Model question papers prepared by Master trainers, Department of PU education, Bangalore.

II-PUC CHEMISTRY

BLUE PRINT FOR MODEL QUESTION PAPER - 1

Group	Unit	Title	Hours	Marks	Part–A I 10 × 1 Mark	Part-B II 8 × 2 Mark	Part-C III 8 × 3 Mark	Part-D IV & V 11 × 5 Mark	Total
Group –I Physical	**1**	The Solid state	**8**	**07**		√		√	**07**
	2	Solution	9	07	√ √			√	07
	3	Electrochemistry	9	08	√	√		√	08
	4	Chemical Kinetics	9	08	√	√		√	08
	5	Surface chemistry	6	05				√	05
		Total of Group -I	**41**	**35**					35
Group –II Inorganic chemistry	6	General principles and processes of isolation of elements	5	04	√		√		04
	7	The p-block elements	11	10	√		√ √ √		10
	8	The d and f- block elements	9	08		√	√ √		08
	9	Co-ordination Compounds	7	07	√		√ √		07
		Total of Group -II	**32**	**29**					29
Group –III organic chemistry	10	Haloalkanes and Haloarenes	7	06	√			√	06
	11	Alcohols, phenols and ethers	8	07		√		√	07
	12	Aldehydes, Ketones and carboxylic acids	9	08	√	√		√	08
	13	Amines	6	05				√	05
	14	Biomolecules	7	06	√			√	06
	15	Polymers	5	05				√	05
	16	Chemistry in everyday life	5	04		√ √			04
		Total of Group -III	**47**	**41**					41
		TOTAL	**120**	**105**					

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II – PUC – CHEMISTRY (34)

MODEL QUESTION PAPER - 1

Time: 3 hours 15 minutes **Maximum Marks: 70**

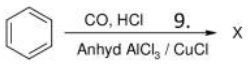
Instructions:

1. The question paper has four parts: A, B, C and D. All parts are compulsory.
2. Write balanced chemical equations and draw labelled diagrams wherever required.
3. Use log tables and the simple calculators if necessary.

(Use of Scientific Calculators is not allowed)

PART- A

I. Answer ALL of the following. (Each questions carries 1 mark) 10 × 1 = 10

1. State Henry's law.
2. What is the conclusion drawn when Vant Hoff's factor of a solution is less than one?
3. How molar conductivity varies with dilution?
4. Mention one criterion for intermolecular collisions of two reactants to be effective.
5. Name the metal that is refined by Van Arkel method.
6. Name the first noble gas compound prepared by Neil Bartlett?
7. Give an example for Heteroleptic complex.
8. Write the IUPAC name for CH_3-$CH(CH_3)$-CH_2Cl.
9. 

Give the name of the product X.
10. Name the storage polysaccharide present in animals.

PART- B

II. Answer Any FIVE of the following. (Each questions carries 2 mark) 5 × 2 = 10

11. a) Give one example for paramagnetic substance.

b) Which type of binding force existing in ice?

12. Write anodic and cathodic half-cell reactions taking place in Daniel cell.
13. Show that for first order reaction $t_{87.5\%} = 3\ t_{50\%}$.
14. What is lanthanide contraction? What is the cause for it?
15. How do you convert bromoethane into tertiary-butylethyl ether? Give the chemical equation of the reaction.
16. What is Stephen's reaction? Give the chemical equation of the reaction.
17. What is the therapeutic action of a) Paracetamol b) Barbituricacid.
18. What are anionic detergents? Give an example.

PART- C

III. Answer Any FIVE of the following. (Each questions carries3 mark) 5 × 3 = 15

19. Explain the extraction of aluminium from purified alumina by Hall-Heroult process. 3
20. Explain manufacture of nitric acid by Ostwald's process. 3

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21. a) How is ozonised oxygen prepared? 2

b) Write the structure of sulphurous acid. 1

22. a) How does phosphorus react with limited amount of chlorine? Give equation. 2

b) What is the product obtained by the reaction between fluorine in excess of bromine? 1

23. a) 3d Transition metals and their compounds are good catalysts. Give two reasons? 2

b) Give the formula for the calculation of spin only magnetic moment. 1

24. Explain the manufacture of Potassium dichromate from chromite ore. 3

25. Using VBT explain, 3

i) Geometry of the complex

ii) Type of hybridization, in the complex ion $[CoF_6]^{3-}$.

iii) Is it an inner or outer orbital complex?

