ATUL VIDYALAYA
FIRST PRELIMINARY EXAMINATION 2012-13

CHEMISTRY
Paper – 1
1(THEORY)

STD- XII **MM-:70**
DATE- **TIME-:3HRS**
SESSION - I

(*Candidates are allowed additional 15 minutes for only reading the paper. They must NOT start writing during this time*)

Answer* all *questions in Part I and six questions from Part II, choosing* two *questions from Section A, two from Section B and two from Section C.All working, including rough work, should be done on the same sheet as, and adjacent to, the rest of the answer. The intended marks for questions or parts of questions are given in brackets [ ].Balanced equations must be given wherever possible and diagrams where they are helpful. When solving numerical problems, all essential working must be shown. In working out problems use the following data: Gas Constant R = 1.987 cal deg-1 mol-1 = 8.314 JK-1 mol-1 = 0.0821 dm3 atm K-1mol-11 l atm = 1 dm3 atm = 101.3 J. 1 Farday = 96500 Coulombs.

PART – I

(ANSWER ALL QUESTIONS)

Question 1

(a) Fill in the blanks choosing from the following: [5]

(Insulating,conducting,acid,dyes,soluble,molarity,natural,lonepair,synthetic,greater,immiscible,depend,zero,fractional,miscible,first,ratio,mole fraction of solvent,second,basic)

i) On the basis of their origin, polymers are classified as _____ and _____.

ii) Ethers behave as weakly _____ substances because of the presence of _____ of electrons on the oxygen atom.

iii) The _____ of the number of solvent moles to the total number of moles of solute and solvent is called _____.

iv) The half-life period of _____ order reactions do not _____ on the concentration of reactants.

v) For a substance to be separated by _____ distillation it should be _____ with water.

(b) i) The reaction $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$ is feasible. How is that hydrogen and oxygen mixture allowed to stand at room temperature show no formation of water at all?

ii) One gram atom of an element weighs 24.045g.What is the weight of an atom of the element? If its atomic number is 12, how many neutrons are present in the element?

iii) What kind of hybridization takes place in a carbon atom when pi-bonding takes place?

iv) The weight of solutes present in two isotonic solutions A and B are in the ratio 2:3.If the solutes are non electrolytes, how are their molecular weights related?

v) Compare crystals of copper and diamond and indicate one similarity and one difference. [5]

(c) i) What kinds of isomerism, if any, do the compounds $CH_3CH=CH_2$ and $CH_3CH=CHCl$ exhibit? [5]

ii) Write the structure of monochloro acetic acid. Is it stronger or weaker than acetic acid? Why?

iii) Dipole moments of aldehydes and ketone are higher than that of alcohols.Why?

iv) What is the reaction taking place when chlorine is bubbled through benzene in presence of iodine? What is the reaction if, instead of adding iodine, the reaction mixture is exposed to sunlight?

v) What happens when sodium hydroxide is heated to 150^0C with carbon monoxide under a pressure of 50 atmosphere? What happens to the resultant compound if heated to 400^0C?

(d) (i) In body centered and face centered arrangements of atoms of an element, what will be the number of atoms present in the representative unit cells? [5]

(ii) At room temperature, in what physical states do fluorine, bromine and iodine exist?

iii) Express the relationship between molar conductivity and specific conductivity of a solution. What is the unit of molar conductivity?

iv) The heat absorbed by a gas at 27^0C during an isothermal reversible expansion is 2400 Joules. What is the entropy change of the gas?

v) Write the balanced chemical equation for the reaction of ethyl isocyanate with alkali and name the organic compound formed?

PART II

(Answer six questions choosing two from Section A, two from Section B and two from Section C)

SECTION A

(Answer any two questions)

Question 2 [3]

a) i) Calculate the work done in joules when 5 moles of an ideal gas at 270C expands isothermally and reversibly from 10 atm to 1 atm.What will be the work done if expansion is against a constant pressure of 1 atm?

ii) If the vapour pressure of pure water is 40 mm Hg under the same conditions, what will be the vapour pressure of an aqueous solution of glucose containing 0.05 mole fraction of glucose?

iii) Explain how fluorine is prepared by the electrolysis of potassium hydrogen fluoride.

b) i) What is the freezing point in degree centigrade of a solution containing 3.42 gm sucrose ($C_{11}H_{22}O_{11}$) dissolved in 1000 gm, of water? The molal freezing point constant of water is 1.86 per mole per kg. [4]

ii) Name the laws or principles obeyed in the following cases:

a) The solubility if a gas increases with increase in temperature.

b) The dissociation of a weak electrolyte in aqueous solution decreases with increase in concentration.

c) The mole fraction of the non volatile solute determines the vapour pressure of the solution.

