THE ASIAN SCHOOL, DEHRADUN

CLASS – 12 **SUBJECT : CHEMISTRY** **CHAPTER- 1– SOLID STATE** **M.M – 30**

	SECTION- A (1 Marks Each)
Q1.	A compound AB_2 possesses the CaF_2 type crystal structure. Write the coordination number of A^{2+} and B^- ions is its crystals.
Q2.	Which point defect in its crystal units increases the density of a solid?
Q3.	What is the difference between 13-15 and 12-16 compounds?
Q4.	What other element may be added to silicon to make electrons available for conduction of and electric current.
Q5.	Aluminium crystallizes in FCC structure. Atomic radius of the metal is 125 PM. What is length of the side of the unit cell of the metal?
	SECTION- B (2 Marks each)
Q6.	What type of stoichiometric defect is shown by i) Zns ii) AgBr?
Q7	A cubic solid is made up of two elements P and Q. Atoms of Q are present at the corners of the cube and atoms of P at body centre. What is the formula of the compound? What are the coordination number of P and Q?
Q8.	If the radius of the octahedral void is r and the radius of the atom in the close packing is R, derive relationship between r and R.
Q9	Analysis shows that nicked oxide has the formula $Ni_{0.98}$. What fractions of the nickel exist as Ni and Ni^{3+} ions?
Q10	Calculate the distance between Na^+ and Cl^- ions in Nacl cystal if its density is 2.165 gcm^{-3} (Molar mass of Nacl = 58.5 glmol, Na = 6.02 X $10^{23}mol^{-1}$)
	SECTION- C (3 Marks each)
Q11.	Ferric oxide cystallises in a henagonal close packed array of oxide ions with two out of every three octahedral voids occupied by ferric ions. Derive the formula of ferric oxide.
Q12	What type of substances would make better permanent magnets, ferromagnetic or ferromagnetic justify your answer.
	SECTION- D (4 Mark)
Q13	If Nacl is doped with 10^{-3} mole % $Srcl_2$. What is the concentration of cation vacancies?
	SECTION – E (5 Mark)
Q14	A) Calculate the efficiency of packing in case of a metal crystal for FCC. B) Write the coordination number of each ion in the following crystal i) Na_2O ii) CaF_2 C) Differentiate between : i) Octahedral and Tetrahedral voids. ii) Crystal lattice and unit cell.

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CLASS – 12 SUBJECT : CHEMISTRY CHAPTER- 2 SOLUTIONS M.M – 30

Q1.	Define molal depression constant or cryoscopic constant.	1
Q2.	What is the van't Hoff factor for a compound which undergo dimerisation in an organic sdvent.	2
Q3.	Why does a solution of ethanol and cyclohexane show positive deviation from Raoult's law?	2
Q4	Depression in freezing point of 0.10 molal solution of HF is -0.201^{0}C. Calculate the percentage degree of dissociation of HF (K_f = 1.86 K Kg mol^{-1})	3
Q5	A 0.1539 molal aqueous solution of cane sugar (mol mass – 342g mol^{-1}) has a freezing point of 271 while the freezing point of pure water is 273.15K. What will be the freezing point of an aqueous solution containing 5g of glucose (mol mass = 180gmol^{-1}) per 100g of solution.	3
Q6	0.90 g of a non- electrolyte was dissolved in 87.90g of benzene. This raised the boiling point of benzene by 0.25^{0}C if the molar mass of non electrolyte is 103.0g mol^{-1}, calculate the molal elevation constant for benzene.	3
Q7.	The osmotic pressure of blood is 8.21 atm at 37^{0}C. How much glucose would be used for an injection that is at the same osmotic pressure as blood.	3
Q8.	Urea forms an ideal solution in water. Determine the vapour pressure of an aqueous solution containing 10% by mass of Urea at 40^{0}C (Vapour pressure of water at 40^{0}C = 55.3 mmHg)	3
Q9 a) b)	State Raoult's law for a solution containing volatile components. How does Raoult's law become a special case of Henrys law. What do you expect to happen when RBC's are placed in i) 1% NaCl solution ii) 0.5% NaCl solution	5
Q10. A) B)	The freezing point of a solution containing 0.3g of acetic acid in 30.0g of benzene is lowered by 0.45^{0}C. Calculate the van't Hoff factor (K_f for benzene – 5.12Kkgmol-^{1}) Explain why equimolar aqueous solutions of sodium chloride and sodium sulphate are not isotonic?	5

