

Mock Test

SECTION - A

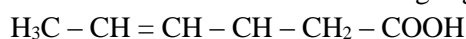
Read the given passage and answer the questions 1 to 5 that follow:

Grignard reagents are versatile organometallic compound in which carbon-magnesium has significant ionic character. The hydrocarbon part of Grignard reagent acts as a source of carbanions. Therefore, it readily undergo nucleophilic addition reactions to aldehydes, ketones, esters, nitrites forming the addition product which upon hydrolysis gives alcohol and other compounds. Grignard reagent on reaction on reaction with H₂O and alcohol gives hydrocarbon.

- Write reaction involved in preparation of benzyl alcohol from methanal.
- How 2-methylpropan-2-ol can be prepared from propanone.
- What will be the product formed when benzyl magnesium bromide is treated with ethanol.
- Write product formed on reaction between ethylformate and excess of CH₃MgBr followed by hydrolysis.
- Write reaction sequence for preparation of propan-1-ol from and bromoethane.

Questions 6 to 10 are one word answers:

- Give IUPAC name of the following organic compound:



- Name the product formed when benzene is treated with acetyl chloride in the presence of anhydrous AlCl₃.
- Write the structure of Acetoxy salicylic acid.
- Name the monosaccharide present in lactose other than β-D-glucose.
- Name a member of lanthanoids series which is well known to exhibit +4 oxidation state.

Question 11 to 15 are multiple choice questions

- Which has the lowest freezing point at 1 atm pressure?
(a) 0.1 M KCl (b) 0.1 urea (c) 0.1 M CaCl₂ (d) 0.1 M AlCl₃
- The $E_{cell}^o = 0.295\text{V}$ for a galvanic cell with change in number of electron $n = 2$ at 25°C. the equilibrium constant for this reaction would be
(a) 1.0×10^{10} (b) 2.0×10^{11} (c) 4.0×10^{12} (d) 1×10^2
- The half life of the first order reaction having rate constant $K = 1.7 \times 10^{-5} \text{ s}^{-1}$ is
(a) 12.1 hr (b) 9.7 hr (c) 11.3 hr (d) 1.8 hr
- In the extraction of aluminium by Hall – Heroult process, purified Al₂O₃ is mixed with CaF₂
(a) to lower the melting point of Al₂O₃ and CaF₂ mixture
(b) decrease the conductivity of molten mixture
(c) reduce $\text{Al}_{(aq)}^{3+}$ into Al(s)
(d) act as catalyst
- Method by which lyophobic sol can be protected.
(a) By addition of oppositely charged sol.
(b) By addition of an electrolyte.
(c) By addition of lyophilic sol.
(d) By boiling.

Questions 16 to 20 are assertion & Reason Type Questions.

Use the following key to select the correct answer.

- If both assertion and reason are correct and reason is correct explanation for assertion
 - If both assertion and reason are correct but reason is not correct explanation for assertion.
 - If assertion is correct but reason is incorrect.
 - If assertion and reason both are incorrect.
- Assertion:** Analgesics bring down the body temperature during fever
Reason: Penicillin is tranquilizer.

17. **Assertion:** Nylon 6, 6 is a thermoplastic polymer
Reason: It is prepared by condensation polymerization of hexamethylene diamine and adipic acid.
18. **Assertion:** Copper sulphate can be stored in zinc vessel.
Reason: Zinc is less reactive than copper.
19. **Assertion:** Aromatic aldehydes and formaldehyde undergo Cannizzaro reaction.
Reason: Aromatic aldehydes are almost as reactive as formaldehyde.
20. **Assertion:** $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_2$ and $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_2$ are reducing in nature.
Reason: Unpaired electrons are present in their d-orbitals.

SECTION: B

21. Write complete chemical equations for
 (a) Oxidation of Fe^{2+} by $\text{Cr}_2\text{O}_7^{2-}$ in acidic medium
 (b) Oxidation of $\text{S}_2\text{O}_4^{2-}$ by MnO_4^- in neutral aqueous medium

OR

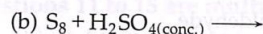
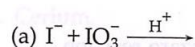
Complete the following chemical equations:

- (a) $\text{MnO}_4^- (\text{aq}) + \text{C}_2\text{O}_4^{2-} (\text{aq}) + \text{H}^+ (\text{aq}) \rightarrow$
 (b) $\text{Cr}_2\text{O}_7^{2-} (\text{aq}) + \text{H}_2\text{S} (\text{g}) + \text{H}^+ (\text{aq}) \rightarrow$
22. A chemical reaction is of first order w.r.t. reactant A and of second order w.r.t. reactant B. How is the rate of the reaction affected when
 (a) the concentration of B is alone increased to three times.
 (b) the concentration of A as well as B are doubled?

