

9-30-19-30 8/11/19

Q.P. Code - 42134

First Semester B.Sc. Degree Examination, October/November 2019

(CBCS Scheme)

Paper I - CHEMISTRY

Time : 3 Hours]

[Max. Marks : 90

Instructions to Candidates :

- 1) Question paper has Two Parts Part A and Part B
- 2) Both the Parts should be answered

PART - A

I. Answer any **TEN** of the following questions. Each question carries **2** marks : **(10 × 2 = 20)**

1. What is diagonal relationship? Give an example.
2. Write the limitations of Bohr's theory.
3. Sketch the radial probability distribution curves for 1S and 2S orbitals.
4. Define lattice energy. List the factors affecting it.
5. Distinguish between sigma and pi bonds.
6. Write the molecular orbital configuration of N_2 . Write its magnetic property.
7. Between ammonia and methyl amine, which is more basic and why?
8. Define the term configuration and conformation and give an example for each.
9. Write any two principles of green Chemistry.
10. Define
 - (a) Chromatogram and
 - (b) Retention time
11. Write the preparation of alkenes by Birch reduction.
12. State Saytzeff's rule with an example.

PART – B

II. Answer any **SEVEN** of the following questions. Each question carries **10** marks :
(7 × 10 = 70)

13. (a) Define ionization energy. How does it vary along a period and down the group? Explain.
- (b) Calculate the bond order of the following : O_2 , O_2^+ and O_2^- .
- (c) State Fajan's rules. (4 + 3 + 3)
14. (a) What are quantum numbers? Explain different quantum numbers and their significance.
- (b) State and explain Hund's rule with an example.
- (c) Write all the possible values of l and m when $n = 3$ / (4 + 3 + 3)
15. (a) (i) Write Schrodinger equation and explain the various terms involved in it.
- (ii) What is the significance of Ψ and Ψ^2 .
- (b) Explain $(n+l)$ rule with an example.
- (c) Calculate the de-Broglie wave length of θ particle of mass $10^{-3} kg$ moving with a velocity of $10^5 m/s$. ($h = 6.63 \times 10^{-34} JS$). (4 + 3 + 3)
16. (a) Draw the molecular orbital energy level diagram for NO molecule, determine its bond order and comment on its magnetic properties.
- (b) Predict and explain the geometry of H_2O and X_cF_4 on the basis of VSEPR theory.
- (c) Explain Sp^3d^2 hybridization with an example. (4 + 3 + 3)
17. (a) Construct the Born-Haber cycle for the formation of M_gO and how the lattice energy is calculated from it?
- (b) The bond angle in Ammonia is 107° , whereas in water 104.5° . Justify.
- (c) Calculate the total number of lone pairs and bond pairs in ClF_3 , BrF_5 and I_3 . (4 + 3 + 3)

18. (a) Define hybridization and explain the hybridization in ethane molecule.
(b) Write a note on
(i) Carbocations and
(ii) Carbanions.
(c) Which of the following compounds are aromatic? Benzene, cyclohexane, pyrrole and tetrahydrofuran. Give reason. (4 + 3 + 3)
19. (a) Write the Newmann projection formulae of
(i) ethane and
(ii) glyceraldehyde
(b) Write the chair and boat conformations of cyclohexane and comment on their relative stabilities.
(c) Calculate the ring strain in the following molecules
(i) Cyclobutane
(ii) cyclopropane and
(iii) cyclohexane (4 + 3 + 3)
20. (a) Write the classification of chromatographic methods based on the nature of stationary phase.
(b) Write the criteria for the selection of mobile phase and stationary phase in TLC and write its applications.
(c) Explain the green synthesis of ibuprofen by BHC-method. (4 + 3 + 3)
21. (a) Explain the oxymercuration and demercuration reaction of propene.
(b) Terminal alkynes are acidic in nature, explain with an example.
(c) Explain ozonolysis of alkynes with suitable example and mention its significance in structural elucidation. (4 + 3 + 3)
22. (a) Describe the preparation of alkenes by the following methods :
(i) dehydration
(ii) dehydrohalogenation
(b) Explain the mechanism of chlorination of propane.
(c) Explain why stability of free radicals follows the order $\dot{3} > \dot{2} > \dot{1}$? (4 + 3 + 3)