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CLASS – 12 SUBJECT : CHEMISTRY CHAPTER- 3Electro Chemistry M.M – 30

Q1.	Why$\wedge^0$m for CH_3COOIH cannot be determined experimentally.	1
Q2.	Give electrode reactions of lead storage battery during discharge.	2
Q3.	Define equivalent conductivity and derive its unit.	2
Q4	The molar conductances of NaOH, NaCl and $BaCl_2$ at infinite dilution are $2.481X10^{-2}$, $1.265X10^{-2}$ and $2.800 X 10^{-2}S m^2 mol^{-1}$. Respectively. Calculate $\wedge^0$m $Ba(0H)_2$.	3
Q5	Can a nickel spoon be used to stir a solution of silver nitrate? Support your answer with reason : E^0Ni^{2+}/Ni = -0.25V E^0Ag^+/Ag = +0.80V.	3
Q6	Calculate the emf of the following cell at 298K Fe(s) I Fe^{2+} (0.001M) II H^+(IM) I H_2(g)(1bar), Pts (Given E^0cell = +0.44V)	3
Q7.	Calculate the equilibrium constant for the following reaction at 298K. $Cu(s) + Cl_2(g) \longrightarrow CuCl_2\ (aq)$ R = 8.314 Jk^{-1} mol^{-1}, E^0cu^{2+} / Cu = 0.34V F = 96500 $Cmol^{-1}$, $E^0 1/2\ Cl_2/\ C1^-$ = 1.36V	3
Q8.	The measured resistance of a conductance cell containing 7.5X 10^{-3} M solution of KCl at 25^0C was 1005 ohms. Calculate a) specific conductance. b) Molar conductance of the solution . Cell constant = $1.25cm^{-1}$.	3
Q9	Give reasons : i) Why does an alkaline medium inhibit the rusting of iron? ii) Why does a dry cell become dead after a long time even if it has not been used. iii) Conductivity of an electrolyte solution decreases with the decrease in concentration.	5
Q10.	Write on : a) Advantages of Fuel cell b) Sacrificial protection	5

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CLASS – 12 SUBJECT : CHEMISTRY CHAPTER- 4 Chemical Kinetics M.M – 30

	SECTION- A	
Q1.	Give an example of a pseudo first order reaction.	1
Q2.	For a reaction A + B $\longrightarrow$ Product the rate law is given by $r = K [a]^{1/2} [B]^2$. What is the order of the reaction?	1
Q3.	Define half life of a reaction. Write the expression of half life for : i) Zero order reaction. ii) First order reaction.	1
Q4	What do you understand by the rate law and rate constant of a reaction? Identify the order of a reaction, if the units of its rate constant are : i) $L^{-1}\,mols^{-1}$ ii) $Lmol^{-1}s^{-1}$	1
Q5	Distinguish between molecularity and order of a reaction.	1
	SECTION- B	
Q6	A first order reaction takes 40 min for 30% decomposition. Calculate $t_{1/2}$ for this reaction (Given log 1.428 = 0.1548)	2
Q7.	The rate constant for a first order reaction is $60s^{-1}$. How much time will it take to reduce the initial concentration of the reactant to its 1/10th value?	2
Q8.	A first order reaction takes 100 min for completion of 60% of the reaction. Find the time when 90% of the reaction will be completed.	2
Q9	The rate of a reaction become four times when the temperature changes from 300K to 320K. Calculate the energy of activation of the reaction, assuming that it does not change will temperature ($R = 8.314Jk^{-1}\,mol^{-1}$)	2
Q10.	The rate constant of a reaction at 500K and 700K are $0.02s^{-1}$ and $0.07s^{-1}$ respectively. Calculate the value of activation energy Ea ($R = 8.314\ JK^{-1}\,mol^{-1}$)	2
	SECTION- C	
Q11.	For decomposition of azoisopropane to hexane and nitrogen at 543K, the following data are obtained? t(s) : 0 360 720 P(mm of Hg) 35 54 63 Calculate the rate constant.	5
Q12.	The time required for 10% completion of a first order reaction at 298K is equal to that required for its 25% completion at 308K. If the value of $\wedge$ is $4X10^{10}\ s^{-1}$. Calculate K at 318K and E_a.	5
Q13.	The following rate data were obtained at 303K for the following reaction : $2A + B \longrightarrow C + D$ Experiment [A] / $molL^{-1}$ [B] / $molL^{-1}$ initial rate of formation of D/$molL^{-1}\,min^{-1}$ i) 0.1 0.1 $6.0X10^{-3}$ ii) 0.3 0.2 $7.2X10^{-2}$ iii) 0.3 0.4 $2.88X10^{-1}$ iv) 0.4 0.1 2.40X10-2 What is the rate law? What is the order with respect to each reactant and the over all order. Also calculate the rate constant and write its unit.	5

