

Preliminary Examination February 2016

Class: XII

Subject: Chemistry

Time: 3 Hrs

SET A

Max Marks: 70

General Instructions:

- All questions are compulsory.
- Questions 1 to 5 are very short answer type carrying 1 mark each. Answer them in one sentence each.
- Questions 6 to 10 are short answer type carrying 2 marks each. Answer them in about 30 words each.
- Questions 11 to 22 are also short answer type carrying 3 marks each. Answer them in about 40 words each.
- Question 23 is value based question carrying 4 marks. Answer it in about 50 words.
- Questions 24, 25 & 26 are long answer type carrying 5 marks each. Answer them in about 70 words each.
- Calculators are not permitted. Use log tables if necessary.

- What is meant by 'Forbidden Zone' in reference to band theory of solids? 1
- Write the dispersed phase and dispersion medium in milk. 1
- Which out of CH_3Cl and CH_3I is more reactive in $\text{S}_{\text{N}}2$ hydrolysis and why? 1
- Write IUPAC name: 1
 $\text{CH}_3 - \text{O} - \text{CH}_2\text{CH}_2\text{CH}_2 - \text{O} - \text{C}_2\text{H}_5$
- How can you prepare Orange dye from Aniline? 1
- (i) Arrange in the increasing order of boiling points in their 1M aqueous solutions: 2
 CaCl_2 , Glucose, NaCl
 (ii) State Henry's law for dissolution of gas in a liquid.
- Show that for a first order reaction, the time taken for 99% completion will be twice the time taken for 90% completion. 2
- A blackish solid A when fused with alkali metal hydroxide in air produces green compound B which on electrolytic oxidation in alkaline medium gives purple coloured oxidizing agent C. Identify A, B and C. What happens if B is acidified? 2
 OR
 (i) Complete the following to obtain balanced reaction:
 $\text{Cr}_2\text{O}_7^{2-} + \text{I}^- + \text{H}^+ \longrightarrow$
 (ii) Why is Cr^{2+} reducing while Mn^{3+} oxidizing when both have d^4 configuration?
- Define the following, giving one example in each case: 2
 (i) Zwitter ion (ii) Glycosidic linkage
- (i) What happens to the structure and property of a protein during its denaturation? 2
 (ii) Draw the anomers of D Glucose.
- (a) Iron has bcc unit cell with a cell edge of 286.6 pm. The density of iron is 7.87g cm^{-3} . 3
 Calculate value of Avogadro's constant. At mass of iron is 56 g mol^{-1} .
 (b) How many octahedral and tetrahedral voids are present in a crystalline solid containing N atoms?

- 12 100 mg of a protein is dissolved in just enough water to make 10.0 ml of solution. If this solution has an osmotic pressure of 13.3 mm Hg at 298K, what is the molar mass of the protein? $R = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1}$ 3
- 13 (i) Name the common elements present in the anode mud in electrolytic refining of copper. Why are they so present? 3
(ii) What is the role of NaCN in froth floatation purification of PbS containing ZnS?
(iii) Why lime stone and coke are introduced into blast furnace along with Haematite during iron extraction?
- 14 For a certain reaction variation in the concentration $\ln [R]$ vs time plot is given below. 3



- (a) What is the order of the reaction? (b) What is the unit of rate constant k ?
(c) Give relationship between k and $t_{1/2}$ (half life period). (d) What does slope of the above line indicate? (e) Draw the plot $\log [R]_0 / [R]$ versus time t (s).
- 15 (i) Draw shape of H_3PO_2 . Why it is monoprotic? How does it react with AgNO_3 solution? 3
(ii) Why do noble gases have very low boiling points?
- 16 (i) How is the variability in oxidation states of transition metals different from that of the non transition metals? 3
(ii) Write the composition and one use of 'Mischmetall'.
(iii) Why transition metals possess high enthalpies of atomization?
- 17 (i) Compute the magnetic moments of $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ and $[\text{Mn}(\text{CN})_6]^{4-}$ ions. 3
(ii) Why $[\text{NiCl}_4]^{2-}$ is paramagnetic while $[\text{Ni}(\text{CO})_4]$ is diamagnetic though both are tetrahedral?
(iii) Write two uses of the chelating ligand EDTA^{4-} .
- 18 (i) Write one test to distinguish between propan - 2- ol and 2- methyl propan - 2- ol. 3
(ii) Starting with phenol, how can you prepare (a) Aspirin (b) Anisole?

OR

- (a) Write mechanism of acid catalyzed dehydration of ethanol to yield ethene.
(b) Arrange the following in the increasing order of boiling points:
Pentan-1-ol, n- butane, pentanal, ethoxy ethane
- 19 Give reasons: 3
(i) Chlorobenzene can not be nitrated as easily as benzene.
(ii) Neopentyl chloride $(\text{CH}_3)_3\text{CCH}_2\text{Cl}$ does not follow $\text{S}_{\text{N}}2$ mechanism.
(iii) Grignard reagent should be prepared under anhydrous conditions.

