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Mock Test -1

Secondary Examination, 2023

Chemistry

Time : 2¼ Hours

Max. Marks : 80

General Instructions to the Examinees:

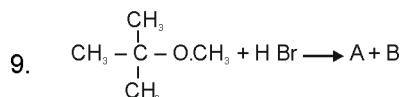
- (1) Candidate must write first her/her Roll No. on the question paper compulsorily.
- (2) All the questions are compulsory.
- (3) Write the answer to each question in the given answer book only.
- (4) For question having more than one part the answers to those part are to be in continuity.
- (5) If there is any error/difference/contradiction in Hindi & English version of the questions paper, the question of the Hindi version should be treated valid.

Section – A

1. Major product of acid catalysed dehydration of 2-methyl cyclohexanol
 - (1) 1-methyl Cyclohexane
 - (2) 1-methyl Cyclohexene
 - (3) 1-Cyclohexyl methanol
 - (4) 1-methylene Cyclohexane
2. Which one of following compounds is more reactive towards SN^1 rxn
 - (1) $CH_2 = CH - Br$
 - (2) $C_6H_5 - Br$
 - (3) $C_6H_5CH_2Br$
 - (4) $C_6H_5CH(CH_3)Br$
3. $KMnO_4$ is coloured due to –
 - (1) d-d-transitions
 - (2) charge transfer from ligand to metal
 - (3) unpaired e^- in d orbital of Mn
 - (4) Charge transfer from metal to ligand.
4. In the rate equation, when concentration of reactants is unity then rate is equal to
 - (1) specific rate constant
 - (2) instantaneous rate constant
 - (3) Average rate constant
 - (4) None of these
5. The rate constant of zero order rxn has the unit –
 - (1) S^{-1}
 - (2) $mol\ L^{-1}S^{-1}$
 - (3) $L^2mol^{-2}S^{-1}$
 - (4) $Lmol^{-1}S^{-1}$
6. In the rxn $2A+B \rightarrow A_2B$, if the concentration of A is doubled & that of B is halved, then the rate of the rxn
 - (1) Increase 2 times
 - (2) Increase 4 times
 - (3) Decrease 2 times
 - (4) Remain the same
7. A substance A decompose by a first order rxn starting initially with $[N] = 2.00\ M$ and after 200 min, $[A]$ becomes $0.15\ M$. For this rxn $t_{1/2}$ is –
 - (1) 53.72 min
 - (2) 48.45 min
 - (3) 50.49 min
 - (4) 46.45 min

8. Arrange the following in order of Increasing Basic strength in aqueous phase –

- (a) CH_3NH_2 (b) $\text{CH}_3 - \text{NH} - \text{CH}_3$
 (c) $(\text{CH}_3)_3\text{N}$ (d) NH_3
 (1) $c > b > a > d$ (2) $b < c > a > d$
 (3) $b > a > c > d$ (4) $c > a > b > d$



(1) $\text{A} = \text{CH}_3\text{Br}$, $\text{B} = (\text{CH}_3)_3\text{C} - \text{OH}$

(2) $\text{A} = \text{CH}_3\text{OH}$, $\text{B} = (\text{CH}_3)_3\text{C} - \text{Br}$

(3) $\text{A} = \text{CH}_3 - \text{CH}(\text{CH}_3)_2$, $\text{B} = (\text{CH}_3)_3\text{C} \text{ Br}$

(4) $\text{A} = \text{CH}_3 - \text{CH}_2 - \text{OH}$, $\text{B} = (\text{CH}_3)_3\text{C} - \text{OH}$

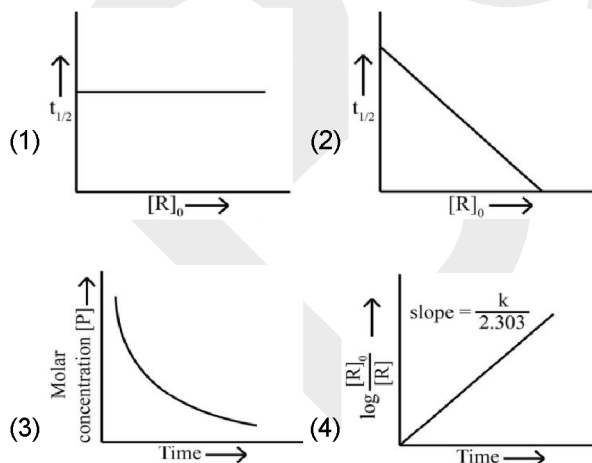
10. Which statement is not correct?

- (1) Ammonia is more acidic than water.
 (2) Hinsberg's reagent reacts with 2° amine to form sulphonamides.
 (3) pK_b value of ethylamine is lower than diethylamine.
 (4) Most alkyl amines are more basic than ammonia solution.