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CLASS – 12 SUBJECT : CHEMISTRY CHAPTER- 5 Surface Chemistry M.M – 30

Q1.	What is occlusion?	1
Q2.	Give one example each of Sol and gel.	2
Q3.	Why is ferric chloride preferred over potassium chloride in case of a cut leading to bleeding?	2
Q4	State Hardy-Schulze rule. Give example.	3
Q5	Explain the following : Dialysis Eleclrophoresis Tyndall Effect	3
Q6	What is shape-selective catalysis?	3
Q7.	Give one example where physiosorption changes to chemisorption with rise in temperature. Explain the reason for change.	3
Q8.	Is it possible to cause artificially rain by spraying silver iodide on the clouds? Comment.	3
Q9	Give reasons : i) Physiorption decreases with increase of temperature. ii) Gelatin which is a peptide is added to icecream. iii) Action of soap is due to emulsificatrass and micelle formation.	5
Q10.	a) In reference to Freundlich adsorption Isotherm write the expression for adsorption of gases on solids in the forms of an equation : b) Write an important characteristic of lyophilic sol. c) Give one example each of associated colloid and multimolecular colloid.	5

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CLASS – 12 SUBJECT : CHEMISTRY CHAPTER- 6 GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS M.M – 30

	SECTION- A	
Q1.	Although carbon and hydrogen are better reducing agents but they are not used to reduce metallic oxides at high temperatures. Why?	1
Q2.	Name the method used for refining of Zirconium.	2
Q3.	An ore sample of galena (PbS) is contaminated with zinc belnde (Zns). Name one chemical which can be used to concentrate galena selectively by froth floatation method.	2
Q4	Name one each (a) Acidic flux b) basic flux	3
Q5	Describe the principle behind each of the following processes : a) Electrolytic refining of a metal. b) Recovery of silver after silver ore was leached with NaCN	3
	SECTION- B	
Q6.	Outline the principles behind the refining of metals by the following methods. i) Zone refining method. ii) Chromatographic method.	2
Q7.	Write down the reaction taking place in blast furnace related to the methallurgy of iron in the temperature range 500-800k.	2
Q8.	Out of C and Co, which is a better reducing agent for ZnO.	2
Q9.	Extraction of copper from pyrite is more difficult than that from its oxide ore through reduction. Comment.	2
Q10.	The value of $\Delta_f G^0$ for formation of Cr_2O_3 is – 540 $Kjmol^{-1}$ and of Al_2O_3 is – 827KJ mol^{-1}. Is the reduction of Cr_2O_3 possible with aluminium.	2
	SECTION – C	
Q11.	Write the reaction involved in the following processes. a) Leaching of bauxite ore to prepare pure alumina . b) Refining of Zirconium by van Arkel method. c) Recovery of gold after gold ore has been leached with NaCN solution.	3
Q12.	Describe how the following changes are brought about. a) Pig iron into steel. b) Impure titanium into pure titanium, c) Zinc oxide into metallic zinc.	3
Q13.	How is leaching is carried out in case of low grade copper ores.	3
Q14.	Why copper matte is put in silica lined converter?	3
Q15.	How is the concept of coupling reaction useful in explaining the occurrence of non-spontaneous thermochemical reactions? Explain.	3

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CLASS – 12 SUBJECT : CHEMISTRY CHAPTER- 7 p Block Elements M.M – 30

