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Mock Test -3

Secondary Examination, 2023

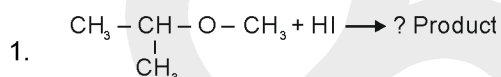
Chemistry

Time : 2¾ 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) Isopropyl alcohol + Methyl iodide
- (2) Methanol + Isopropyl Chloride
- (3) Ethanol + Methyl iodide
- (4) None of these

2. Which is more reactive towards SN^2 reaction

- (1) $\text{CH}_3 - \text{CH}_2 - \text{Br}$
- (2) $\text{CH}_3 - \underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}} - \text{Br}$
- (3) $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{Br}$
- (4) $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2 - \text{Br}$

3. What happens when $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ is heated?

- (1) N_2 gas is evolved
- (2) CO_2 gas is evolved
- (3) NH_3 gas evolved
- (4) H_2 gas is evolved

4. Find the correct statement –

- (1) Cr^{2+} is a reducing agent.
- (2) Mn^{3+} is reducing agent.
- (3) Cu(I) ion is stable in an aqueous solution.
- (4) Transition metals are not good catalyst.

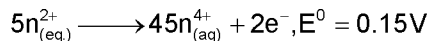
5. If the rate constant of a reaction is $k = 3 \times 10^{-4} \text{ s}^{-1}$ then identify the order of the rxn.

- (1) 0
- (2) 1
- (3) 2
- (4) 3

6. For a reaction $\text{R} \rightarrow \text{P}$, half life ($t_{1/2}$) is observed to be independent of the initial concentration of reactants. What is the order of the rxn?

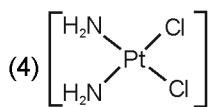
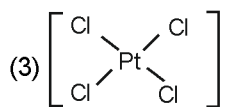
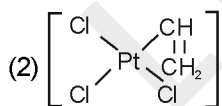
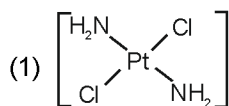
- (1) 0
- (2) 1
- (3) 2
- (4) 3

7. Two half cell reactions of an electrochemical cell are given below –



What is value of E^0 cell for these reaction.

- (1) +1.36 (2) –1.36
(3) 1.42 (4) –1.42
8. Calculate the degree of dissociation of acetic acid if its conductivity (λ_m) is $39.05 \text{ Scm}^2\text{mol}^{-1}$.
Given
 $\lambda^0(\text{H}^+) = 349.6 \text{ Scm}^2\text{mol}^{-1}$
 $\lambda^0(\text{CH}_3\text{COO}^-) = 40.9 \text{ Scm}^2\text{mol}^{-1}$
(1) 0.1 (2) 0.2
(3) 0.4 (4) 0.5
9. Among the following, which compound has 2 –OH groups?
(1) Phenol (2) O – Cresol
(3) Picric acid (4) Resorcinol
10. Ethylene on reaction with Baeyers's reagent gives
(1) Ethyl alcohol (2) Ethyl methyl ether
(3) Ethane (4) Ethylene Glycol
11. Benzaldehyde can be obtained from benzal chloride when benzal chloride is treated with conc. aqueous KOH then predict the product.
(1) Benzoic acid (2) Benzaldehyde
(3) Benzyl alcohol (4) Phenol
12. The ionization isomer of $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{NO}_2)]\text{Cl}$ is –
(1) $[\text{Cr}(\text{H}_2\text{O})_4(\text{O}_2\text{N})]\text{Cl}_2$ (2) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2](\text{NO}_2)$
(3) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{ONO})]\text{Cl}$ (4) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2(\text{NO}_2)]\text{H}_2\text{O}$
13. CuSO_4 when reacts with KCN forms CuCN which is insoluble in water. It is soluble in excess of KCN due to formation of the following complex :
(1) $\text{K}_2[\text{Cu}(\text{CN})_4]$ (2) $\text{K}_2[\text{Cu}(\text{CN})_4]$
(3) CuCN_2 (4) $\text{Cu}[\text{K Cu}(\text{CN})_4]$
14. Which of the following is considered to be an anticancer species?