11. Which test is used to distinguish between 1° , 2° , 3° alcohol –

- (1) Fehling Test (2) Lucas Test
 (3) 2, 4 DNP Test (4) Tollen Test

12. Which of the following graph is correct for a 1st order rxn –



13. The number of ions formed on dissolving one molecule of $\text{K}_4[\text{Fe}(\text{CN})_6]$

- (1) 4 (2) 3
 (3) 5 (4) 6

14. In Riemer-Tiemann Rxn intermediate is –

- (1) Nucleophile (2) Electrophile
 (3) Carbanion (4) Carbocation

15–18 (A) Assertion & Reason (R)

Selection the most appropriate answer for the option–

- (1) Both A & R are true and R is correct explanation of A.
 (2) Both A & R are true but R is not correct explanation of A.
 (3) A is true but R is false.
 (4) A is false but R is true.
15. **A** → Linkage isomerism arises in coordination compounds because of ambidentate ligand.
R → Ambidentate ligand like NO_2 has 2 different donation i.e. N and O
16. **A** → Sucrose is a non reducing sugar.
R → Sucrose has glycosidic linkage.
17. **A** → The order of reactivity of different alkyl halides towards β -elimination is $3^\circ > 2^\circ > 1^\circ$
R → 3° alkyl halides give more substituted alkenes, which being more stable are formed at a faster rate.
18. **A** → Bond Angle in ethers is slightly less than tetrahedral angle.
R → There is repulsion between bulky (R) groups.

Section – B

19. Account for the following –

- (1) 6C in Glucose
 (2) Formation of Gluconic acid from Glucose

Or

What happens when –

- (1) Glucose reacts with acetic anhydride
 (2) Glucose reacts with hydrogen cyanide
20. A first order reaction has a rate constant $1.15 \times 10^{-3} \text{ s}^{-1}$. How long will 5g. reactant take to reduce to 3g.
21. Give the reason –
 (1) Haloarene is less reactive towards nucleophilic substitution rxn as compared to haloalkane why?
 (2) In $\text{S}_\text{N}2$ inverted product is formed.

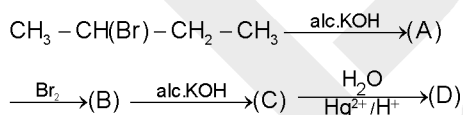
Or

- (1) Write the product when potassium tertiary butoxide reacts with 2-chlorobutane.
 (2) Chloroethane has a lower boiling point than iodoethane. Why?
22. The formula $\text{CO}(\text{NH}_3)_5\text{CO}_3\text{Cl}$ could represent a carbonate or a chloride. Write the structures and names of possible isomers.
23. On passing 3F of electricity through 3 electrolytic cells connected in series containing Ag^+ , Ca^{2+} , Al^{3+} ions respectively. The molar ratio in which 3 metal ions are liberated at the electrode is –
 (1) 1 : 2 : 3 (2) 3 : 2 : 1
 (3) 6 : 3 : 2 (4) 3 : 4 : 2

24. (1) Why does the rate of rxn increase with the temperature.
(2) Why do catalyst do not have any effect on the equilibrium constant of a reaction?
25. Write the rxn & IUPAC name of the product when 2-methyl-2 propanol is treated with ethyl magnesium bromide followed by hydrolysis?
26. Write the equation for the following rxn –
(1) Cannizaro rxn
(2) Aldol-condensation rxn
(3) Rosenmund Reduction
27. Using VBT, explain the following for $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$
(1) Hybridization
(2) Magnetic Moment
(3) Type of complex (inner/outer)
28. (1) State Raoult's Rule
(2) Henry's law constant for CO_2 in water is 1.67×10^8 Pa at 298 K. Calculate the number of moles of CO_2 in 500 ml of soda water when packed under 2.53×10^5 Pa at same temperature.
29. Give reason for any 3 –
(1) Why is NH_2 group of aniline acetylated before carrying out Nitration.
(2) What is the best reagent to convert nitrile to primary amine.
(3) What is the role of HNO_3 in the nitrating mixture used for the nitration of benzene.
(4) Why is benzene diazonium chloride not stored and used immediately after its preparation?
30. (1) Monochlorination of ethane to ethyl chloride is more practical than chlorination of n-pentane. Give reason.
(2) Haloalkanes react with KCN to give alkyl cyanides as main product while with AgCN, they form isocyanide as the main product. Why?

Or

- (1) Identify the following :



- (2) Predict the product –

- (a) HCl with $\text{CH}_3\text{C}(\text{Cl})=\text{CH}_2$
(b) HBr with $\text{CH}_3\text{CH}=\text{C}(\text{CH}_3)_2$

31. Read the passage given below and answer the following questions :

Carbohydrates are polyhydroxy aldehydes and ketones and those compounds which on hydrolysis give such compounds are also carbohydrates. The carbohydrates which are not hydrolysed are called monosaccharides. Monosaccharides with aldehydic

group are called aldose and those which free ketonic groups are called ketose. Carbohydrates are optically active. Number of optical isomers = 2^n

Where n = number of asymmetric carbons. Carbohydrates are mainly synthesised by plants during photosynthesis. The monosaccharides give the characteristic reactions of alcohols and carbonyl group (aldehydes and ketones). It has been found that these monosaccharides exist in the form of cyclic structures. In cyclization, the $-\text{OH}$ groups (generally C_3 or C_4 in aldohexoses and C_3 or C_6 in ketohexoses) combine with the aldehyde or keto group. As a result, cyclic structures of five or six membered rings containing one oxygen atom are formed, e.g., glucose forms a ring structure. Glucose contains one aldehyde group, one 1° alcoholic group and four 2° alcoholic groups in its open chain structure.

