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Mock Test -2

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

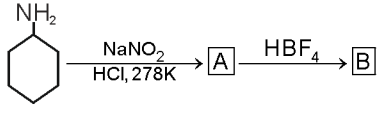
- Which is the best method for the preparation of alkyl halide by alcohol –
 - Groove's Process
 - Darzen Rxn
 - By PCl_3
 - By H_2O
- $\text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow[\text{(ii) H}_2\text{O}_2 / \text{OH}^-]{\text{(i) BH}_3 / \text{THF}}$ Product
 - Propanol
 - Propane
 - Propan-2-ol
 - Propyne
- Gun metal is an alloy of –
 - Cu & Al
 - Cu & Sn
 - Cu, Zn & Sn
 - Cu, Zn & Ni
- $\text{A} + \text{B} \rightleftharpoons \text{C} + \text{D}$, the energies of activation of the forward reaction & the reverse reaction are 250 KJ and 150 KJ respectively. The forward rxn is –
 - Exothermic
 - Exothermic & Endothermic
 - Endothermic
 - None of these
- Which of the following represents the expression for $\frac{3}{4}$ th life of a first order rxn –
 - $\frac{k}{2.303} \log \frac{4}{3}$
 - $\frac{2.303}{k} \log \frac{3}{4}$
 - $\frac{2.303}{k} \log 4$
 - $\frac{2.303}{k} \log 3$
- In the rxn $\text{N}_2\text{O}_{4(g)} \rightarrow 2\text{NO}_{2(g)}$, the pressure of N_2O_4 falls from 0.5 atm to 0.32 atm in 30 minutes, the rate of appearance of $\text{N}_2\text{O}_{4(g)}$ is –
 - 0.012 atm min⁻¹
 - 0.024 atm min⁻¹
 - 0.006 atm min⁻¹
 - 0.003 atm min⁻¹
- How many kJ of energy is spent when a current of 4 amp. passes for 200 second under a potential of 115V?
 - 52 KJ
 - 72 KJ
 - 82 KJ
 - 92 KJ

8. Which of the following complexes shows zero crystal field stabilization energy?
- (1) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$ (2) $[\text{Fe}(\text{CH}_3\text{O})_6]^{3+}$
(3) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ (4) $[\text{Mn}(\text{H}_2\text{O})_6]^{3+}$
9. In this rxn acetamide is converted to methanamine
- (1) Gabriel phthalimide synthesis
(2) Stephen's reaction
(3) Carbylamine reaction
(4) Hoffmann bromamide rxn
10. How many structural isomers are possible for $\text{C}_3\text{H}_9\text{N}$?
- (1) 4 (2) 2
(3) 5 (4) 3
11. Reactions occur between aldehydes and ketones –
- (1) Nucleophilic addition
(2) Electrophilic substitution
(3) Electrophilic addition
(4) Nucleophilic substitution
12. Which of the following compound is formed when benzyl alcohol is oxidised with KMnO_4 ?
- (1) CO_2 and H_2O (2) Benzoic acid
(3) Benzaldehyde (4) Benzophenone
13. Phenol on reduction with H_2 in the presence of Ni catalyst gives –
- (1) Benzene (2) Toluene
(3) Cyclohexane (4) Cyclohexanol
14. Which of the following is formed when phenol is exposed to air?
- (1) o-benzoquinone (2) p-benzoquinone
(3) phenoxinone (4) o-and p-benzoquinone
- 15–18 Assertion (A) and Reason (R) Based questions–**
- (1) Both A and R are true & 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 $\rightarrow [\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_2$ and $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_2$ are reducing in nature.
R $\rightarrow$ Unpaired electrons are present in their d-orbitals.
16. A $\rightarrow \alpha$ -amino acids have zwitter ion structure.
R $\rightarrow \alpha$ -amino acids have least conductivity at isoelectronic point.
17. A $\rightarrow$ Boiling points of alkyl halides decrease in the order of $\text{R-I} > \text{R-Br} > \text{R-Cl} > \text{R-F}$
R $\rightarrow$ Vander waals forces decreases with increase in the size of halogen atom.
18. A $\rightarrow$ Low spin tetrahedral complexes are rarely observed.
R $\rightarrow$ The orbital splitting energies are not sufficiently large to forcing pairing.