- 20 (a) Explain the following with an example each: 3
(i) Carbylamine Reaction (ii) Hoffman Bromamide Degradation
(b) Arrange in the increasing order of basic strength in aqueous solution and justify:
 CH_3NH_2 , $(\text{CH}_3)_2\text{NH}$, $(\text{CH}_3)_3\text{N}$
- 21 Explain the following: 3
(i) Tyndall Effect (ii) Peptization (iii) Freundlich adsorption isotherm
- 22 (a) Why Sucralose is a better sweetener than aspartame and alitame? 3
(b) Write the use of the following in everyday life?
(i) Tincture of iodine (ii) BHT (iii) Tetracycline (v) Equanil
- 23 Indian farmers growing rubber plants suffer due to high production cost and 4
decreasing price of produced rubber. Natural rubber is made from plant material which
does not degrade the environment. The most significant hazards of Synthetic rubber
are the amount of carbon dioxide and other undesirable emissions and it requires over
10 times as much energy to produce as natural rubber.
a) Write the name and structure of monomer of natural rubber.
b) What is responsible for elastic property of natural rubber?
c) What happens to its structure when natural rubber is vulcanized?
d) What are the values associated with using natural rubber over synthetic rubber?
- 24 (i) Arrange the following in the increasing order of property indicated with justification: 5
 F_2 , Cl_2 , Br_2 , I_2 - Bond enthalpy
(ii) Complete the following:
(a) $\text{U} + \text{ClF}_3 \longrightarrow$
(iii) Write the optimum conditions to maximize yield in 'Contact Process' for
manufacture of sulphuric acid.
(iv) An aqueous solution of a gas (X) shows the following reactions :
(a) It turns red litmus blue. (b) When added in excess to CuSO_4 solution, a deep blue
colour is developed. Identify (X) and give equation for the reaction involved.
- OR
- (a) Arrange the following in the increasing order of property indicated:
 NH_3 , PH_3 , AsH_3 , SbH_3 , BiH_3 - Reducing Power
(b) Complete the following: $\text{I}_2 + \text{Cl}_2 + \text{H}_2\text{O} \longrightarrow$
(c) Draw the shape of noble gas species which is iso-structural with:
(i) IBr_2^- (ii) BrO_3^-
(d) Give Reasons:
(i) IF_7 is known to exist whereas ClF_7 is unknown.
(ii) Both the Oxygen - Oxygen bonds in ozone have equal bond length.

- 25 (a) Illustrate Cross Aldol Condensation reaction.
- (b) Why ethanoic acid has higher boiling point than propanol?
- (c) An organic compound, having molecular mass 86 g/mol, contains 69.77% carbon, 11.63% hydrogen and rest oxygen. It does not reduce Tollen's Reagent but forms an addition compound with sodium hydrogen sulphite and give positive iodoform test. On vigorous oxidation it gives ethanoic and propanoic acid. Write possible structure and IUPAC name of the compound. Write reactions involved.

OR

- (i) Illustrate Etard's Reaction.
- (ii) Why is acetic acid stronger than phenol but weaker than formic acid?
- (iii) Arrange in increasing order of their reactivity in nucleophilic addition reaction:
Benzaldehyde, p-tolualdehyde, p- nitro benzaldehyde, Acetophenone
- (iv) How does cyclohexane carbaldehyde react with Tollens' Reagent?
- (v) Complete:



- 26 (i) Write the products obtained at cathode and anode when copper (II) sulphate is electrolysed between copper electrodes.
- (ii) Starting with Nernst equation, obtain an expression for the equilibrium constant for a cell which operates at 298K.
- (iii) At 291 K, the limiting molar conductivities of NH_4Cl , NaOH and Na Cl are 129.8, 217.4 and 108.9 $\text{S cm}^2 \text{mol}^{-1}$ respectively. If molar conductivity of 0.01M solution of ammonium hydroxide is 9.330 $\text{S cm}^2 \text{mol}^{-1}$, find the degree of dissociation and dissociation constant of NH_4OH .

OR

- (i) Draw a well labelled diagram to show the variation of molar conductivity with concentration change for strong and weak electrolytes by taking examples.
- (ii) Name the anode, cathode and electrolyte used in mercury cell and write the electrode reactions.
- (iii) Silver is electrodeposited on a metallic vessel of total surface area 900 cm^2 by passing 0.50 A for 2 hours. Calculate the amount of silver deposited and thickness if density of silver is 10.5g cm^{-3} , Atomic mass of Ag 108 g/mol.

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