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V Semester B.Sc. Degree Examination, April - 2022

CHEMISTRY

Organic Chemistry

(CBCS New Scheme (F+R) 2020-21 onwards)

Paper : V



Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

- i. The question paper has two parts. Answer both the parts.
- ii. Draw diagrams and chemical equations wherever necessary.

PART - A

Answer any **EIGHT** of the following questions. Each question carries two marks. (8×2=16)

1. What is meant by stereoisomerism?
2. Meso tartaric acid is optically inactive why?
3. Give the preparation of aniline from nitrobenzene.
4. How is pyrrole prepared from acetylene?
5. State isoprene rule.
6. How do you show that Zingiberene contain three carbon - carbon double bonds.
7. Mention any two uses of ephedrine.
8. Explain hypsochromic shift with an example.
9. What is meant by chemical shift in NMR spectroscopy?
10. What are mordant dyes? Give an example.
11. What are tranquilisers? Give an example.
12. Give the principles of Green chemistry.

[P.T.O.]



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PART - B

Answer any NINE of the following questions. Each question carries six marks. (9×6=54)

13. a) Explain optical isomerism in 2,3 - dichlorobutane.
b) Write syn and anti configurations of benzaldoxime. (4+2)
14. a) What is resolution? Explain the chemical method of resolution of a racemic mixture.
b) Write the structures of E and Z configurations of $\text{CH}_3 - \underset{\text{Cl}}{\underset{|}{\text{C}}} = \underset{\text{H}}{\underset{|}{\text{C}}} - \text{Br}$. (4+2)
15. a) Write the conformations of cis and trans isomers of 1,3 - dimethylcyclohexane. Which form is more stable and why?
b) Explain the formation of a quaternary ammonium salt with an example. (4+2)
16. a) What is Hinsberg reagent? How is it used to distinguish primary, secondary and tertiary amines?
b) How is benzenediazonium chloride converted to benzonitrile? (4+2)
17. a) Represent the orbital structure of pyridine and explain the aromaticity of pyridine based in Huckel's rule.
b) Explain nitration of indole. (4+2)
18. a) Explain the general mechanism of electrophile substitution reaction of furan.
b) Explain the relative basic strengths of pyridine and piperidine. (4+2)
19. a) How is fructose converted to glucose?
b) Write the Haworth structure of maltose. (4+2)
20. a) Explain with reactions to locate the position of carbon - carbon double bonds in citral.
b) Write the structure of camphor. (4+2)
21. a) How do you show that
i) Nicotine contains pyridine ring.
ii) Nitrogen atoms in nicotine are tertiary.
b) Mention any two general characteristics of alkaloids. (4+2)



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22. a) Describe the different types of allowed transitions in UV spectroscopy taking acetone as an example.
- b) How is IR spectrum used to distinguish between free -OH group and hydrogen bonded -OH group.
- c) Why tetramethyl silane is used as a reference compound in NMR spectroscopy. (2+2+2)
23. a) Explain
- i. Spin - Spin splitting.
- ii. Nuclear shielding in NMR spectroscopy.
- b) Mention the number of signals and multiplicity of the signals in the NMR spectrum of $\text{CH}_3\text{CH}_2\text{Cl}$. (4+2)
24. a) Give the synthesis of congo red.
- b) What are Vat dyes? Give an example. (4+2)
25. a) Describe the synthesis of paracetamol from phenol.
- b) Mention the uses of chloramphenicol. (4+2)
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V Semester B.Sc. Degree Examination, April - 2022

CHEMISTRY

Physical Chemistry

(CBCS Scheme 2020-21 onwards (F+R))

Paper : VI



Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

- 1) The question paper has two parts. Answer both the parts.
- 2) Draw diagrams and chemical equations wherever necessary.

PART-A

Answer any EIGHT of the following questions. Each question carries Two marks. (8×2=16)

1. What are concentration cells ?
2. Name a primary and secondary electrode used in electrochemical measurements.
3. A solution of a specific conductance $1.4 \times 10^{-1} \text{ S m}^{-1}$ was placed a conductivity cell. The resistance of the solution was found to be 160 ohm. Calculate the cell constant.
4. State Kohlrausch law of independent migration of ions.
5. Write Debye-Huckel-onsager equation, indicate the terms involved.
6. What is the effect of dilution and temperature on the degree of hydrolysis of salt formed from weak acid and a weak base.
7. The dipole moment of HF, HCl, HBr and HI are 2, 1.3, 0.8 and 0.4 Debye/ Arrange them in the increasing order of polar character.
8. The force constant of HF molecule is 970 Nm^{-1} . Calculate the zero point energy.

[P.T.O.]



9. State Franck - Condon principle.
10. N_2 molecule fails to exhibit rotational spectra but CO exhibits. Why ?
11. Write Ilkovic equation and mention the terms.
12. Write any two analytical applications of buffer solutions.

PART - B

II Answer any NINE of the following questions. Each question carries SIX marks. ($9 \times 6 = 54$)

13. a) Define transport number. How is the transport number of an ion determined by moving boundary method ?
b) Mention any two advantages of conductometric titrations.
14. a) Derive Nernst equation for a single electrode system.
b) Give any two limitations of Arrhenius theory.
15. a) Molar conductances of HCl , $NaCl$ and CH_3COONa at infinite dilutions are 4.2616×10^{-2} , 1.2645×10^{-2} and $9.1 \times 10^{-3} \text{ Sm}^2 \text{ Mol}^{-1}$ respectively. Calculate the degree of dissociation of 0.01M acetic acid solution. The molar conductance of acetic acid at 0.01M is $1.58 \times 10^{-3} \text{ Sm}^2 \text{ mol}^{-1}$.
b) Give any limitations of Quinhydrone electrode.
16. a) Explain asymmetric effect and electrophoretic effect of strong electrolytes.
b) Represent Weston-cadmium cell symbolically.
17. a) Describe the determination of pH of a solution using a quinhydrone electrode.
b) The standard reduction potential of Ag^+/Ag and $Cu^{2+}(1M)/Cu$ electrodes are 0.8V and 0.34V respectively. Represent the cell symbolically and calculate the Emf of the cell.
18. a) Derive the relation : $pH = 7 + \frac{1}{2} pK_a + \frac{1}{2} pK_b$ in the case of salt hydrolysis of weak acid and weak base.
b) Give reason : aqueous solution of $NaCl$ is neutral to litmus.



19. a) Define solubility product ? Why is NH_4Cl added in excess prior to NH_4OH during the detection of III group basic radicals in the inorganic qualitative analysis.
- b) Explain piezoelectricity with an example.
20. a) Explain seebeck effect and Thomson effect with an example.
- b) Write clausius - Mossotti equation and indicate the terms involved.
21. a) Sketch the normal modes of vibration of CO_2 molecule. Which of these are IR active ?
- b) What is Raman effect ?
22. a) If the energy of transition of $J = 2$ to 3 rotational transition of 1_{11}^{35}Cl considered as rigid rotator is 63.56 cm^{-1} . Calculate the moment of inertia of the molecule.
- b) Define zero point energy. Give its equation.
23. a) What are stokes and anti-stoke lines? How are they different from Rayleigh line.
- b) The Vibration energy levels of a harmonic oscillator are equally spaced. Justify the statement with appropriate explanation.
24. a) Mention any four advantages of Raman Spectra over IR spectra.
- b) Mention two applications of semiconductors.
25. a) Draw the current-potential curve in a polarographic experiment. Explain the different types of current observed in polarogram.
- b) What is half-wave potential ? Give its significance.
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