Section – B

19. Shows that for a first order reaction, the time required for 99.9% completion of the reaction is 10 times that required for 50% completion.
20. Account for following –
- (1) Glucose contains -CHO group
(2) Denaturation
- Or**
- (1) Glucose reaction with HI/Red?
(2) Glucose reaction with HIO_4
21. Give reason $\rightarrow$
- (1) During the electrophilic substitution rxn of haloarenes, para substituted derivative is the major product.
(2) Why alcohols are soluble in water.
- Or**
- (1) E_2 reaction Mechanism?
(2) O-nitrophenol is more volatile than P-nitrophenol?
22. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is blue in colour while CuSO_4 is colourless why?
23. Explain the working principle of an electrochemical cell?
24. (1) What is pseudo first order reaction? Explain with an example.
(2) Although reaction b/w $\text{H}_2(\text{g})$ and $\text{O}_2(\text{g})$ is highly feasible leaving the gases in the same vessel at room temperature does not result in the creation of water. Explain
25. (i) Write the rxn when sodium phenoxide is heated with ethyl iodide.
(ii) $\text{CH}_3-\text{CH}_2-\text{CH}=\text{CH}_2$
 $\xrightarrow{\text{HBr}/\text{H}_2\text{O}_2} \text{Y} \xrightarrow{\text{C}_6\text{H}_5\text{ONa}} \text{Z}$
- Write X and Y IUPAC name and structure.

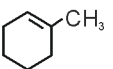
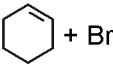
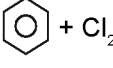
Section – C

26. Write the chemical rxn –
- (1) 
- (2) On heating an aliphatic primary amine with chloroform and ethanolic potassium hydroxide
- (3) When $\text{CH}_2=\text{CH}-\text{COOH}$ is reduced with LiAlH_4
27. Mention the main postulates of Werner's theory.
28. (1) State Henry's law and mention some important applications.
(2) Prove that osmotic pressure is a molecular property.

29. (1) Give a chemical test to distinguish between ethylamine and aniline.
 (2) How may methyl bromide be preferentially converted to methy isocyanide
 (3) $\text{CH}_3 - \text{CH}_2 - \text{Cl} \xrightarrow{\text{NaCN}} \text{[A]} \xrightarrow{\text{Ni/H}_2} \text{[B]}$ Predict A and B
 30. Describe the following chemical equation –
 (1) Carbylamine rxn
 (2) Hofmann's Bromamide rxn

Or

Complete the rxn –

- (1) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{C} \equiv \text{CH} + \text{Br}_2 \longrightarrow ?$
 (2)  + HI $\longrightarrow ?$
 (3)  + Br₂ $\xrightarrow[\text{light}]{\text{Heat}}$?
 (4)  + Cl₂ $\xrightarrow[\text{dark}]{\text{Fe}}$?
 (5) $\text{C}_2\text{H}_5\text{Cl} + \text{aq.KOH} \xrightarrow{\Delta} ?$

Section – D

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

The f-block elements are those in which the differentiating electron enters the $(n-2)f$ orbital. There are two series of f-block elements corresponding to filling of 4f and 5f orbitals. The series of 4f-orbitals is called lanthanides. Lanthanides show different oxidation states depending upon stability of f^0 , f^7 and f^{14} configurations, though the most common oxidation states is +3. There is a regular decrease in size of lanthanides ions with increase in atomic number which is known as lanthanide contraction.

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

- (i) The atomic numbers of three lanthanide elements X, Y and Z are 65, 68 and 70 respectively, their Ln^{3+} electronic configuration is –
 (1) $4f^8, 4f^{11}, 4f^{13}$ (2) $4f^{11}, 4f^8, 4f^{13}$
 (3) $4f^0, 4f^2, 4f^{11}$ (4) $4f^3, 4f^7, 4f^9$
 (ii) Lanthanide contraction is observed in
 (1) Gd (2) At
 (3) Xe (4) Te
 (iii) Which of the following is not the configuration of lanthanoid?
 (1) $[\text{Xe}]4f^{10}6s^2$ (2) $[\text{Xe}]4f^15d^16s^2$
 (3) $[\text{Xe}]4d^{14}5d^{10}6s^2$ (4) $[\text{Xe}]4f^75d^16s^2$

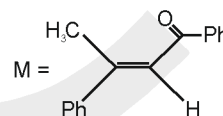
Or

Name a member of the lanthanoid series which is well known to exhibit +4 oxidation state.

