R.K. Science (P.G.) College, Kalwar, Jaipur

CHEMISTR'. SEM.-II FLP-I

Sec. A. Attempt all 10 questions. Each question carries a mark weight of 2.

1 What is called face-centred cubic structure. 2 What are agents? 3 What is called electrophile? 4 What is called nucleophile. 5 Name two compounds containing F centre. 6 Give reason why water is a liquid while H2S is a gas. 7 What is radius ratio? 8 Give two drawbacks of Kekulé structure of benzene. 9 Draw the diagram of benzene with molecular orbitals. 10 What is Saytzeff rule? 11 Give an example of Hofmann elimination reaction.

Choose any 4 questions, choosing 1 question from each unit. Each question carries 15 marks

UNIT-1 1 Explain the following

a) The melting point of the following chlorides is in decreasing order. Explain.

NaCl >MgCl2>AlCl3

b) Explain the decreasing order of solubility of sulphates from magnesium to barium in the alkaline earth metals. MgSO4 > CaSO4 > SrSO4 > BaSO4

C) Calculate the value of radius ratio for tetrahedral geometry in an ionic compound.

or

a) Explain the shapes of NH3, SF4, BrF5 molecules based on VSEPR theory.

b) SF4 molecule is distorted tetrahedron. Give reasons and describe the structure of ICl2.

C) NH3 is a polar molecule while NF3 is a nearly nonpolar molecule.

UNIT-II

1 a) What do you mean by reactive intermediate? Draw orbital diagrams of alkyl carbonium (carboxetine) ions and explain their stability.

a) Give the increasing order of stability of various alkyl, allyl and benzene free radicals b) Explain the stability of different types of carbon anions by giving the orbital structure of alkyl carbon anion

What are the methods for determining the mechanism of organic reactions?

explain

UNIT-III

1 a) Discuss the structure of benzene on the basis of resonance and molecular orbital theory.

b) Discuss modern ideas about the structure of benzene.

1. Explain the mechanism of electrophilic aromatic substitution using the example of benzene. To support your answer, give two methods by which your given mechanism can be proved.

UNIT-IV

1 a) What is the molecular theory of gases?

b Explain the Joule Thomson effect.

C Explain average velocity.

or

1 a Write a note on isotherms of real gases.

b Write a note on critical temperature and Boyle temperature.

C. Comment briefly on the equated state equation.

R.K Vigyan (P.G.) Mahavidhyalaya, Kalwar , Jaipur

Chemistry SEM.-|| FLP-II

Sec. A: Attempt all 10 questions. Each question carries a mark weight of 2.

1. Give reason why water is a liquid while H2S is a gas. 2. Why does ice float on the surface of water? 3. Why is B2 molecule paramagnetic? 4. How is NO molecule paramagnetic? 5. What is called carbanion and give examples. 6. What are free radicals? 7. What is called nitron? 8. Write the order of stability of carbocations. 9. What is Saytzeff's rule? 10. What is Markovnikoff rule? What is 11O/P ratio? 12. What is back chain reaction? 13. What is sulphonation reaction of benzene?

Choose any 4 questions, choosing 1 question from each unit. Each question carries a mark weightage of 15

UNIT-I

1 Explain on the basis of MOT.

102 molecules are paramagnetic while N2 molecules are diamagnetic. 2 NO molecules are paramagnetic while NO+ ions are diamagnetic. 3 The bond order of the NO molecule is 2.5 Explain. The stability of the 4O2 molecule is greater than that of O2-.

Or

1 a State Fajans's law. Discuss the application of Fajans' law.

B What do you understand by polarizability and polarizability?

Why do the melting points of chlorides decrease in the following series?

हैNacl,MgCl2,Alcl3,SnCl4

UNIT-II

1 a What do you understand by carbon intermediate? Differentiate between singlet carbon and triplet carbon. Give reactions in which carbon intermediates are formed.

What is the nitrene intermediate and what type of reaction is it formed in?

Or

1a What is Baer's distortion theory? State its limitations.

B Write short notes on the following

1. Kore-House reaction 2. Diels Alder reaction

UNIT-III

1 a Write the characteristic properties of aromatic compounds and also describe aromaticity.

B Explain the mechanism of electrophilic aromatic substitution giving the example of benzene. Give two methods to support your answer in which your given mechanism is proved.

Or

a Give two pieces of evidence to support the Kekulé structure of benzene.

b What is Hückel's (4n+2) rule

Draw the pi MO energy level diagram of benzene.

Give reason for this liability of Tropyllium catine.

Explain the term aromaticity

UNIT-IV

1. What is the Joule Thomson law? The Joule Thomson coefficient for an ideal gas is Explain?

What are the limitations of Vander Waal's equation?