The following questions are multiple choice questions, Choose the most appropriate answer :

- (i) First member of ketos sugar is
(1) ketotriose (2) ketotetrose
(3) ketopentose (4) ketohexose
- (ii) In $\text{CH}_2\text{OHCHOHCHOHCHOHCHOHCHO}$, The number of optical isomers will be
(1) 16 (b) 8
(c) 32 (d) 4
- (iii) Some statements are given below :
1. Glucose is aldohexose.
2. Naturally occurring glucose is dextrorotatory.
3. Glucose contains three chiral centres.
4. Glucose contains one 1° alcoholic group and four 2° alcoholic groups.

Among the above, correct statements are

- (1) 1 and 2 only (2) 3 and 4 only
(3) 1, 2 and 4 only (4) 1, 2, 3 and 4
- (iv) Two hexoses form the same osazone, find the correct statement about these hexoses.
(1) Both of them must be aldoses.
(2) They are epimers at C-3.
(3) The carbon atoms 1 and 2 in both have the same configuration.
(4) The carbon atoms 3, 4 and 5 in both have the same configuration.

Or

Which of the following reactions of glucose can be explained only by its cyclic structure?

- (1) Glucose forms cyanohydrin with HCN .
(2) Glucose reacts with hydroxylamine to form an oxime.
(3) Pentaacetate of glucose does not react with hydroxylamine.

(4) Glucose is oxidised by nitric acid to gluconic acid.

32. Read the passage given below and answer the following questions :

At 298 K, the vapour pressure of pure benzene, C_6H_6 is 0.256 bar and the vapour pressure of pure toluene $C_6H_5CH_3$ is 0.0925 bar. Two mixtures were prepared as follows :

- (I) 7.8 g of C_6H_6 + 9.2g of toluene
- (II) 3.9 g of C_6H_6 + 13.8 g of toluene

The following questions are multiple choice questions. Choose the most appropriate answer:

- (i) The total vapour pressure (bar) of solution I is
 - (1) 0.128
 - (2) 0.174
 - (3) 0.198
 - (4) 0.258
- (ii) Which of the given solutions have higher vapour pressure?
 - (1) I
 - (2) II
 - (3) Both have equal vapour pressure
 - (4) Cannot be predicted
- (iii) Mole fraction of benzene in vapour phase in solution I is
 - (1) 0.128
 - (2) 0.174
 - (3) 0.734
 - (4) 0.266
- (iv) Which of the following statements is/are correct?
 - (I) Mole fraction of toluene in vapour phase is more in solution I.
 - (II) Mole fraction of toluene in vapour phase is less in solution I.
 - (III) Mole fraction of benzene in vapour phase is less in solution I.
 - (1) Only II
 - (2) Only I
 - (3) I and III
 - (4) II and III

Or

Solution I is an example of a/an

- (1) ideal solution
- (2) non-ideal solution with positive deviation
- (3) non-ideal solution with negative deviation
- (4) can't be predicted.

Section-D

33. Two compound X & Y both on rxn with SeO_2 gives methyl glyoxal. X gives positive tollen test & negative iodo form test. Y gives negative tollen and positive Iodoform test. Give the structure of X & Y.

Or

- (1) Name the electrophile produced in the run of benzene with benzoyl chloride in the presence of anhydrous $AlCl_3$. Name the rxn also.
- (2) Name the products formed on oxidation of 2,5 – dimethyl hexane-3-one.
- 34. (1) Corrosion of motor cars is of a greater problem in winter when salts are spread on roads to melt ice & snow why?
- (2) Why is it necessary to use salt bridges in a galvanic cell?
- (3) Electrolysis of KBr gives Br_2 at anode but KF does not give F_2 ?

Or

- (1) What is a fuel cell? Write rxn involved in $H_2 - O_2$ fuel cell.
- (2) Zn rod weighing 25g. was kept in 100 ml of 1M $CuSO_4$ solution. After certain time interval, the molarity of Cu^{2+} was found to be 0.8M. What is the molarity of SO_4^{2-} in the resulting solution and what should be the mass of Zn rod after learning and drying.
- 35. (1) What will be the mole fraction of water in C_2H_5OH solution containing equal number of moles of water and C_2H_5OH .
- (2) Gases tend to be less soluble in liquids as the temperature is raised, why?
- (3) Define cryoscopic constant.
- (4) What is reverse osmosis?
- (5) What is the value of van't Hoff factor. If solute molecules undergo dimerisation