

CHEMISTRY FOR IIT-JEE

Conducted By:

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CHEMISTRY SAMPLE PAPER-III

CLASS - XII

Time : Three Hours

Max. Marks : 70

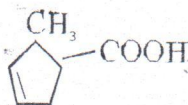
General Instructions

1. All questions are compulsory.
2. Question nos. 1 to 8 are very short answer questions and carry 1 mark each.
3. Question nos. 9 to 18 are short answer questions and carry 2 marks each.
4. Question nos. 19 to 27 are also short answer questions and carry 3 marks each.
5. Question nos. 28 to 30 are long answer questions and carry 5 marks each.
6. Use log tables if necessary, use of calculators is not allowed.

1. Name the type of point defect that occurs in a crystal of zinc sulphide. 1

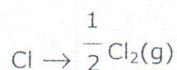
2. The decomposition reaction of ammonia gas on platinum surface has a rate constant $k = 2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$. What is the order of the reaction? 1

3. Give the IUPAC name of the following compound 1



4. How many octahedral voids are there in 1 mole of a compound having cubic close packed structure? 1

5. What is the molecularity of the reaction? 1

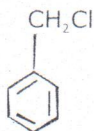


6. In each of the following pairs of organic compounds, identify the compound which will undergo SN^1 reaction faster? 1

(a)



(b)

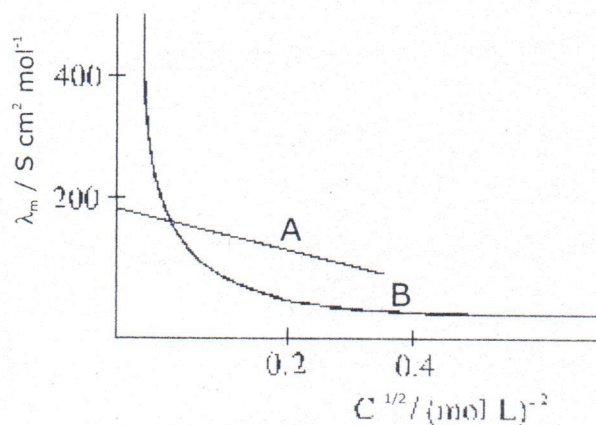


7. In the ring test for identification of nitrate ion, what is the formula of the compound responsible for the brown ring formed at the interface of two liquids? 1

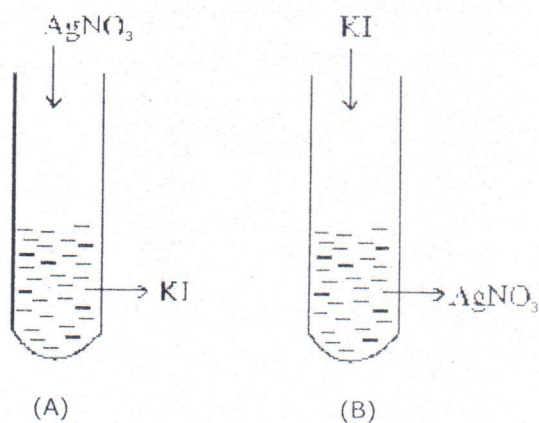
8. Except for vitamin B_{12} , all other vitamins of group B, should be supplied regularly in diet. Why? 1

9. An element E crystallizes in body centred cubic structure. If the edge length of the cell is $1.469 \times 10^{-10} \text{ m}$ and the density is 19.3 g cm^{-3} , calculate the atomic mass of this element. Also calculate the radius of an atom of this element. 2

10. The following curve is obtained when molar conductivity λ_m (y-axis) is plotted against the square root of concentration $C^{1/2}$ (x-axis) for two electrolytes A and B.



- (a) What can you say about the nature of the two electrolytes A and B?
- (b) How do you account for the increase in molar conductivity λ_m for the electrolytes A and B on dilution? 2
11. (a) Adsorption of a gas on the surface of solid is generally accompanied by a decrease in entropy. Still it is a spontaneous process. Explain.
- (b) How does an increase in temperature affect both physical as well as chemical adsorption? 2
12. A colloidal solution of AgI is prepared by two different methods shown below:-



- (i) What is the charge of AgI colloidal particles in the two test tubes (A) and (B)?
- (ii) Give reasons for the origin of charge. 2
13. (a) What is the covalence of nitrogen in N₂O₅?
- (b) Explain why both N and Bi do not form pentahalides while phosphorus does. 2

OR

When conc. H_2SO_4 was added into an unknown salt present in a test tube, a brown gas (A) was evolved. This gas intensified when copper turnings were also added into this test-tube. On cooling, the gas (A) changed into a colourless gas (B).

- (a) Identify the gases A and B.
(b) Write the equations for the reactions involved.

14. Which is a stronger acid - Phenol or Cresol? Explain. 2

15. (a) How can you convert an amide into an amine having one carbon less - than the starting compound?
(b) Name the reaction.

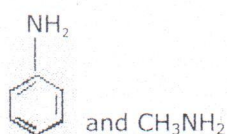
(c) Give the IUPAC name and structure of the amine obtained by the above method if the amide is 3-chlorobutanamide. 2

16. (a) Why does chlorine water lose its yellow colour on standing?