Q1.	In what way can it be proved that PH_3 is basic in nature?	1
Q2.	Write the order of thermal stability of the hydrrdes of group 16 elements.	2
Q3.	Complete the following chemical reaction equations : i) $P_4 + SO_2Cl_2 \longrightarrow$ ii) $XeF_6 + H_2O \longrightarrow$	2
Q4	Draw the structures of : i) $H_2S_2O_8$ ii) $HClO_4$ iii) H_3PO_3	3
Q5	Give reasons for the following : i) $R_3P = O$ exists but $R_3N = O$ does not. R is an alkyl group. ii) White phosphorus is more reactive than red phosphorus. iii) Give resonating structures of NO_2.	3
Q6.	Account for the following : i) Sulphur in vapour form exhibits paramagnetic behaviour. ii) Bi(V) is a stronger oxidizing agent than Sb(V). iii) Solid phosphorus pentachloride behaves as an ionic compound.	3
Q7.	a) Why are halogens coloured? b) Why is ICl more reactive than I_2? c) The negative value of electron gain enthalpy is less for fluorine than for chlorine.	3
Q8.	i) Arrange HClO, HBrO and HIO in order of decreasing acid strength giving reason : a) Why does NO_2 dimerise? b) $5F_6$ is inert toward hydrolysis.	3
Q9.	Draw the structures : i) $XeOF_4$ ii) O_3 iii) ClF_3 iv) N_2O_5 v) XeF_6	5
Q10.	Complete the following equations : $P_4 + NaOH(aq) + H_2O(l) \longrightarrow$ $I^-(aq) + H_2O(l) + O_3(g) \longrightarrow$ $PtF_6 + Ye \longrightarrow$ $H_3PO_3 \xrightarrow{\Delta}$ $Cl_2 + NaOH \longrightarrow$ (hot and conc)	5

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CLASS – 12 SUBJECT : CHEMISTRY CHAPTER- 8 The d and F-Block Elements M.M – 30

	SECTION- A	
Q1.	Reactivity of transition elements decreases almost regularly from Sc to Cu. Explain.	1
Q2.	Which of the 3d series of the transition metals exhibit the largest number of oxidation states and why?	1
Q3.	Why are interstitial compounds? Why are such compounds well known for transition metals?	1
Q4	Describe the preparation of potassium dichromate from iron chromite ore. What is the effect of increasing P^H on a solution of potassium dichromate.	1
Q5	What are the disproportion reaction? Give two examples.	1
	SECTION- B	
Q6.	What is lanthanoid contraction? What are the consequences of lanthanoid contraction?	2
Q7.	Complete the following equation : i) $2MnO_4^- + 5S^{2-} + 16H^+ \longrightarrow$ ii) $Cr_2O_7^{2-} + 2OH^- \longrightarrow$	2
Q8.	Calculate the number of unpaired electrons in the following gaseous ions : i) Mn^{3+} ii) Cr^{3+} iii) V^{3+} iv) Ti^{3+}	2
Q9.	Give reasons : i) Transition metals form a number of interstitial compounds. ii) Zn^{2-} salts are white while Cu^{2+} salts are blue. iii) Among transition metals, the highest oxidation state is exhibited in ozxoanions of a metal. iv) Although +3 oxidation state is the characteristic oxidation state of lanthanoids but certain shows +4 oxidation state of lanthanoids but certain shows +4 oxidation stat also why?	2
Q10.	Give reason for the following : i) E^0 values of Mn, Ni and Zn are more negative than expected. ii) $[Ti(H_2O)]^{3+}$ is coloured while $[Sc(H_2O)_6]^{3+}$ is colourless.	2
	SECTION- C	
Q11.	a) Out of Ag_2SO_4, CuF_2, MgF_2 and CuCl which compound will be coloured and why? b) Explain : c) $CrO4^{2-}$ is a strong oxidizing agent while $MnO4^{2-}$ is not. d) Zr and Hf have identical sizes e) The lowest oxidation state of Manganese is basic while the highest is acidic. f) Mn (ii) Shows maximum paramagnetic character?	5
Q12.	How would you account for the following : i) There is a gradual decrease in the atomic sizes of transition elements in a series with increasing atomic numbers. ii) The atomic radii of the metals of the third (5d) series of transition elements are virtually the same as those of the corresponding members of the second (4d) series. iii) The E^0 value for the Mn^{3+}/ Mn^{2+} couple is much more positive than that for Cr^{3+}/Cr^{2+} couple or Fe^{3+}/Fe^{2+} couple. iv) The transition elements have great tendency for complex formation. v) Although Zr beloing to 4d and Hf belongs to 5d transition series but itiquite difficult to separate them.	5
Q13.	On the basis of lanthanoid contraction, explain the following : a) Nature of bonding in La_2O_3 and Lu_2O_3. b) Trends in the stability of oxo salts of lanthanoids from La to Lu. c) Stability of the complex of Lanthanoids d) Radii of 4d and 5d block elements. e) Trends in acidic character of Lanthanoid oxides.	