First Semester B.Sc. Degree Examination, November 2017

(CBCS Scheme)

Chemistry

Paper I – CHEMISTRY

Time : 3 Hours]

[Max. Marks : 90

Instructions to Candidates :

- 1) The question paper has two Parts, Part A and Part B.
- 2) Both the parts should be answered.
- 3) Write the reactions wherever it is necessary.

PART – A

Answer any **TEN** of the following questions. Each question carries **2** marks.

(10 × 2 = 20)

1. Define Electron affinity.
2. Explain Hund's rule with an example.
3. Give any two limitations of Bohr's theory.
4. Write the factors favouring the formation of ionic bond.
5. Write the resonance structures of CO₂.
6. Explain why He₂ does not exist.
7. Which is stronger between trichloroacetic acid and chloroacetic acid? Why?
8. Calculate the angle strain in cyclobutane.
9. Discuss any two general principles of Green Chemistry.
10. Define Retention time and R_f value.
11. Explain Saytezeff's rule with example.
12. Give the reaction of propyne with hot alkaline KMnO₄.

PART - B

Answer any **SEVEN** of the following questions. Each question carries **10** marks.

(7 × 10 = 70)

13. (a) How does Bohr's theory account for the spectrum of H₂ atom?
(b) Define atomic radius. What is its trend across a period and down the group?
(c) Derive de Broglie's equation. **(4 + 3 + 3)**
14. (a) What are radial and angular nodes? Give their significance.
(b) State and explain Fajan's rules of polarization.
(c) Define salivation energy and give its significance. **(4 + 3 + 3)**
15. (a) Construct Born - Haber cycle for the formation of MgO and write the equation for the calculation of lattice energy.
(b) Calculate the bond order in O₂, O₂⁺ and O₂⁻.
(c) Discuss the structure of PCl₅ based on hybridization. **(4 + 3 + 3)**
16. (a) State Pauli's exclusion principle. Write the electronic configuration of chromium and copper.
(b) Explain the structure of BrF₅ based on VSEPR theory.
(c) Draw the shapes of p and d orbitals. **(4 + 3 + 3)**
17. (a) Describe any two methods of detection of spots in thin layer chromatography.
(b) Write the synthesis of Ibuprofen using green chemistry principles.
(c) Discuss the relative stabilities of conformers of cyclohexane. **(4 + 3 + 3)**
18. (a) Write any two methods of preparation of alkenes.
(b) Discuss the spotting and development of plates in thin layer chromatography.
(c) Explain the free radical mechanism of chlorination of propene. **(4 + 3 + 3)**

19. (a) Explain the addition of HBr to propene in presence of H_2O_2 with mechanism.
(b) Explain any three criteria for the selection of mobile phase in chromatography.
(c) How do you prepare ethane by Kolbe's electrolysis method? **(4 + 3 + 3)**
20. (a) Using energy level diagram explain the conformational analysis of ethane.
(b) Draw the Newmann projection formulae for lactic acid and 2, 3 - dichlorobutane.
(c) Discuss Baeyer's strain theory in deciding the stability of cycloalkanes. **(4 + 3 + 3)**
21. (a) Write the preparation of alkanes from (i) Grignard reagents (ii) Wurtz reaction.
(b) Explain Hydroboration-oxidation reaction of propene.
(c) Arrange the following free radicals in increasing order of stability. Justify your statement. (i) $(CH_3)_2\dot{C}H$ (ii) $CH_3\dot{C}H_2$ (iii) $(CH_3)_3\dot{C}$. **(4 + 3 + 3)**
22. (a) Discuss the structure of ethyne molecule based on hybridization.
(b) What are limitations of valence bond theory?
(c) Explain Huckel's rule. Discuss the aromaticity of pyrrole briefly. **(4 + 3 + 3)**
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I Semester B.Sc. Examination, November/December 2016
(CBCS Scheme)
Paper – I : CHEMISTRY – I

Time : 3 Hours

Max. Marks : 90

- Instructions :** 1) The question paper has **two** parts. Part – A and Part – B.
2) **Both** the parts should be answered.
3) Write the reactions **wherever** it is necessary.