Or

A What are the main points of the kinetic theory of gases? Establish the kinetic gas equation.

Derive the critical constant in terms of the van der Waals constant.

R.K. Science (P.G.) College, Kalwar, Jaipur

CHEMISTRY SEM.-II HLP-I

Sec. A Choose any 5 questions. Each question carries a mark weight of 2.

1 What is Barnes equation? 2 Define lattice energy. 3 What is electron affinity? 4 Differentiate between transition state and intermediate state. 6 What is the production analysis method for determining the mechanism of organic reactions? 7 What do you understand by activation energy? 8 What do you understand by molecular kinetics of reactions? 9 How is electron transport represented by an arrow? 10 What is an addition reaction?

* Choose any 2 questions, choosing 1 question from each unit. Each question carries a mark weightage of 15.

UNIT-I

1 a Explain the different types of hybridisation found in inorganic molecules with suitable examples.

B NO_2^+, NO_2 and NO_2^- have the same shape and number of atoms, even though Their shapes are different. Explain why.

Or

2 a Distinguish between conductors, insulators and semiconductors on the basis of band theory of metals

b. Explain Frenkel and Schottky defects. Explain with examples.

UNIT-II

What do you mean by reactive intermediate? alkyl carbonium

Draw orbital diagrams of (carboxylate) ions and explain their stability. Give the increasing order of stability of various alkyl, allyl and benzene free radicals.

or

Write a note on the following: (i) Electron- and nucleophilic reagents

(ii) Lewis acids and Lewis acids (iii) Intermediate

R.K. Science (P.G.) College, Kalwar, Jaipur

CHEMISTRY SEM.-II HLP-II

Sec. A Choose any 5 questions. Each question carries a mark weight of 2.

1 Give two deficiencies of the Kekulé structure of benzene 2 Draw the molecular orbital diagram of benzene 3 Give the allowed structure of the benzene free radical

4 What is Tropyllium Catena?

5 Explain the Kekule structure of the benzene ring and give evidence in favour of the Kekule structure and point out the drawbacks of the Kekule structure. 5 What is Hückel's rule?

6 What is Birch Absorption What is the Arrhenius equation?

8 What is the unit of the discretion constant of first order, second order and zero order reactions? 9 Name the methods of determining the order of a reaction.

10 What is half life and average or middle life? 11 Explain the dependence of the rate of reaction on temperature.

12 Define what is threshold energy 13 What is temperature coefficient

Sec. c Choose any 2 questions, choosing 1 question from each unit. The mark weight of each question is

UNIT-III

1 a Explain the Kekule structure of the benzene ring and give evidence in favour of the Kekule structure and point out the shortcomings of the Kekule structure.

b What is Hückel's rule?

Write an example of Friedel-Crafts reaction.

1 What is the Brown and Gibson rule? How can it be used to explain the nature of the disubstituted product obtained from the electrophilic substitution reaction of a monosubstituted derivative of benzene?

UNIT-IV

1 a What is the Vander Waals equation? Explain the deviation from the behavior of the Vander Waals equation. b What is the collision frequency? What is the critical temperature and critical pressure of a gas?

What happens?

or

What is the Joule-Thomson law? Explain the Joule-Thomson coefficient for an ideal gas. What are the limitations of the van der Waal equation?

ii Write the van der Waals equation for n moles of gas.

Describe the liquefaction of gases.

or

a How are liquid crystals classified? Distinguish between smectic and nematic liquid crystals.

B. Write the applications of liquid crystals.

C Explain anisotropy and isotropy, mesomorphic state

Or

1 a. Explain the applications of liquid crystals in the context of thermography and seven-segment cell.

R.K Vigyan (P.G.) Mahavidhyalaya, Kalwar , Jaipur

CHEMISTRY SEM.-II QLP-I

Sec. A Choose any 2 questions. Each question carries a mark weight of 2.

1 Define hydrogen bond. 2 Define Vander Waal. 3 Name different types of hydrogen bonds. 4 What is London attraction force. 5 What is dipole dipole attraction. 6 $MgSO_4$ is soluble in water whereas $BaSO_4$ is insoluble why? 7 LiF is sparingly soluble in water but LiCl is soluble why? 8 Sodium chloride is soluble in water whereas silver chloride is insoluble why? 9 Give the order of solubility of silver halides. AgF, AgCl, AgBr, AgCl 10 Br molecule is paramagnetic 11 What is Frenkel error. 12 What is Schottky error. 12 What are non stoichiometric compounds. 13 What are stoichiometric compounds.

Sec. C Choose any 1 question. Each question carries 15 marks.