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CLASS – 12 SUBJECT : CHEMISTRY CHAPTER- 9 Coordination compounds M.M – 30

	SECTION- A	
Q1.	How many ions are produced from the complex $[Co(NH_3)_6Cl_2$ in solution.	1
Q2.	What is meant by chelate effect? Give an example.	1
Q3.	How many isomers are there for octahedral complex $[CoCl_2(en)(NH_3)_2]^+$	1
Q4	Why Co a stronger ligand than Cl^-?	1
Q5.	Specify the oxidation number of the metals in the following Coordination entities. i) $K_3[Fe(CN)_6]$ ii) $[Pt Cl_4]^{2-}$	1
	SECTION- B	
Q6.	Why do compounds having similar geometry have different magnetic moment.	2
Q7.	Giving a suitable example for each of the following : a) Linkage isomerism ii) Ambidentate ligand	2
Q8.	$[Cr(NH_3)_6]^{3+}$ is paramagnetic while $[Ni(CN)_4]^{2-}$ is diamagnetic. Explain why.	2
Q9.	A solution of $[Ni(H_2O)_6]^{2+}$ is green but a solution of $[Ni(CN)_4]^{2-}$ is colourless. Explain.	2
Q10.	Explain why $[Fe(H_2O)_6]^{3+}$ has magnetic moment value of 5.92 BM whereas $[Fe(CN)_6]^{3-}$ has a value of only 1.74BM.	2
	SECTION- C	
Q11.	Explain the following a) Low spin octahedral complexes of nickel are not known. b) CO^{2+} is easily oxidized to Co^{3+} in the presence of a strong ligand. c) CO is a stronger complexing reagent than NH_3.	3
Q12.	Name the following coordination entities and draw the structures of their stereoisomers. i) $[Co(en)_2Cl_2]^+$ ii) $[Cr(C_2O_4)_3]^{3-}$ iii) $[Pt (NH_3)_2Cl_2]$	3
Q13.	Write the types of isomerism exhibited by the following complexes: i) $[Co(NH_3)_5Cl] SO_4$ ii) $[Co(en)_3)^{3+}$ iii) $[Co(NH_3)_6]$ $[Cr(CN)_6]$	3
Q14.	Give the electronic configuration of the following complexes on the basis of crystal field splitting theory : i) $[CoF_6]^{3-}$ ii) $[Fe(CN)_6]^{4-}$ iii) $[Cu(NH_3)_6]^{2+}$	3
Q15.	Discuss the nature of bonding in the following coordination entities on the basis of valence bond theory. i) $[Fe(CN)_6]^{4+}$ ii) $[Pt(NH_3)_2Cl(NO_2)]$ iii) $[Ni(CN)_4]^{2-}$	3

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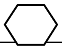
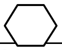
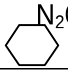
CLASS – 12 SUBJECT : CHEMISTRY CHAPTER-10 Haloaikanes and Haloarenes M.M – 30

Q1.	Give IUPAC name. $(CH_3)_3\ CH_2Br$	1
Q2.	What are enantiomers? Draw the structures of the possible enantiomers of 3 methyl pent -1-ene.	1
Q3.	Why choloform is stored in closed dark coloured bottles completely filled so that air is kept out.	1
Q4	Explain the following: i) Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanide as the major product. ii) The treatment of alkyl chlorides with aqueous KOH leads to the formation of alcohds but in presence of alcoholic KOH alkenes are the major products.	1
Q5	Explain as to why haloarenes are much less reactive than haloalkanes towards nucleophilic substitution reactions.	1
Q6.	Arrange the compounds in order of reactivity towards SN_2 displacement. i) 2 Bromo-2-methyl butane, 1 Bromopentane, 2 Bromopentane ii)  CH_2Cl or  -Cl	2
Q7.	Give use of Freon-12, CCl_4 and iodoform.	2
Q8.	Convert – Complete $(CH_3)_2\ CHCl \xrightarrow[\text{Dry ether}]{Na}$ $CH_3CH_2Br + NaI \longrightarrow$ N_2Cl  $\xrightarrow{Cu/HCl}$	2
Q9.	Give the following reactions : Sandmeyer Reaction Wurtz Fitting Reaction Dow's Process Finkelstein Reaction Swarts Reaction	2
Q10.	a) Give mechanism of following reactions : $(CH_3)_3\ CBr + OH^- \longrightarrow (CH_3)_3\ C\text{-}OH + Br^-$ b) Give equations : Hundiecker Reaction GaHerrann Reaction Sayzeff Elimination	2