PART – A

Answer **any ten** of the following questions. **Each** question carries **2** marks. (10×2=20)

1. Define ionization energy. How it varies along the period ?
2. Write de-Broglie's equation and mention the terms in it.
3. State Heisenberg's uncertainty principle.
4. Write the structure of XeF_4 and indicate the number of lone pairs in it.
5. Oxygen is paramagnetic in nature, give reason.
6. Distinguish between sigma and pi bonds.
7. State Huckel's rule of aromaticity.
8. Calculate the angle strain in cyclopropane.
9. Write any two principles of green chemistry.
10. Define Retardation factor and write its significance.
11. What is Kharasch peroxide effect ? Give an example.
12. What are alkynides and how they are formed ?

P.T.O.



PART - B

Answer any seven of the following questions. Each question carries 10 marks : (7×10=70)

13. a) Give all the allotropic forms exhibited by carbon and sulphur.
b) Write a note on :
i) free radical and
ii) carbanions.
c) What is inductive effect ? Give its types with suitable examples. (4+3+3)
14. a) What is hydrogen atom spectra ? Name the different series and their regions.
b) Explain the green synthesis of ibuprofen by BHC method.
c) Define the terms : Eluent, Elution and Retention time. (4+3+3)
15. a) Write Schrodinger equation and explain the various terms involved in it. What is the significance of ψ and ψ^2 in Schrodinger wave equation ?
b) Write the classification of chromatography based on the nature of stationary phase.
c) Give the general method of preparation of alkanes using Grignard's reagent. (4+3+3)
16. a) Construct the Born-Haber cycle for the formation of NaCl and write the equation for the calculation of its lattice energy.
b) With suitable example explain the oxy-mercuration and de-mercuration reaction of alkenes.
c) Explain ozonolysis of propene and write the significance of alkene ozonolysis. (4+3+3)
17. a) Explain the geometry of SF_6 molecule on the basis of VSEPR theory.
b) Write the Fisher projection formulae for
i) lactic acid and
ii) glyceraldehyde
c) Using energy level diagram, explain the conformational analysis of n-butane. (4+3+3)



18. a) Explain Markovnikov's rule with suitable example.
b) What is radial distribution function? Write the distribution curves for 1s and 2s orbitals.
c) Write all the possible values of l and m when n = 2. (4+3+3)
19. a) What is hyperconjugation? Explain with an example.
b) Write the significance of all the four quantum numbers.
c) Calculate the de-Broglie wavelength of a particle of mass 10^{-4} Kg moving with a velocity of 10^6 ms $^{-1}$. ($h = 6.63 \times 10^{-34}$ Js). (4+3+3)
20. a) Write the conformations of cis and trans isomers of methyl cyclohexane and compare their relative stability.
b) Explain the structure of PCl_5 molecule based on hybridization.
c) State Fajan's rules. (4+3+3)
21. a) Explain any one method of preparation of TLC plates.
b) Calculate the total number of electron pairs, lone pairs and bond pairs in BCl_3 and H_2O .
c) Differentiate between bonding and antibonding molecular orbitals. (4+3+3)
22. a) Write a note on stability of free radicals.
b) Calculate the bond order of N_2 and O_2 molecules based on MOT.
c) Explain sp^2 hybridization with an example. (4+3+3)

Q.P. Code – 22134

First Semester B.Sc. Degree Examination, November 2017

(Semester Scheme)

CHEMISTRY

Paper I – CHEMISTRY

Time : 3 Hours]

[Max. Marks : 60

Instructions to Candidates :

- 1) The question paper has two parts. Both the parts should be answered.
- 2) Equations and structures are to be given wherever necessary.