UNIT-I

1 Explain the energetics of solubility and solution of ionic compounds. Mention the factors affecting the solubility of ionic compounds. 2 a Draw the MO diagrams of CO and NO molecules and explain the bond order and magnetic behavior of each.

What is molecular orbital theory? How does it explain the formation of B_2 and O_2 molecules? Draw their molecular orbital energy diagrams.

3 What is VSEPR theory? Describe the various rules of this theory. Explain its limitations.

4 a Explain the Born-Haber cycle and its importance.

b Explain the formation of NaCl with the help of Born-Haber cycle and explain its importance.

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CHEMISTRY SEM.-II QLP-II

Sec. A Choose any 2 questions. Each question carries a mark weight of 2.

1 What is resonance 2 What is resonance energy 3 What is hyperconjugation 4 What is homogeneous fission 5 What is heterogeneous fission 6 Explain bond fission Write the order of stability of carbocation 7 Write the order of stability of carbanion 8 Give the orbital structure of carbanion 10 Give the orbital structure of carbocation 11 Give the orbital structure of nitrene 12 What do you mean by reactive intermediate 13 What is O/P ratio 14 What is a back chain reaction

What is the sulphonation reaction of benzene?

Sec. C Choose any 1 question. Each question carries 15 marks.

UNIT-II

1 a) Write a method for the synthesis of 1,3-butadiene from ethyne.

b) Explain 1,2 and 1,4 electrophilic addition reactions on conjugated dieno. c) What are 1,2 and 1,4 addition.

2 Describe the following methods of preparing cycloalkanes.

1. Wislicenus method 2. Perkin method 3. What is Baer's distortion theory and what are its limitations 4. What is banana closure

3a Explain the chlorination of isobutane with the help of an energy state diagram.

b Describe the methods of preparation of cycloalkanes.

4 a Explain the types of different types of organic reactions

b Explain Markonikov and anti-Markovnikov theorems with examples. Explain Seljeff's rule.

R.K Vigyan (P.G.) College, Kalwar, Jaipur CHEMISTRY.

SEM.-II QLP-III Sec. A Choose any 2

questions. The mark weight of each question is

1 What is Hückel's (4n+2) rule? 2 Draw the pi MO energy level diagram of benzene. 3 Give the reason for this responsibility of tropylium ketene 4 Explain the term aromaticity 5 Give two evidences in favour of Kekulé structure 6 Explain ortho and para ratio 7 Explain the side chain reaction of benzene 8 What are the deactivating and meta directing groups 9 Draw the energy profile diagram of hydrogenation of benzene 10 Give the reaction of chloromethylation of benzene

Sec. C Choose any 1 question. Each question carries 15 marks. UNIT-III

1A. Explain the stability of benzene by drawing a pi MO energy level diagram and drawing its pi MO's.

Explain the Kekule structure of the benzene ring and give evidence in favour of the Kekule structure and point out the shortcomings of the Kekule structure.

2 Write the characteristic properties of aromatic compounds and also describe aromaticity.

3 Explain the mechanism of electrophilic aromatic substitution using the example of benzene. To support your answer, give two methods by which your given mechanism can be proved.

4 Discuss the structure of benzene along with its orbital structure.

5 Explain the following: i. What is Itad reaction? ii. Give the reaction of chloromethylation of benzene. iii. Draw the energy profile diagram of halogenation of benzene.

R.K. Science (P.G.) College, Kalwar, Jaipur

CHEMISTRY EM.-II QLP-IV

Sec. A Choose any 2 questions. Each question carries a mark weight of 2.

1 What are liquid crystals? 2 What are seven-lobed cells? 3 What are cholesterol liquid crystals? 4 Write examples of liquid crystals. 5 Name the different types of liquid crystals. 6 What is the mesomorphic state? 7 Explain the three-dimensional lattice.

8 Define unit cell. 9 Define crystalline material.

10 Define the axis of symmetry of a crystal. 11 What is the number of vertices in the unit cell of the face central lattice?

*Choose any 1 question. Each question carries 15 marks.

UNIT-IV

1 a What are the main points of the kinetic theory of gases? Set up the kinetic gas equation. b Derive the critical constant in terms of the van der Waals constant.

2 (a) Explain Maxwell's law of distribution (b) Root Mean Square Average Explain end most probable velocity

3a) Explain what Collagnon number is. b) What is liquefaction of gases? Explain using Joule Thomson effect.

4 a) Distinguish between solid, liquid, and gaseous states. Mention the characteristic properties of liquids. b) What is the van der Waals force of attraction? Give evidence for its existence.

5 a) Write a short note on Bragg equation, band theory of solids, symmetry elements of crystals.

b) Explain the Bragg equation nx = 2d sin 0 and discuss its applications in the study of crystal structure.