15-18 Assertion (A), Reason (R) Questions

- (1) Both A & R are true and R is correct explanation of A.
(2) Both A & R are true but R is not the correct.
(3) A is true but R is false.
(4) A is false but R is true.
15. **Assertion (A)** – Aromatic i amines can be prepared by Gabriel Phthalimide synthesis.
Reason (R) – Aryl halides do not undergo nucleophilic substitution with anion formed by phthalimide.
16. **Assertion (A)** – Acylation of amines gives a monosubstituted product whereas alkylation of amines gives poly substituted product.
Reason (R) – Acyl group sterically binder the approach of further acyl groups.
17. **Assertion (A)** – Glucose, Monnose and Fructose form identical osazone.
Reason (R) – Glucose, Monnose & Fructose have identical configuration at 3rd, 4th, 5th carbon atom.
18. **Assertion (A)** – D–Fructose is laevorotatory.
Reason (R) – D–Glucose is desetrorotatory

Section – B

19. A first order gas phase reaction
 $\text{A}_2\text{B}_{2(\text{g})} \rightarrow 2\text{A}_{(\text{g})} + 2\text{B}_{(\text{g})}$ at the temperature 400°C has the rate constant $k = 2.0 \times 10^{-4} \text{ sec}^{-1}$. What percentage of A_2B_2 is decomposed on heating for 900 seconds? (Antilog 0.0781 = 1.197)
20. Derive integrated rate equation for rate constant of a first order reaction.
21. (1) During milk curdling, what happens to the sugar present in it?
(2) Why must vitamin c be supplied regularly in diet?

OR

- (1) Sucrose is dextrorotatory but the mixture obtained after hydrolysis is laevorotatory. Explain
(2) How do enzymes help a substrate to be attacked by the reagent effectively?
22. (1) Carboxylic acids do not give characteristic rxn of carbonyl group. Explain why?
(2) Give a chemical test to distinguish between benzoic acid and phenol.

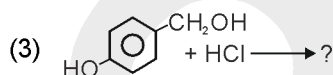
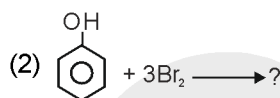
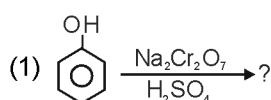
OR

- (1) What type of aldehydes undergo cannizaro reaction?
(2) What type of aldehydes undergo Aldol condensation?

23. (1) When equilibrium is reached inside the 2 half cells of the electrochemical cells, what is the net voltage across the electrodes?
- (2) Why does an electrochemical cell stop working after some time?
- (3) Electrolysis of KBr gives Br_2 at anode but does not give F_2 . Why?
24. (1) Define corrosion. Write the chemical formula of rust.
- (2) What is conductivity of water?
25. Explain these following reactions –
- (1) Reimer – Tiemann Rxn
- (2) Kolbe's reaction

Section – C

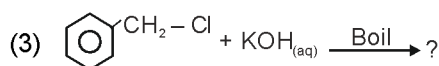
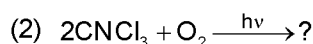
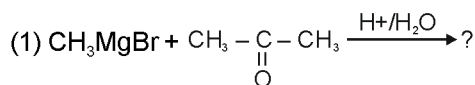
26. Illustrate the following name rxn by giving example –
- (1) Cannizzaro's Rxn
- (2) Clemmensen Reduction
27. Write down the product –



28. (1) Why do gases nearly always tend to be less soluble in liquids as the temperature is raised?
- (2) Calculate the freezing point depression expected for 0.0711 m aqueous solution of Na_2SO_4 . If this solution actually freezes at $-0.320^\circ C$, what would be the value of van't Hoff factor? ($k_f = 1.86^\circ C \text{ mol}^{-1}$)

29. (1) $C_6H_5N_2Cl + H_3PO_2 + HCl \rightarrow$?
- (2) $CH_3CH_2Cl \xrightarrow{NaCN} A \xrightarrow[Ni/H_2]{\text{Reduction}} B$
- (3) $CH_3NH_2 + CHCl_3 + 3 KOH_{(alc.)} \longrightarrow B$
- (4) $R-\overset{\overset{O}{||}}{C}-NH_2 + Br_2 + 4NaOH \longrightarrow ?$

30. Predict the product –



OR

- (1) What are ambident Nucleophiles? Explain with an example.
- (2) How would you differentiate between SN^1 and SN^2 mechanisms of substitution reactions?

Section – D

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

A reaction is said to be of the first order if the rate of the reaction depends upon one concentration term only. For a first order reaction of the type $A \rightarrow \text{Products}$, the rate of the reaction is given as : $\text{rate} = k[A]$. The differential rate law is given as :

$$\frac{dA}{dt} = -k[A]. \text{ The integrated rate law is : } \ln$$

$$\frac{[A]}{[A]_0} = -kt, \text{ where } [A] \text{ is the concentration of reactant}$$

left at time t and $[A]_0$ is the initial concentration of the reactant, k is the rate constant.

