

CHEMISTRY HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

SECTION – B (Marks 42)

Q. 2 Answer the following questions briefly.

(14x3=42)

(i)	Write chemical equations to show what happens when following compounds are heated: a. $LiNO_3$ b. $NaNO_3$ c. $Mg(NO_3)_2$	03	OR	What is the difference between the functional groups present in the following pairs of compounds? a. Acid halides and Acid amides b. Ethers and Esters c. Aldehydes and Ketones	03
(ii)	Write down the electronic configuration of Copper and Chromium. Why these electronic configurations violate Aufbau principle?	2+1	OR	Describe the geometries of complex ions with co-ordination number 4 and 6	2+1
(iii)	State Fajan's rule and justify it by giving two examples.	1+2	OR	Write down the reactions of Acetic anhydride with a. H_2O b. NH_3 c. C_2H_5OH	03
(iv)	Justify that the restricted rotation about C-C bond in 1,2-dimethyl cyclo propane is responsible for geometrical isomerism.	03	OR	How can aldehydes and ketones be differentiated by giving two chemical tests?	03
(v)	Write down the mechanism of SN1 reactions.	03	OR	Write down three differences between addition and condensation polymerization.	03
(vi)	How $Cr_2O_7^{2-}$ and CrO_4^{2-} ions exist in equilibrium with one another? How can they be interconverted due to this equilibrium?	1+2	OR	Briefly describe enzyme inhibition? What are its types.	1+2
(vii)	How can 1-Butyne be prepared using a suitable vicinal dihalide and a geminal dihalide? Give chemical reactions with conditions.	03	OR	What is green house effect? Give its brief description.	1+2
(viii)	Write down the reactions of Phenol with conc. HNO_3 , aq. Br_2 and conc. H_2SO_4	03	OR	Describe the type of electronic transition that occurs when UV-Vis radiations of 200–800nm wavelength are passed through $CH_2 = CH - CH_2 - \ddot{O}H$	03
(ix)	Write down three differences between E1 and E2 reactions.	03	OR	Describe the significance of Functional group region and Finger print regions in the IR spectrum.	03
(x)	Justify that $Al(OH)_3$ is amphoteric but $Mg(OH)_2$ is basic.	2+1	OR	Write down the reactions of $CH_3 - CH_2 - Mg - Br$ with: a. Acetone b. CO_2	03
(xi)	Describe anomalous trends in the ionization energies of elements of 3 rd period in the periodic table.	03	OR	Why is Acetaldehyde more reactive than Acetone in nucleophilic addition reactions?	03
(xii)	Write down two reactions in which O–H bond of alcohol is broken. What is reactivity order of different alcohols in these reactions?	2+1	OR	What is the role of chloro-fluoro carbons (CFC) in destroying ozone layer in the stratosphere?	03
(xiii)	Write down the chemical reactions for the following observations: a. Calcium when heated in air (containing O_2 and N_2) results in the formation of two compounds b. One of the above two compounds reacts with water to form a pungent gas.	2+1	OR	Naturally occurring magnesium has three isotopes. $Mg - 24$ mass = 24amu % - age abundance = 78.70% $Mg - 25$ mass = 25amu % - age abundance = 10.13% $Mg - 26$ mass = 26amu % - age abundance = 11.17% Calculate relative atomic mass of Mg .	03
(xiv)	How can ethene be converted into: a. Ethanol b. Ethylene chlorohydrin	03	OR	Acetone undergoes aldol condensation reaction with a mild base. Write down the mechanism of this reaction of acetone.	03

SECTION – C (Marks 26)

Note: Attempt the following questions.

Q.3	Justify that CO_2 is an acidic oxide. How the dioxides of Ge , Sn and Pb differ in nature from CO_2 ? Explain by giving two chemical reactions for each in the support of your answer.	1+2+2 +2	OR	How is the refining of Crude oil carried out? State the basic principle involved and explain the steps in industrial process. (Do not describe the fractions)	1+1 +5
Q.4	Why Carbon and Silicon show +4 oxidation states whereas Ge , Sn and Pb show +4 as well as +2 oxidation states in their compounds? Explain. Also compare the relative stability of +4 and +2 oxidation states in Ge , Sn and Pb .	3+3	OR	Explain the structure of Benzene on the basis of molecular orbital concept. How does this concept justify the stability of benzene? Why does benzene preferably give electrophilic substitution reactions?	3+2+1
Q.5	How can Acetyl Chloride be prepared from carboxylic acid? Write down the reactions of $\begin{matrix} O \\ \\ CH_3 - C - Cl \end{matrix}$ with: a. Acetic acid b. Ethanol c. NH_3	06	OR	Describe lipids. How can essential and non-essential lipids be differentiated? Write down the following reactions of a general triglyceride: a. Hydrolysis b. Saponification	3+3
Q.6	What is mass spectrometry? Write down its basic principle. Explain the construction and working of a mass spectrometer.	1+1+5	OR	What is the order of acidic strength of phenol, alcohol and carboxylic acid? Justify your answer by giving pKa values, and stability of their conjugate bases.	1+2+2 +2

(B) —

SUPPLEMENTARY TABLE

Atomic No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Symbol	H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca
Mass No	1	4	7	9	11	12	14	16	19	20	23	24	27	28	31	32	35.5	40	39	40

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SECTION – B (Marks 42)


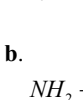
Q. 2 Answer the following questions briefly.