Question 3 [4]

a) 20 cc of a solution of sulphuric acid neutralize 21.2 cc of a 3% solution of sodium carbonate? How would you reduce the strength [3]

b) i) The dissociation constant of carbonic acid is 4.31 X 10 -7 and the solubility product of silver carbonate is 6.15 X 10-12.What will happen to the concentration of hydrogen ions in a 0.05 molar carbonic acid solution and also its pH if 10-12 mole of silver nitrate powder is added to the solution which is a mixture of carbonic acid and silver carbonater?Why? [4]

ii) A galvanic cell is constructed using two divalent metals A and B and electrolyte solutions' containing equal concentration of reversible ions.It is observed that the current flows from B to A. Which metal has the highest reduction potential?

c) At S.T.P 2.8 Litres of oxygen were mixed with 19.6 litres of nitrogen.Calculate the Increase in entropy. [2]

Question 4

a) i) Why does water have a dipole moment while carbon dioxide and p- Dichlorobenzene does not?
ii) Explain why transition metals form many co-ordination complexes.

b) i) State three ways to increase the rate of a reaction.

ii) A small quantity of sparingly soluble calcium oxalate (k_{sp} = 1.75 X 10^{-9}) suspended in pure water dissolves on the addition of dilute hydrochloric acid. Explain why?

c) i)Calculate the e.m.f at 298 K of the cell of

$Zn/ZnSO_4$ (aq) (0.01M) II KCl (0.1 M),Hg_2Cl_2 (s)/Hg

Given the potential of the calomel electrode is 0.242 V and the standard potential of the zinc electrode is – 0.763 V.

ii) Name one method of measuring the concentration of a solution which is not temperature dependent.

SECTION B
Answer any* two *questions

Question 5

Indicate the steps involved in the extraction of potassium permanganate from pyrolusite ore.

Question 6

Draw the structures of enantiomers of optical isomers of

i) [Cr(OX)3]-3

ii) [PtCl2(en)2]+2

iii) [CrCl2(en)(NH3)2]+

Question 7

Complete and balance the following equations:

i) $KMnO_4 + H_2SO_4 \rightarrow$ _____ + _____ +_____

ii) $K_2Cr_2O_7 + KOH \rightarrow$ _____ + _____

iii) NH_3 (Excess) + $Cl_2 \rightarrow$ _____ +_____

SECTION C

(Answer any two questions)

Question 8

(a) How can the following conversions be brought about?
(i) Methyl amine to ethylamine. [2]
(ii) Propanol to isopropyl alcohol. [2]
(iii) Acetaldehyde to Acetone. [2]

(b) Name the organic compounds which have the same molecular formula C_2H_6O.
Write the reactions of these two compounds with PCl_5 . [3]
(c) An alkyl halide having the molecular formula C_4H_9Cl is optically active. What is its Structural formula. [1]

Question 9

a) A compound X which reduces Fehling's solution, on oxidation with acidified potassium permanganate, formed a compound Y having the same number of carbon atoms as X which reacted with aqueous sodium carbonate generating carbon dioxide.Y on reaction with ethanol in presence of concentrated sulphuric acid formed a pleasant smelling compound Z of molecular mass 88.Identify the compounds X, Y, and Z by name. Explain how you identified Z.What is the compound that is isomeric with Z and has similar properties. [4]

b) Write the following naming reactions [2]

i) Friedel craft's reaction
ii) Aldol condensation

c) Give one good chemical test to distinguish between the following pairs of compounds:
(i) Benzoic acid and phenol.
(ii) Formaldehyde and Acetaldehyde.

Question 10

a) A compound A with molecular formula C4H100 on oxidation forms compound B.The compound B gives positive iodoform test. Compound B on reaction with CH_3MgBr followed by hydrolysis gives C.Identify A, B and C and give the sequence of reaction.

b)

i) Name the product obtained when ethyl cyanide is treated with

a) Alkaline hydrogen peroxide

b) Dil.hydrochloric acid

ii) Write the structures of possible isomers represented by the molecular formula C_3H_6O.

c) Aniline is converted into acetanilide before nitration.Explain.

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