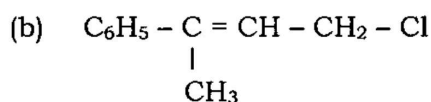
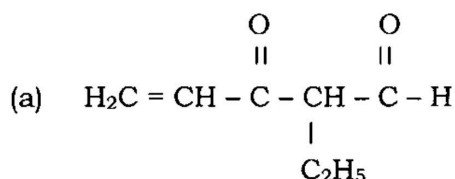
PART – A

Answer any **SIX** of the following. Each question carries **2** marks. (6 × 2 = 12)

1. Write the electronic configuration of chromium and copper.
2. State Hund's rule and illustrate with an example.
3. Define orbital. How is it different from orbit?
4. Write all the possible values of 'l' and 'm' when $n = 2$.
5. Why are the atoms of group II elements smaller than corresponding Group I elements in the periodic Table?
6. Explain why the ionization energy of Na^+ is more than that of Na atom.
7. Calculate the oxidation number of
 - (a) Cr in $\text{K}_2\text{Cr}_2\text{O}_7$
 - (b) P in PO_4^{3-}
8. Mention all the four colligative properties.
9. State Raoult's law.

Q.P. Code – 22134

10. Write the IUPAC names of the following



PART – B

Answer any **EIGHT** of the following. Each question carries **6** marks.

(8 × 6 = 48)

11. (a) Derive an expression for the radius of electron orbit in hydrogen atom.
(b) What are Eigen values and Eigen functions? **(4 + 2)**
12. (a) Derive de-Broglie's wave equation.
(b) Calculate the wave number of the spectral lines when an electron jumps from 4th Bohr orbit to the ground state. **(3 + 3)**
13. (a) Write the significance of all the four Quantum numbers.
(b) State and Explain Heisenberg's uncertainty principle. **(4 + 2)**
14. (a) Compare the properties of group 16 elements with respect to their
(i) Electronegativity
(ii) Hydrides formation.
(b) Define Co-valent radius. **(4 + 2)**
15. (a) Discuss the properties of alkalimets with respect to
(i) Atomic size
(ii) Electronegativity.
(b) What is diagonal relationship? Explain with an example. **(4 + 2)**
16. (a) Balance the following equation by ion-electron method.
 $\text{Cu} + \text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{NO}$
(b) Define Vander Waal's radius. **(4 + 2)**

17. (a) Describe Ostwald's – Walkers dynamic method for determining the lowering of vapour pressure of non-volatile solute.
- (b) 4.83×10^{-3} Kg of substance (molar mass = 180×10^{-3} kg/ mol) when dissolved in 50×10^{-3} Kg of water, lowered the freezing point of water by 1 K. Calculate the molal depression constant of water. **(4 + 2)**
18. (a) Derive the relationship between elevation in boiling point and molar mass of the solute by vapour-pressure temperature curve method.
- (b) What are Inductive effect and mesomeric effect? **(4 + 2)**
19. (a) Give any two general method of preparation of alkenes. Write the equations.
- (b) Why Formic acid is stronger than acetic acid? **(4 + 2)**
20. (a) Write the mechanism of chlorination of methane.
- (b) What is Diel's – alder reaction? Give an example. **(4 + 2)**
21. (a) How do you explain the relative stabilities of cyclo-alkanes by Baeyer's strain theory?
- (b) Write cis-trans isomers of 2-Butene. **(4 + 2)**
22. (a) Discuss the relative stability of chair and boat conformations of cyclohexane.
- (b) Give an example for Hydroboration-Oxidation of alkenes. **(4 + 2)**
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I Semester B.Sc. Examination, Nov./Dec. 2016

(Semester Scheme)

CHEMISTRY (Paper – I)

Time : 3 Hours

Max. Marks : 60

Instructions : 1) The question Paper has **two** Parts. **Both** Parts should be answered.

