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COMMON PRE-BOARD PAPER – III, CHENNAI REGION

SUBJECT: CHEMISTRY

MAX MARKS - 70

GENERAL INSTUCTIONS

1. ALL QUESTIONS ARE COMPULSORY

2. MARKS FOR EACH QUESTION ARE INDICATED AGAINST IT.

3. QUESTIONS FROM I TO 8 ARE VERY SHORT ANSWER QUESTIONS AND CARRY 1 MARK EACH

4. QUESTIONS FROM 9 TO 18 ARE SHORT- ANSWER QUESTIONS AND CARRY 2 MARKS EACH.

5. QUESTIONS FROM 19 TO 27 CARRY ARE ALSO SHORT ANSWER QUESTIONS AND CARRY THREE 3 MARKS EACH.

6. QUESTIONS 28 T0 30 ARE LONG ANSWER QUESTIONS AND CARRY 5 MARK EACH

7. USE LOG TABLES, IF NECESSARY USE OF CALCULATORS IS NOT ALLOWED.

1. Name one solid which shows both Frenkel and Schottky defect.

2. Which structure in a protein is unaffected during denaturation.

3. How will you convert But- 2 - ene to ethanal.

4. Write a balanced equation for complete hydrolysis of PCl_5

5. A reaction has rate constant 3.5×10^{-5} mol l^{-1} s^{-1}. What is its order?

6. Give the expression for the half life of a first order reaction.

7. Though polar, Haloalkanes are insoluble in water. Why?

8. Why do alkali halides, heated in alkali vapour give out colours?

9. Critical temperatures of N_2, CO, CH_4 are 126, 134, and 190 K, respectively. Arrange them in increasing order of adsorption on the surface of charcoal. Give reason.

10. In Chromium (iii) chloride, chloride forms the ccp, and chromium ions occupy octahedral voids.,What fraction of octahedral voids are occupied . What is the fraction of total voids occupied?

11. Which will have greater molar conductivity and why?

a) 1 mole of KCl dissolved in 200ml of the solution

b) 1 mole of KCl dissolved in 500 ml of the solution.

(OR)

a) Distinguish between specific conductivity amd molar conductivity. Give the units

12.a) Write the structure of 2- methoxy acetophenone

b) $CH_3CH_2(OH)CH_2CH_2COOH$

13. Give reasons

a) H_3PO_3 and H_3PO_2 are good reducing agents, but not H_3PO_4.

b) On adding ozone gas to KI solution, violet colour is obtained.

14.Give reason

a) Cu(1) compounds are unstable in solution

b) Orange colour of $K_2Cr_2O_7$ turns yellow on adding NaOH.

15. How will you convert

a) Benzoic acid to Aniline

b) Aniline to Phenylisocyanide

16. Give reasons

a) Gabriel phthalimide synthesis cannot be used for preparation of aromatic primary amines.

b)pK_b of aliphatic amines is lower than aromatic amines.

17. How will you chemically distinguish

a) Acetaldehyde and Benzaldehyde

b) Ethanoic acid and Methanoic acid

18. A colloidal solution of AgI is prepared by two different methods A) by adding $AgNO_3$ solution to excess KI solution B) By adding KI solution to excess $AgNO_3$ solution. Explain the charge on the AgI colloidal particles in the two cases.

19 A cell is set up with the following notation Al/ Al^{3+}(.0001M) // Ni^{2+}(.5M)/Ni calculate cell potential if the standard EMF is 1.41 V

20. a) Why do tetrahedral complexes not show geometrical isomerism?

b) A metal ion M^{n+} has d^4 configuration . It combines with three didentate ligands to form complexes. Assuming $\Delta_o > P$, draw the diagram showing the splitting of d orbitals during this complex formation and write the electronic configuration of the metal ion in terms of e_g and t_{2g}.

21..Explain

a) Aqueous NaCl cannot be used for isolation of sodium by electrolysis

b) reduction of metal oxides is easier if the metal is formed in the liquid state at the temperature of reduction.

c)carbon is a better reducing agent than CO for the reduction of ZnO

22.Arrange according to property mentioned and give reason

a)1,2 dichlorobenzene, 1,3 dichlorobenzene, 1,4dichlorobenzene – melting point

b) Four isomeric bromobutanes - reactivity to SN2 mechanism

c)CH_3CH_2Br, CH_3CH_2I

23. Explain with an example

a) tranquilisers

b) anti- oxidant

c) artificial sweetner

24. Satya finds his neighborhood littered with polythene wrappers and the dustbins overflowing with them. He decides to sensitise the people of his locality towards the hazards of polythene.

a) Suggest two steps that you would have taken, if you were Satya.

b) Give two harmful effects of using polythene.

c) What values is Satya trying to promote?

25. a) Name a monosaccharide with D configuration which is laevorotatory.

b) Which forces are responsible for the stability of Alpha helical structure of proteins.

c)On hydrolysis of an RNA strand, there is no relationship between the number of nitrogen bases formed. What can you conclude about the structure of RNA from this?

(OR)

a)Name the linkage in Nucleic acids

b) Give the structural differences between starch and cellulose

c) Give one example each of globular and fibrous proteins (1+1+1)

26.a compare the lanthanides and actinides with respect to contraction and oxidation states.

b) What is Misch metal . Give 1 use . (2+1)

27 .Find the ratio of $t_{3/4}$ and $t_{1/2}$ for a first order reaction.

28.a) Define colligative properties. Which of the colligative properties is the best to measure molarmasses of biomolecules. Why?

b) What mass of urea needs to be dissolved in 100 g of water in order to decrease the vapour pressure by 25%. . What will be the molality of the solution? (2+3)

(OR)

a)Derive the relationship between relative lowering of vapour pressure and mole fraction of the solute.

b) Calculate a) molality b) moarity of KI solution which is 20% (w/w), if its density is 1.202 g/cc (2+3)

29. An element ‘A’ exists as a yellow solid . It forms a volatile hydride B, which has a foul smell and is used extensively in salt analysis. When treated with oxygen, it forms ‘C’, which is a colorless pungent smelling gas..This gas when passed through acidified $KMnO_4$ solution, decolorizes it. ‘C’ gets oxidized to another oxide ‘D’ in the presence of a heterogenous catalyst. Identify A, B, C, D and write the reactions involved. (½ + ½ + ½+ ½ +1+1+1)

(OR)

A) Write equations for the following

1) Action of heat on H_3PO_3

2) Reaction of fluorine with water

3) Reaction of ClF_3 with water

B) Give the shapes of the following molecules a) SF_4 b) XeF_4 (3+2)

30. Write short notes on

A) 1) Aldol condensation

2) Clemmensons reduction

3) Rosenmunds reduction

B) Write the mechanism of dehydration of ethanol at 443 K (3+2)

(OR)

A) Write short notes on a) Kolbes reaction

b) Williamsons synthesis

B) An unknown aldehyde ‘A’ on reacting with alkali gives a beta – hydroxyl aldehyde, which loses water to give an unsaturated aldehyde But-2-enal. Another aldehyde ‘B’ undergoes disproportionation in the presence of concentrated alkali to form C and D. C is an alcohol with formula C7H8O. Identify A and B. Write the equations involved.. Give the product formed when ‘A’ reacts with Zn/ Hg ana HCl. (2+3)