(14x3=42)

(i)	Write down the reactions of dil. HCl with Li_2O , Na_2O_2 and KO_2	03	OR	What is the significance of dissolved oxygen (DO), Biochemical oxygen demand (BOD) and chemical oxygen demand (COD)?	03
(ii)	What is the role of effective nuclear charge and number of electronic shells in determining the atomic radii of elements of 3 rd period?	2+1	OR	$MgCl_2$ is a high melting solid, $AlCl_3$ is a solid that sublimes at $180^\circ C$ whereas $SiCl_4$ is a volatile liquid. How will you justify this difference in volatility?	03
(iii)	Why Alkali metals impart different colours to the flame?	03	OR	Write down the mechanism of following reaction: $2CH_3 - OH \xrightarrow[140^\circ C]{Conc. H_2SO_4} CH_3 - O - CH_3 + H_2O$	03
(iv)	How is BaO prepared? Write down chemical equation to show what happens when: a. BaO is heated in air b. Resulting product is reacted with dil H_2SO_4	03	OR	Identify ligands, co-ordination number and geometry of the following complex ion $[Co(en)_2Cl_2]^+$	03
(v)	Write down the reactions of V_2O_5 with HCl , HNO_3 , SO_2	03	OR	Differentiate between atomic emission and atomic absorption spectroscopy.	03
(vi)	How is $KMnO_4$ used in redox titration with acidified $FeSO_4$? Describe the procedure with chemical equation.	1+2	OR	Differentiate between, secondary and tertiary structures of proteins.	03
(vii)	Write down two similarities and one difference between the members of a homologous series.	2+1	OR	Briefly describe the process of spin flipping in NMR spectroscopy.	03
(viii)	1-Propanol shows two types of structural isomerism. Name the types and draw the isomers of each type.	03	OR	Write down three difference between SN_1 and SN_2 reaction mechanisms.	03
(ix)	Write down the mechanism for the following reaction of Benzene. 	03	OR	What happens when following compounds are reacted with $LiAlH_4$ a. $CH_3 - CN$ b.  c. 	03
(x)	How SN_2 reaction mechanism can be supported by kinetic and stereochemical evidences?	03	OR	Write down three adverse effects of dissolved fertilizers present in water as pollutants.	03
(xi)	Write down the reactions of $CH_3 - CH_2 - NH_2$ with acetyl chloride, Acetaldehyde, HNO_2 / HCl	03	OR	Describe the structural components of nucleotides of RNA.	03
(xii)	How can Dimethyl ether be prepared by: a. Williamson's synthesis b. From an alkyl halide	03	OR	How can Propanoic acid be prepared from: a. A nitrile b. A Grignard reagent c. An Aldehyde	03
(xiii)	Write down the reactions of 1-Propanol with. a. $SOCl_2$ b. $Conc. H_2SO_4 / 180^\circ C$ c. $K_2Cr_2O_7 / H_2SO_4$	03	OR	Write down the composition and uses of following fractions of Petroleum refining. a. Gasoline b. Naphtha	03
(xiv)	Write down any two applications of iodoform test with chemical equations.	03	OR	0.240g of an organic compound contain 0.096g of carbon, 0.016g hydrogen and 0.128g oxygen. Determine empirical formula of the compound.	03

SECTION – C (Marks 26)

Note: Attempt the following questions.

Q.3	Describe resonance and resonance energy. How can the resonance energy of benzene be calculated with the help of heat of hydrogenation?	3+4	OR	Describe polymerization. What are its types? Describe one example of each type with chemical equation for its formation.	1+2 +4
Q.4	Why halogens act as oxidizing agents? How is the oxidizing property of halogens represented? What is the order of relative power of halogens as oxidizing agent? Prove this order by giving chemical equations.	1+1+1 +3	OR	Write down the reactions of Acetaldehyde and Acetone with. a.  b. 	3+3
Q.5	Describe the trends in the following physical properties of elements of 3 rd period. a. Ionization potential b. Melting point and boiling points	3+3	OR	How can phenol be prepared from: a. Chlorobenzene b. Cumene c. Aniline	2+2 +2
Q.6	What meant by directive influence of substituents on benzene ring? How can substituents be classified on this basis? Give one example of directive influence of substituents for each class with chemical equation.	1+2+4	OR	What is IR spectroscopy? Discuss with reference to: a. Reason for absorption of IR-radiations b. IR-spectra c. Application of IR-spectroscopy	1+2 +2+2

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(D) —

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