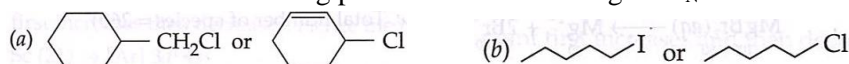
OR

A first order reaction has specific rate constant of 10^{-3} sec^{-1} . How much time will it take for 10 g of it to reduce to half the quantity.

23. Complete the following chemical reactions.



24. Differentiate between molarity and molality for a solution. How does a change in temperature influence their values?
25. Which one of the following pair of substances undergoes $\text{S}_\text{N}2$ substitution reaction faster and why?



26. $[\text{CoF}_6]^{3-}$ paramagnetic but $[\text{Co}(\text{CN})_6]^{3-}$ is diamagnetic. Why?
27. How many geometrical isomers are possible in the following coordination entities?
 (i) $[\text{Cr}(\text{C}_2\text{O}_4)_3]^{3-}$ (ii) $[\text{Cr}(\text{NH}_3)_3\text{Cl}_3]$

SECTION: C

28. Calculate the freezing point of an aqueous solution containing 10.5 g of MgBr_2 in 200 g of water (given molar mass of $\text{MgBr}_2 = 184 \text{ g mol}^{-1}$, k_f for water = $1.86 \text{ K kg mol}^{-1}$, also MgBr_2 is 80% dissociated).
29. The rate of a reaction becomes four times when the temperature changes from 300 K to 320 K. Calculate the energy of activation of the reaction, assuming that it does not change with temperature. ($R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$)
30. (a) How electrophoresis leads to coagulation of gold sol?
 (b) Explain Tyndall effect briefly by taking an example.
 (c) Explain why coagulation of sols will occur.
31. Explain the following with suitable reason.
 (a) In transition elements, the melting point first increases and then decreases.
 (b) Actinoid contraction is greater than lanthanoids contraction.

OR

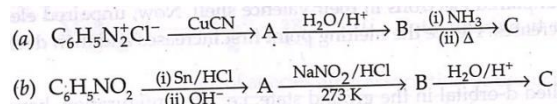
With the help of chemical reactions, explain how KMnO_4 is prepared from pyrolusite ore? Also, write the chemical reaction reaction of KMnO_4 -with SO_2 gas in acidic medium?

32. How will you bring about following conversions? Write complete equations in each case.
- (a) Ethanal to 3-hydroxybutanal (b) Benz aldehyde to benzophenone
(c) Propanone to propene

OR

Under what circumstances may an aldehyde can be prepared by the oxidation of primary alcohols, ROH, using acid dichromate?

33. Give the structures of A, B and C in the following reactions:



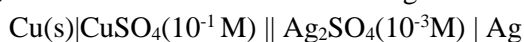
34. Explain the following:

- (a) peptide linkage (b) Essential amino acid (c) pyranose structure of β glucose

SECTION - D

35. (a) What type of battery is the lead storage battery? Write the anode and the cathode reactions and the overall reaction occurring in a lead storage battery when current is drawn from it.

- (b) Calculate the emf of the following cell at 25^oC:



Given $E_{cell}^0 = 0.46 V$

OR

- (a) Write the anode and cathode reactions occurring in a commonly used mercury cell. How is the overall reaction represented?

- (b) Calculate the degree of dissociation and dissociation constant of 0.01 M acetic acid at 298 K, given that

$$\Lambda_m^c(CH_3COOH) = 39 S cm^2 mol^{-1}$$

$$\Lambda_m^0(CH_3COO^-) = 40.9 S cm^2 mol^{-1}$$

$$\Lambda_m^0(H^+) = 349.1 S cm^2 mol^{-1}$$

36. (a) Arrange the following sets of compounds in increasing order according to the given instruction.

- (i) Phenol, 2-Nitrophenol, Cyclohexanol (acidic character)
(ii) Pentan-1-ol, n-Butane, Pentanal, Ethoxyethane (boiling points)

- (b) Describe the mechanism of hydration of ethane to yield ethanol.

- (c) Write Kolbe's reaction with an example.

OR

- (a) Explain the following name reactions with a suitable example.

- (i) Reimer-Tiemann reaction
(ii) Williamson's synthesis

- (b)(i) Haloalkanes are more soluble in organic solvent as compared to water, why?

- (ii) Grignard's reagent is prepared under anhydrous conditions, why?

- (iii) Phenol is more acidic than ethanol, why?

37. (a) Explain each of the following:

- (i) H_2Se is more acidic than H_2O .

- (ii) The electron gain enthalpy of Fluorine is less than Chlorine.

- (iii) Fluorine forms only one oxoacid, that is HOF

- (b) Draw the structure of



OR

- (a) Which neutral molecule would be isoelectronic with ClO^-

- (b) Why is ICl more reactive than I_2

- (c) Bond enthalpy of fluorine is lower than that of chlorine. Why?

- (d) Why do noble gases have very low boiling points?

- (e) What inspired N. Bartlett for carrying out reaction between Xe and PtF_6 .