26. a) Draw the structures of cis -trans isomers for $[Pt(NH_3)_2.Cl_2]$. 2

b) How many ions are produced from the aqueous solution of complex $K_3[Al(C_2O_4)_3]$ 1

PART –D

IV. Answer Any THREE of the following. (Each questions carries5 mark) 3 × 5 = 15

27. a) Calculate the packing efficiency in a Face Centered Cubic lattice. 3

b) If a metal with atomic mass 209 crystallizes in a simple cubic lattice what is the edge length of its unit cell. (Given d = 91.5 kg m^{-3}). 2

28. a) 5.8g of a non-volatile solute was dissolved in 100g of carbon disulphide (Molar mass = 76). The vapour pressure of the solution was found to be 190mmHg. Calculate the molecular mass of the solute. The vapour pressure of pure carbon disulphide 195 mm Hg. 3

b) What are azeotropes? Give an example. 2

29. a) The resistance of M/10 solution is found to be 2.5 X 10^3 ohms. Calculate molar conductance (Given Cell constant = 1.15 cm^{-1}). 3

b) Mention two general methods for prevention of corrosion. 2

30. a) Derive an expression for rate constant of a first order reaction. 4

b) What is the effect of positive catalyst on energy of activation? 1

31. a) Mention two factors which affect adsorption of a gas on a solid. 2

b) Is synthesis of ammonia by Haber's process, a homogeneous or heterogeneous catalysis? 1

c) State Hardy-Schulze rule. Among $Al_2(SO_4)_3$ and $(NH_4)_3PO_4$ which is better coagulating agent for a negative sol ? 2

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V. Answer ANY FOUR of the following. (Each questions carries 5 mark) 4 × 5 = 20

32. a) Complete the following reaction and write its name

$2C_6H_5Cl + 2Na \xrightarrow{\text{Dry ether}} ? + 2NaCl$ 2

b) Explain Zaitsev rule with an example. 2

c) A Haloalkane when boiled with aqueous KOH which gives an alcohol having inversed configuration. Name the mechanism involved in this reaction. 1

33. a) Explain the mechanism involved in the conversion of ethanol into ethene. 3

b) An organic compound with molecular formula C_6H_6O gives white precipitate with bromine water. Identify the functional group in the organic compound and write the chemical equation for the reaction.

34. a) Explain Cannizaro's reaction with an example. 2

b) Name the product obtained by the reaction of acetyl chloride with dimethylcadmium. 1

c) Explain the reaction between carboxylic acid and PCl_5. 2

35. a)Explain carbylamine reaction by taking methyl amine as an example. 2

b) Why do primary amine have higher boiling point than tertiary amines? 1

c) Give an example for a coupling reaction of diazonium salt and give its chemical equation. 2

36. a) Deficiency of which vitamin leads to night blindness? 1

b) Which hormone is responsible for the hyperthyroidism? 1

c) What is a Zwitter ion of an amino acid? Give its general formula. 2

d) What is a nucleotide? 1

37. a) What are Elastomers? Give example. 2

b) Write the partial structure of nylon 6, 6 and Bakelite. 2

c) What is vulcanization of rubber? 1

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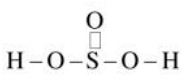
II – PUC – CHEMISTRY (34)

SCHEME OF VALUATION FOR MODEL QUESTION PAPER – 1

Note: Any other correct alternate answer can be honoured wherever applicable.

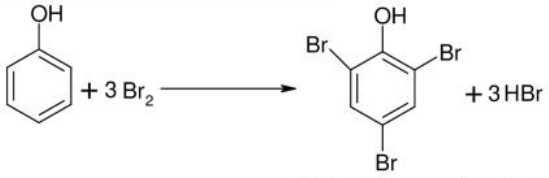
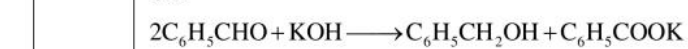
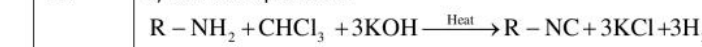
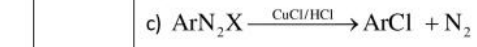
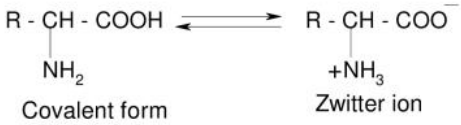
I.	PART - A	Marks
1.	Henry's law states that "the partial pressure of the gas in vapour phase is proportional to the mole fraction of the gas in the solution." OR "The mole fraction of the gas in the solution is proportional to the partial pressure of the gas over the solution.	1
2.	The solute in the solution undergoes association. OR ΔT_b or ΔT_f will be half of the normal value and molar mass will be twice the expected value.	1
3.	It increases with dilution	1
4.	Proper orientation of molecules. or Energy of activation of the molecules.	1
5.	Zirconium OR Zr OR Titanium OR Ti	1
6.	Xenonhexafluroplatinate(IV)	1
7.	$[Co(NH_3)_4\ CO_3]\ Cl$ OR any suitable example	1
8.	1-Chloro-2-methylpropane	1
9.	Benzaldehyde	1
10.	Glycogen	1
II.	PART -B	
11.	a) O_2 OR Compounds of Cu^{+2} OR Fe^{+3} OR Cr^{+3} OR any suitable example.	1
	b) Hydrogen bonding	1
12.	$\text{At anodic}: Zn_{(s)} \longrightarrow Zn^{+2} + 2e^-$ $\text{At Cathodic}: Cu^{2+} + 2e^- \longrightarrow Cu_{(s)}$	1 1

