to volume ratio ?
5. What is meant by elution ?
6. Discuss the principle of IR spectroscopy.
7. What is bathochromic shift ?
8. What is COD ?
9. What is greenhouse effect ?
10. What is octane number ?
11. Compare LPG and CNG.
12. How are dyes classified ?

(8 × 3 = 24 marks)

Section B (Paragraph)

Answer at least **five** *questions.*
Each question carries 5 *marks.*
All questions can be attended.
Overall Ceiling 25.

13. Explain different purification techniques of colloids.
14. What is the principle of UV spectroscopy ?
15. Explain application of nanomaterial's in electronics and robotics.
16. Explain briefly TLC.
17. What are Pollutants ? How are they classified ?
18. Explain briefly different theories of dyes.
19. Define and give an example of antipyretics, analgesics, antibiotics, antacids and antiseptics.

(5 × 5 = 25 marks)

Section C (Essay)

Answer any **one** *question.*
The question carries 11 *marks.*

20. Discuss briefly different spectroscopic techniques used in the structural determination of organic molecules.
21. What are biodegradable polymers ? Explain application of biodegradable polymers.

(1 × 11 = 11 marks)

C 3518 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION, APRIL 2021

Chemistry

CHE 4B 04—ORGANIC CHEMISTRY-I

Time : Two Hours Maximum : 60 Marks

Section A (Short Answers)

Answer at least **eight** *questions.*
Each question carries 3 *marks.*
All questions can be attended.
Overall Ceiling 24.

1. What are the limitations of Kekule's structure ?
2. Which compound is easily nitrated- benzene or nitrobenzene ? Substantiate your answer.
3. What is Birch reduction ?
4. Why-OH group is ortho- para orienting ?
5. Predict the product in the nitration of methyl benzene.
6. State and explain Saytzeff's rule.
7. Explain the aromaticity of tropylium ion on the basis of Huckel's rule.
8. What are annulenes ? Give two examples of annulenes that are aromatic.
9. Is anthracene aromatic ? Justify your answer.
10. What are carbenes ? Give two examples.
11. Which is a stronger acid ? Acetic acid or formic acid ?
12. What are the consequences of intermolecular hydrogen bonding ?

(8 × 3 = 24 marks)

Section B (Paragraph)

Answer at least **five** *questions.*
Each question carries 5 *marks.*
All questions can be attended.
Overall Ceiling 25.

13. Draw the Newman projections of conformers of butane. Represent the stability of the conformers in a potential energy diagram.
14. Distinguish between enantiomers and diastereomers.

Turn over

15. What is steric effect ? Explain its effect in determining the basicity of 1°, 2°, 3° amines.

16. Discuss hyperconjugation and its significance with illustrative examples.

17. What is meant by Kharasch effect ? Explain the mechanism with an example.

18. Explain the hydroboration-oxidation reaction of alkenes with a suitable example.

19. Halogens are electron withdrawing yet they direct the incoming electrophile to ortho -para positions. Why ?

(5 × 5 = 25 marks)

Section C (Essays)

Answer any **one** *question.*

The question carries 11 *marks.*

20. Discuss the different methods of resolution of a racemic mixture.

21. Illustrate the stereochemical aspects of S_N1 and S_N2 mechanisms. Also discuss the effect of substrate structure, solvent, nucleophile and leaving group.

(1 × 11 = 11 marks)