- (1) Cerium (Z = 58) (2) Europium (Z = 63)
 (3) Lanthanum (Z = 57) (4) Gadolinium (Z = 64)
 (iv) Identify the incorrect statement among the following.
 (1) Lanthanoid contraction is the accumulation of successive shrinkages.
 (2) The different radii of Zr and Hf due to consequence of the lanthanoid contraction.
 (3) Shielding power of 4f electrons is quite weak.
 (4) There is a decrease in the radii of the atoms or ions as one proceeds from La to Lu.

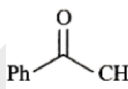
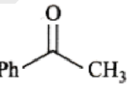
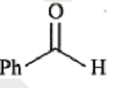
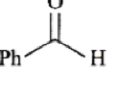
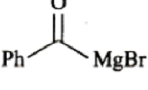
32. Read the passage given below and answer the following questions :

A tertiary alcohol H upon acid catalysed dehydration gives a product I. Ozonolysis of I leads to compounds J and K. Compound J upon reaction with KOH gives benzyl alcohol and a compound L, whereas K on reaction with KOH gives only M.



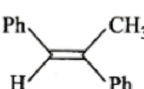
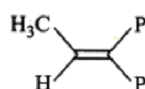
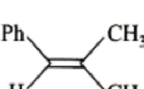
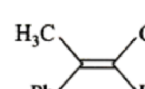
The following questions are multiple choice questions. Choose the most appropriate answer :

- (i) Compound H is formed by the reaction of

- (1)  + PhMgBr
 (2)  + PhCH₂MgBr
 (3)  + PhCH₂MgBr
 (4)  + 

Or

The structure of compound I is

- (1)  (2) 
 (3)  (4) 

(ii) The structures of compound J, K and L, respectively, are

- (1) PhCOCH_3 , $\text{PhCH}_2\text{COCH}_3$ and $\text{PhCH}_2\text{COO}^-\text{K}^+$
- (2) PhCHO , PhCH_2CHO and PhCOO^-K^+
- (3) PhCOCH_3 , PhCH_2CHO and $\text{CH}_3\text{COO}^-\text{K}^+$
- (4) PhCHO , PhCOCH_3 and PhCOO^-K^+

(iii) When (J) is treated with acetic anhydride, in the presence of corresponding salt of an acid, the product obtained is

- (1) cinnamic acid (2) crotonic acid
- (3) maleic acid (4) benzylic acid

(iv) Which of the following statements is correct for compound (K)?

- (1) It reacts with alkaline KMnO_4 followed by acidic hydrolysis and forms benzoic acid.
- (2) It reacts with iodine and NaOH to form triiodomethane.
- (3) It is prepared by the reaction of benzene with benzoyl chloride in presence of anhydrous aluminium chloride.
- (4) It reacts with freshly prepared ammoniacal silver nitrate solution.

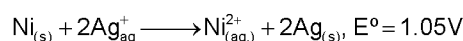
Section – E

33. (1) What is meant by lanthanoid contraction?
 (2) Why do transition elements show variable oxidation states?
 (3) What happens when $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ is heated?
 (4) Transition elements and their compounds are generally found to be good catalyst in chemical reactions. Explain.

34. (1) Express the relation between conductivity and molar conductivity.
 (2) What is effect of catalyst on →
 (a) Gibbs energy (BG)
 (b) Activation energy of a reaction

OR

- (1) Determine the values of equilibrium constant (K_c) and ΔG° for the following reaction –

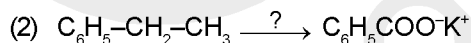
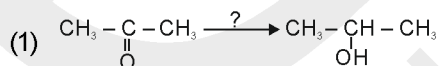


- (2) The conductivity of 0.20M solution of KCl at 298K is 0.025 Scm^{-1} . Calculate its molar conductivity.

35. (1) Give a chemical test to distinguish between benzoic acid and phenol.
 (2) Carboxylic acids do not show characteristic reactions of carbonyl group. Explain why?
 (3) Give a test to distinguish between propan-2-one and pentan-3-one.

Or

Name the reagents used in the following rxn –



Write the equations –

- (1) Wolff – Kishner Reduction
- (2) Etard Reaction
- (3) Hell-Volhard Zelinsky Rxn
- (4) Decarboxylation Rxn