2) **Diagrams, equations** and structures are to be given **wherever necessary**.

PART – A

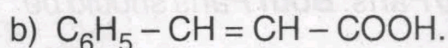
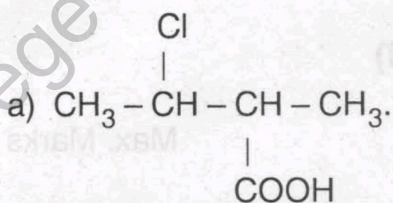
Answer **any six** of the following. **Each** question carries **two** marks : (6×2=12)

1. Calculate the wave number of the spectral line when an electron jumps from the Second Bohr orbit to the ground state. $R_H = 1.097 \times 10^7 \text{ m}^{-1}$.
2. Write all the possible values of l and m , when $n = 3$.
3. Write the Schrodinger wave equation for Hydrogen atom.
4. State Hund's rule of maximum multiplicity.
5. Arrange the following ions according to the increase in ionic size. N^{3-} , F^- , O_2^- . Justify the order.
6. Calculate the oxidation number of
 - a) Cr in $\text{Cr}_2\text{O}_7^{2-}$
 - b) P in PO_4^{3-} .
7. Calculate the Osmotic pressure of a solution containing $3 \times 10^{-3} \text{ kg}$ of $\text{NH}_2 - \text{Co} - \text{NH}_2$ in $100 \times 10^{-3} \text{ kg}$ of its solution at 27°C . $R = 8.314 \text{ J/K/mol}$.
8. Define Van't Hoff correction factor.

P.T.O.



9. Write I. U. P. A. C. names of the following :



10. What is a free radical ? Give an example.

PART - B

Answer **any eight** of the following. **Each** question carries **six** marks : (8×6=48)

11. a) Derive an expression for the energy of the first Bohr orbit in Hydrogen atom.
- b) Write any two limitations of Bohr theory. (4+2)
12. a) Briefly explain the significance of all the four Quantum numbers.
- b) Write DeBroglie equation and explain the terms in it. (4+2)
13. a) 1) Write Pauli's exclusion principle.
2) Write the expression for Rydberg constant.
- b) What are eigen values and eigen functions ? (4+2)
14. a) Compare the properties of group 16 elements with respect to their
1) Electronegativity
2) Oxidising character.
- b) What is diagonal relationship ? Give an example. (4+2)
15. a) Explain Pauling method of evaluation of electro-negativity of elements.
- b) HF is a weak acid. But HCl is strong. Explain. (4+2)
16. a) What is ionisation energy of an atom ? List the factors affecting it.
- b) Balance the following equation by oxidation number method.
- $$\text{Mg} + \text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2. \quad (4+2)$$



17. a) State and explain the laws of osmotic pressure. (4+2)
b) Define molal elevation constant. What is its unit ? (4+2)
18. a) Explain Ostwald and Walker's dynamic method for determining the lowering of vapour pressure of a non-volatile solute. (4+2)
b) What are isotonic solutions ? Among urea 60 g/dm^3 and glucose 120 g/dm^3 , which one has higher Osmotic pressure ? (4+2)
19. a) What are carbocations and carbanions ? Explain how they are formed ? (4+2)
b) Chloroacetic acid is stronger than acetic acid. Explain. (4+2)
20. a) Explain Markonikoff's rule and Kharash peroxide effect, with an example each. (4+2)
b) What is Diel's Alder reaction ? Give an example. (4+2)
21. a) Explain the mechanism of chlorination of methane. (4+2)
b) Explain Cis-trans isomerism in 2-Butene. (4+2)
22. a) Write the reaction between :
i) Propene with ozone followed by hydrolysis.
ii) Acetylene with ammonical silver nitrate.
b) Write Kolbe's electrolysis for the preparation of Alkanes. (4+2)
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I Semester B.Sc. Examination, Nov./Dec. 2014
(Semester Scheme)
CHEMISTRY
Paper – I : Chemistry