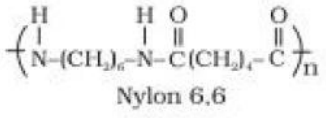
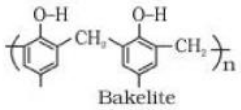
13.	Expression of k when 87.5% of react an t is reacted $k = \frac{2.303}{t_{87.5\%}} \log \frac{100}{12.5}$ $k = \frac{2.303}{t_{87.5\%}} x\, 0.9031 ---(1)$ Expression of k when 50% of react an t is reacted $k = \frac{2.303}{t_{50\%}} \log \frac{100}{50}$ $k = \frac{2.303}{t_{50\%}} x\, 0.3010 ---(2)$ $K = \text{Equation (1)} / \text{Equation (2)}$ $t_{87.5\%} = t_{50\%}$	**1** **1**
14.	The overall decrease in atomic and ionic radii from Lanthanum to Lutetium is known as Lanthanide Contraction. It causes radii of 3rd transition series to be very similar with those of the corresponding members of second transition series.	**1** **1**
15.	$C_2H_5Br + (CH_3)_3C\text{-}O\text{-}Na \rightarrow (CH_3)_3C\text{-}O\text{-}C_2H_5 + NaBr$ Explanation	**1** **1**
16.	$RCN + SnCl_2 + HCl \rightarrow RCH = NH$ $\xrightarrow[H]{RCHO}$ Explanation	**1** **1**
17.	a) Decreases body temperature during fever b) Tranquilizer	**1** **1**
18.	The sodium salts of sulphonated long chain alcohols or hydrocarbons are called anionic detergents. Example: Sodium lauryl Sulphate	**1** **1**
III.	**PART – C**	
19.	Diagram At cathode: $\mathbf{Al^{3+}_{(Molten)} + 3e^- \rightarrow Al_{(l)}}$ At anode: $\mathbf{C_{(S)} + O^{2-} \rightarrow CO_{(g)} + 2e^-}$ **or** $\mathbf{C_{(S)} + 2O^{2-} \rightarrow CO_{2(g)} + 4e^-}$	**1** **1** **1**
20.	Catalytic oxidation of ammonia by atmospheric oxygen. $4NH_{3(g)} + 5O_{2(g)} \xrightarrow{\text{[illegible]}} 4NO_{(g)} + 6H_2O_{(g)}$ Nitiric oxide oxidises into nitrogen dioxide $2NO_{(g)} + O_{2(g)} \rightarrow 2NO_{2(g)}$ Nitrogen dioxide dissolves in water to give nitric acid $3NO_{2(g)} + H_2O_{(l)} \rightarrow 2HNO_{3(aq)} + NO_{(g)}$	**1** **1** **1**
21.	a) Explanation $3O_2 \xrightarrow{\text{[illegible]}} 2O_3$ b) $H-O-\overset{\overset{O}{\square}}{S}-O-H$	**1** **1** **1**
22.	a) Explanation $P_4 + 6\, Cl_2 \rightarrow 4PCl_3$ b) BrF_5	**1** **1** **1**