(b) What happens when Cl_2 reacts with cold dilute solution of sodium hydroxide? Write equation only. 2

17. How will you distinguish between:

(a)



(b) $\text{CH}_2\text{-N-H}$ and $(\text{CH}_3)_3\text{N}$
 CH_3 2

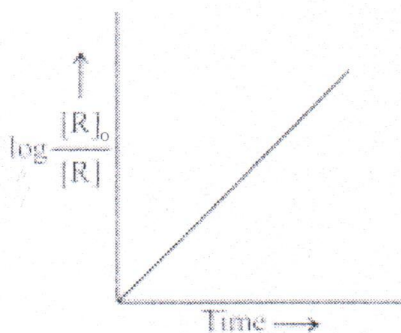
18. Give mechanism of preparation of ethoxyethane from ethanol. 2

19. (a) A current of 1.50 amp was passed through an electrolytic cell containing AgNO_3 solution with inert electrodes. The weight of Ag deposited was 1.50g. How long did the current flow?

(b) Write the reactions taking place at the anode and cathode in the above cell.

(c) Give reactions taking place at the two electrodes if these are made up of Ag. 3

20. (i)



Answer the following questions on the basis of the above curve for a first order reaction $\text{A} \rightarrow \text{P}$

(a) What is the relation between slope of this line and rate constant? (1)

(b) Calculate the rate constant of the above reaction if the slope is $2 \times 10^{-4} \text{ s}^{-1}$

- (ii) Derive the relationship between half life of a first order reaction and its rate constant. 3
21. (a) Name the method used for refining of
(i) Nickel
(ii) Zirconium
(b) The extraction of Au by leaching with NaCN involves both oxidation and reduction. Justify giving equations. 3
22. Write down the equations for hydrolysis of XeF_4 and XeF_6 . Which of these two reactions is a Redox reaction? 3
23. Give the electronic configuration of the
(a) d- orbitals of Ti in $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ ion in an octahedral crystal field.
(b) Why is this complex coloured? Explain on the basis of distribution of electrons in the d- orbitals.
(c) How does the colour change on heating $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ ion? 3
24. (a) Which will have a higher boiling point?
1 - Chloro ethane or 2 methyl -2- chlorobutane
Give reasons
(b) p - nitro chlorobenzene undergoes nucleophilic substitution faster than chlorobenzene. Explain giving the resonating structures as well. 3
25. Despite having an aldehyde group
(a) Glucose does not give 2,4 - DNP test. What does this indicate?
(b) Draw the Haworth structure of $\alpha - \text{D} - (+) - \text{Glucopyranose}$.
(c) What is the significance of D and (+) here? 3
26. (a) What is the role of Benzoyl peroxide in polymerisation of ethene?
(b) What are LDPE and HDPE? How are they prepared? 3
27. Classify synthetic detergents giving an example in each case.

OR

What are antihistamines? Give two examples. Explain how they act on the human body. 3

28. (a) Derive the relationship between relative lowering of vapour pressure and mole fraction of the volatile liquid.
(b) (i) Benzoic acid completely dimerises in benzene. What will be the vapour pressure of a solution containing 61g of benzoic acid per 500g benzene when the vapour pressure of pure benzene at the temperature of experiment is 66.6 torr?
(ii) What would have been the vapour pressure in the absence of dimerisation?
(iii) Derive a relationship between mole fraction and vapour pressure of a component of an ideal solution in the liquid phase and vapour phase. 5

OR

28. (a) Which aqueous solution has higher concentration - 1 molar or 1 molal solution of the same solute? Give reason
(b) 0.5g KCl was dissolved in 100g water and the solution originally at 20°C , froze at -0.24°C . Calculate the percentage ionization of salt. K_f per 1000g of water = 1.86K.
29. (a) Out of Ag_2SO_4 , CuF_2 , MgF_2 and CuCl , which compound will be coloured and why?
(b) Explain :
(i) CrO_4^{2-} is a strong oxidizing agent while MnO_4^{2-} is not.
(ii) Z_r and H_f have identical sizes.
(iii) The lowest oxidation state of manganese is basic while the highest is acidic.
(iv) Mn (II) shows maximum paramagnetic character amongst the divalent ions of the first transition series. 5

OR

- (a) In the titration of FeSO_4 with KMnO_4 in the acidic medium, why is dil H_2SO_4 used instead of dil HCl ?
(b) Give reasons:
(i) Among transition metals, the highest oxidation state is exhibited in oxoanions of a metal.
(ii) Ce^{4+} is used as an oxidizing agent in volumetric analysis.
(iii) Transition metals form a number of interstitial compounds.
(iv) Zn^{2+} salts are white while Cu^{2+} salts are blue.
30. An unknown Aldehyde 'A' on reacting with alkali gives a β -hydroxy -aldehyde, which loses water to form an unsaturated aldehyde, 2- butenal. Another aldehyde 'B' undergoes disproportionation reaction in the presence of conc. alkali to form products C and D. C is an arylalcohol with the formula $\text{C}_7\text{H}_8\text{O}$.
(i) Identify A and B.
(ii) Write the sequence of reactions involved.
(iii) Name the product, when 'B' reacts with Zinc amalgam and hydrochloric acid. 5

OR

A compound 'X' ($\text{C}_2\text{H}_4\text{O}$) on oxidation gives 'Y' ($\text{C}_2\text{H}_4\text{O}_2$). 'X' undergoes haloform reaction. On treatment with HCN 'X' forms a product 'Z' which on hydrolysis gives 2- hydroxy propanoic acid.

- (i) Write down structures of 'X' and 'Y'.
(ii) Name the product when 'X' reacts with dil NaOH .
(iii) Write down the equations for the reactions involved.



A COMPLETE PACKAGE FOR IIT-CHEMISTRY