Time : 3 Hours

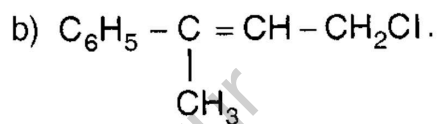
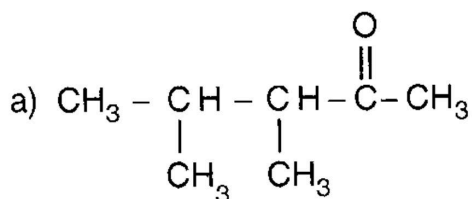
Max. Marks : 60

- Instructions :** i) The question paper has **two** Parts.
ii) **Both** the Parts should be answered.

PART – A

I. Answer **any six** of the following. **Each** question carries **2** marks. (6×2=12)

- 1) State aufbau principle.
- 2) What is a carbanion ? Give an example.
- 3) What is meant by dual nature of a particle ?
- 4) Explain why the ionization energy of Na^+ is more than that of Na atom.
- 5) Why are the atoms of group 2 elements smaller than corresponding group 1 elements in the periodic table ?
- 6) Calculate the oxidation number of phosphorous in H_3PO_4 and Manganese in MnO_2 .
- 7) Osmotic pressure is a colligative property. Why ?
- 8) Write the IUPAC names of the following :



- 9) What are carbenes ? Give example.
- 10) Give an example for hydroboration-oxidation reaction.

P.T.O.



PART – B

II. Answer **any eight** of the following. **Each** question carries **6** marks. **(8×6=48)**

- 11) a) Write Schrodinger's wave equation and define the terms eigen values and eigen functions.
b) Calculate the wave number of the spectral line when an electron jumps from the 4th Bohr orbit to the ground state. **(4+2)**
- 12) a) Derive an expression for the energy of the first Bohr orbit in hydrogen atom.
b) State and explain Heisenberg's uncertainty principle. **(4+2)**
- 13) a) Briefly describe the significance of all the four quantum numbers.
b) Write the deBroglie's relation and explain the terms in it. **(4+2)**
- 14) a) Balance the following equation by ion-electron method.
$$\text{Cu} + \text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{NO}$$

b) Write all the values of 'm' when l = 2. **(4+2)**
- 15) a) What is meant by covalent radii of an element? How does atomic radius vary across a period and down the group? Explain.
b) Compare the group 1 and group 2 elements with respect to first ionization energies. **(4+2)**
- 16) a) Discuss the properties of halogens in the periodic with respect to
i) Ionization energy ii) Electron affinity.
b) Cations are smaller in size than corresponding neutral atom. Give reason. **(4+2)**
- 17) a) State and explain laws of osmotic pressure.
b) Define cryoscopic constant. Give its unit. **(4+2)**
- 18) a) Derive the relationship between elevation of the boiling point and lowering of vapour pressure.
b) 2×10^{-3} kg of a solute dissolved in 50×10^{-3} kg of water lowered the freezing point by 0.61 K. Calculate the molar mass of the solute. Given, K_f for water = $1.86 \text{ K kg mol}^{-1}$. **(3+3)**
- 19) a) Describe the mechanism of chlorination of methane.
b) How do you prepare ethene by dehydrohalogenation? **(4+2)**
- 20) a) Write a note on inductive effect. Explain the influence of this on acidity of carboxylic acids.
b) What is Diel's Alder reaction? Give example. **(4+2)**
- 21) a) Explain the following with a suitable example :
i) Hoffmann's elimination ii) Ozonolysis.
b) Why hydrogen of acetylene is acidic in nature? **(4+2)**
- 22) a) Explain Sachse-Mohr's theory of strainless rings.
b) Draw the various conformations of n-butane and which among them is most stable. **(4+2)**