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

- (i) The unit of rate constant for a first order reaction is
- (1) s^{-1} (2) $\text{mol L}^{-1} s^{-1}$
- (3) $\text{L mol}^{-1} s^{-1}$ (4) $\text{L}^2 \text{mol}^{-2} s^{-1}$
- (ii) Half-life period of a first order reaction is 10 min. Starting with initial concentration 12 M, the rate after 20 min is
- (1) $0.693 \times 3 \text{ M min}^{-1}$ (2) $0.0693 \times 4 \text{ M min}^{-1}$
- (3) $0.0693 \text{ M min}^{-1}$ (4) $0.0693 \times 3 \text{ M min}^{-1}$

OR

50% of a first order reaction is complete in 23 minutes. Calculate the time required to complete 90% of the reaction.

- (1) 70.4 minutes (2) 76.4 minutes
- (3) 38.7 minutes (4) 35.2 minutes
- (iii) For a first order reaction, $A \rightarrow \text{products}$, the concentration of A changes from 0.1 M to 0.025 M in 40 minutes. The rate of reaction when the concentration of A is 0.01 M, is
- (1) $3.47 \times 10^{-4} \text{ M/min}$
- (2) $3.47 \times 10^{-5} \text{ M/min}$
- (3) $1.73 \times 10^{-4} \text{ M/min}$
- (4) $1.73 \times 10^{-5} \text{ M/min}$

- (iv) The half-life period of a 1st order reaction is 60 minutes. What percentage will be left over after 240 minutes?

- (1) 6.25 (2) 4.25
(3) 5% (4) 6%

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

Iron forms many complexes in its +2 and +3 oxidation states such as $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (A); $[\text{Fe}(\text{CN})_6]^{4-}$ (B); $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (C); $[\text{Fe}(\text{CN})_6]^{3-}$ (D), etc., They exhibit, different magnetic properties and undergo different hybridisation of iron.

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

- (i) Which of the following statements is correct?
(1) (B) is paramagnetic while (C) is diamagnetic.
(2) Both (B) and (D) are outer orbital complexes.
(3) Both (A) and (C) are paramagnetic.
(4) (A) is outer orbital complex and (C) is inner orbital complex.
- (ii) The complex having maximum magnetic moment is
(1) (A) (2) (B)
(3) (C) (4) (D)

OR

Which of the following does not represent correct configuration of d-orbitals in the given complexes?

- (1) (A) : $t_{2g}^4 e_g^2$ (2) (B) : $t_{2g}^6 e_g^0$
(3) (C) : $t_{2g}^4 e_g^1$ (4) (D) : $t_{2g}^5 e_g^0$

- (iii) The spin only magnetic moment of complexes (A), (B), (C) and (D) are respectively (in BM)

- (1) $2\sqrt{6}, 0, \sqrt{35}, \sqrt{3}$ (2) $0, 2\sqrt{6}, \sqrt{35}, \sqrt{3}$
(3) $\sqrt{15}, 2\sqrt{6}, \sqrt{3}, 0$ (4) $\sqrt{3}, \sqrt{8}, 0, \sqrt{15}$

- (iv) Which of the given complexes are outer orbital complexes?

- (1) (A) and (B) only (2) (B) and (C) only
(3) (A) and (C) only (4) (B) and (D) only

Section – E

33. (1) Nitrophenol is more acidic than o-methoxyphenol.
(2) Phenol is more reactive towards electrophilic substitution reaction than benzene.

OR

- (1) Aldol condensation of a ketone in the presence of a dilute alkali gives 4-Hydroxy-4-methylpentan-2-one. Write the structure of the ketone and its IUPAC name.
(2) An organic compound A ($\text{C}_9\text{H}_{10}\text{O}$) forms 2, 4 DNP derivative, reduces Tollens reagent and undergoes Cannizzaro rxn. On rigorous oxidation, it gives, 1, 2 - benzene dicarboxylic acids.
34. (1) Why sodium metal is not obtained at cathode when aq. NaCl is electrolysed with Pt electrodes but obtained when molten NaCl is electrolysed?
(2) Write any 3 differences between potential difference and E.M.F.

OR

- (1) Zn rod weighing 25g kept in 100 ml of 1 M CuSO_4 solution. After certain time interval, the molarity of Cu^{2+} was found to be 0.8 M. What is the molarity of SO_4^{2-} in the resulting solution and what should be the mass of Zn rod after cleaning and drying?
(2) How many grams of chlorine can be produced by the electrolysis of molten NaCl with a current of 1.02 A for 15 min?
35. (1) Why is the 3rd ionisation energy of Manganese ($z = 25$) is unexpectedly high?
(2) Which elements among 3d-transition elements, exhibit the highest oxidation state?
(3) Silver has completely filled d-orbitals ($4d^{10}$) in its ground state. How can you say that it is transition element?
(4) In 3d series ($\text{Sc} \rightarrow \text{Zn}$), the enthalpy of atomisation of Zn is low, why?
(5) Mention one consequence of lanthanoid contraction.