23.	a) 1) Large surface area, 2) Variable valence b) $\mu = \sqrt{n(n+2)}$	**1** **1** **1**
24.	Explanation with $4\ FeCr_2O_4 + 8\ Na_2CO_3 + 7\ O_2 \rightarrow 8\ Na_2CrO_4 + 2\ Fe_2O_3 + 8\ CO_2$ $2Na_2CrO_4 + 2\ H^+ \rightarrow Na_2Cr_2O_7 + 2\ Na^+ + H_2O$ $Na_2Cr_2O_7 + 2\ KCl \rightarrow K_2Cr_2O_7 + 2\ NaCl$	 **1** **1** **1**
25.	Geometry:- Octahedral Hybridisation:- sp^3d^2 Type of complex:- Outer orbital complex	**1** **1** **1**
26.	a) structure of isomers b) 4 ions	**1 + 1** **1**
IV.		
27.	a) Packing efficiency = [illegible] $= \frac{4x\frac{4}{3}\ r^3 x\ 100\%}{a^3}$ edge length $a = 2\sqrt{2}\,r$ $= \frac{[illegible]}{[illegible]} = 74\%$ b) $a^3 = \frac{Z.M}{N_A.d}$ $= \frac{1x209}{6.023x10^{23}x91.5x10^{-3}}$ $= 3.359x10^{-6}\,cm$	**1** **1** **1** **1** **1**
28.	a) $\frac{P^0 - P}{P^0} = \frac{w.M}{m\,W}$ $\frac{195-190}{195} = \frac{5.8x76}{m\,x100}$ $m = \frac{5.8x76x195}{100x5}$ $= 171.9\,g\,mol^{-1}$ b) A solution which distils over without change in composition Example: 95.6% ethanol + 4.4 % water OR any other suitable example.	**1** **1** **1** **1** **1**

29	a) $k = \frac{l}{A} x \frac{l}{R}$ $= 1.15 x \frac{1}{2.5 x 10^3}$ $= 4.60 x 10^{-4}\ ohm^{-1}cm^{-1}$ $\Lambda_m = \frac{1000 x k}{M}$ $= \frac{1000 x 4.60 x 10^{-4}}{0.1}$ $= 4.60\ ohm^{-1}cm^2\ mol^{-1}$ b) i) painting ii) Electrochemical method Or any other suitable method	**1** **1** **1** **1** **1**
30	a) Consider a first order reaction $R \rightarrow P$ $Rate = -\frac{d[R]}{dt} = k[R]$ $\frac{d[R]}{[R]} = -k\,dt$ Integrating the above equation we get $\ln[R] = -k\,t + I \quad .....(1)$ When t =0 , [R] = $[R]_0$ Equation (1) becomes $\ln[R]_0 = I$ Therefore equation (1) becomes $\ln[R] = -k\,t + \ln[R]_0$ $k = \frac{1}{t} \ln \frac{[R]_0}{[R]}$ $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ b) Energy of activation decreases	**1** **1** **1** **1** **1**
V.		
31	a) i) Surface area of adsorbent ii) Nature of adsorbent or adsorbate or any suitable factor b) Heterogeneous Catalysis c) Greater the valency of the flocculating ion added, greater is its power to cause precipitation $Al_2(SO_4)_3$	**2** **1** **1** **1**
32	 or Biphenyl Fittig reaction	**1** **1** **1**

	b) In dehydrohalogenation reaction the preferred product is that alkene which has the greater number of alkyl groups attached to the doubly bonded carbon atom  c) S_N2	1 1
33.	a) Step: 1 : Formation of protanated alcohol Equation Step 2: Formation of Carbocation Equation Step 3: Elimination of proton and formation of alkene Equation b) The organic compound is phenol  2,4,6 - tribromophenol	 1 1 1 1 1
34	a) Statement  OR  b) Acetone c) Explanation R-COOH + PCl_5 → R-COCl + $POCl_3$ + HCl	1 1 1 1 1
35.	a) Correct Explanation  b) Due to intermolecular association OR more hydrogen bonding c)  Explanation	1 1 1 1 1
36.	a) Vitamin A b) Thyroxin c) The amino acid forms dipolar ion called Zwitter ion in the aqueous solution.  Covalent form Zwitter ion d) Basic unit of nucleic acid containing one sugar unit ,heterocyclic base and phosphoric acid is called nucleotide	1 1 1 1 1
37.	*a) The polymers that have elasticity, like rubber in which polymer chains are held together by the weakest intermolecular forces are referred to as elastomers.* Example: natural rubber, neoprene, vulcanized rubber. b) Nylon:	1 1

	 Nylon 6,6	**1**
	Bakelite :	**1**
	 Bakelite	**1**
	c) Rubber when heated with sulphur with an appropriate additive to a temperature of 373K to 415K	