SY-225

Reg. No.

Name : .

SECOND YEAR HIGHER SECONDARY EXAMINATION, MARCH 2026

Part – III

Time : 2 Hours

CHEMISTRY

Cool-off time : 15 Minutes

Maximum : 60 Scores

General Instructions to Candidates :

- There is a 'Cool-off time' of 15 minutes in addition to the writing time.
- Use the 'Cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും 'കൂൾ ഓഫ് ടൈം' ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിനു മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

Answer any 4 questions from 1 to 5. Each carries 1 score. ($4 \times 1 = 4$)

1. In the electrolysis of molten NaCl, the substance liberated at the cathode is :

   (a) Cl_2 (b) Na

   (c) H_2 (d) O_2

2. The half-life of a first-order reaction depends on :

   (a) Initial concentration (b) Temperature only

   (c) Rate constant (d) Both (a) and (c)

3. Which of the following is a chelating ligand ?

   (a) NH_3 (b) H_2O

   (c) Cl^- (d) $C_2O_4^{2-}$

4. Which of the following is least reactive towards nucleophilic substitution(S_N1) ?

   (a) Benzyl chloride

   (b) Methyl chloride

   (c) Chlorobenzene

   (d) Allyl chloride

5. Which of the following is a polysaccharide ?

   (a) maltose

   (b) sucrose

   (c) fructose

   (d) cellulose

Answer any eight questions from 6 to 15. Each carries 2 scores. **(8 × 2 = 16)**

6. Why saline water is mixed with medicine before injected into the blood of a patient ?

7. The standard electrode potential for Daniel cell is 1.1 V. Calculate the standard Gibbs Energy change for the reaction : $Zn\ (s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu\ (s)$.

8. (i) Define activation energy. **(1)**

   (ii) Explain the effect of catalyst on the rate of chemical reaction. **(1)**

9. The initial concentration of the first order reaction,

   $N_2O_5\ (g) \rightarrow 2NO_2\ (g) + \frac{1}{2}\ O_2\ (g)$, was 1.24×10^{-2} $molL^{-1}$ at 300 K. The concentration of N_2O_5 after 60 minutes was 0.20×10^{-2} $molL^{-1}$. Calculate the rate constant of the reaction at 300 K.

10. Identify the products X and Y formed in the following reactions :

    (i) $CH_3CH_2OH + PCl_5 \rightarrow X + POCl_3 + HCl$ **(1)**

    (ii) $CH_3Br + AgF \rightarrow Y + AgBr$ **(1)**

11. Give two differences between S_N1 and S_N2 reactions.

12. (i) In the presence of light, chloroform is slowly oxidised by air to an extremely poisonous gas called _____. **(1)**

    (ii) How is chlorobenzene converted into l-chloro-2-methyl benzene ? **(1)**

13. How methanol is prepared industrially ? Write the chemical equation.

14. Give one chemical test to distinguish between formaldehyde and acetaldehyde.

15. How will you convert nitrobenzene to 2, 4, 6-Tribromo aniline ?

Answer any eight questions from 16 to 26. Each carries 3 scores. **(8 × 3 = 24)**

16. 200 cm^3 of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be 2.57×10^{-3} bar. Calculate the molar mass of the protein. ($R = 0.083$ L bar mol^{-1} K^{-1})

17. Briefly explain the electrochemical processes involved in the rusting of iron.

18. (i) Write any two differences between order and molecularity. **(2)**

    (ii) What do you mean by pseudo order reaction ? **(1)**

19. Give reasons for the following :

    (i) Zn, Cd and Hg are not considered transition elements. **(1)**

    (ii) Transition metals form complex compounds. **(1)**

    (iii) Sc^{3+} is colourless, but Ti^{3+} is coloured. **(1)**

20. How do you prepare $K_2 Cr_2 O_7$ from chromite ore ?

21. (i) $[Ni(CN)_4]^{2-}$ and $[Ni(CO)_4]$ have different structures, but do not differ in their magnetic behaviour. Explain. **(2)**

    (ii) Write the formula of Tetraamineaquachloridocobalt(III)chloride. **(1)**

22. (i) Draw the diagram which indicates the splitting of d-orbitals in tetrahedral field. (2)

(ii) Write any one limitation of valance bond theory. (1)

23. Name the products formed when phenol is treated with the following reagents :

(i) Bromine water

(ii) Zinc dust

(iii) Conc. HNO_3

24. Complete the following table :

Sl. No	Reactant	Reagent	Major product	Name of reaction
1	RCOCl	H_2,Pd/$BaSO_4$	_____	_____
2	CH_3COOH	Cl_2/Red P	_____	_____
3	CH_3CHO	_____	_____	Clemmensen reduction

25. (i) The reaction in which an amide is converted into a primary amine by the action of Br_2 and alcoholic NaOH is known as _____. (1)

(ii) How is a primary amine distinguished from a secondary amine using Hinsberg test ? (2)

26. (i) Differentiate between globular and fibrous proteins. (2)

(ii) What is meant by denaturation of protein ? (1)

Answer any four questions from 27 to 31. Each carries 4 scores **(4 × 4 = 16)**

27. (i) State Henry's Law. Give two applications of it. (2)

(ii) Draw the vapour pressure-mole fraction curve for a non-ideal solution having positive deviation, if A and B are the two volatile components. (2)

28. (i) Write the cell reaction and Nernst equation for a Daniel cell. (2)

(ii) Explain the variation of conductivity and molar conductivity of a solution with dilution. (2)

29. (i) Write two postulates of Werner's Coordination theory. (2)

(ii) Draw the geometrical isomers of $[Co(NH_3)_3 (NO_2)_3]$ and give their structures. (2)

30. (i) Predict the products A and B

$$3CH_3 - CH = CH_2 + (H - BH_2)_2 \rightarrow A \xrightarrow{H_2O_2/OH^-} B.$$ (2)

(ii) Explain the preparation of phenol from cumene. (2)

31. (i) Explain Aldol condensation with example. (2)

(ii) How are the following conversions achieved

(a) Benzene → Benzaldehyde

(b) Ethanoic acid → ethanol (2)