SECOND YEAR HIGHER SECONDARY
MODEL EXAMINATION, FEBRUARY 2023

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.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്ലിയിട്ടുണ്ട്.
- 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. Identify the order of the reaction if the unit of its rate constant is mol $L^{-1}s^{-1}$.

2. Zirconium and Hafnium have similar chemical properties. This is due to _____.

3. Give an example for a polydentate ligand.

4. Which among the following compounds do not contain an alpha hydrogen ?

   (a) Propanone

   (b) Ethanal

   (c) Ethanol

   (d) Benzaldehyde

5. A polyhalogen compound is _____.

   (a) Chloroform

   (b) Chlorobenzene

   (c) Chloroethane

   (d) Iodobenzene

Answer any 8 questions from 6 – 15. Each carries 2 scores. $(8 \times 2 = 16)$

6. (i) State Raoult's Law.   **(1)**

   (ii) Give an example for a solution which show positive deviation from Raoult's law. **(1)**

7. What are isotonic solutions ? Give an example.

8. Write the anode reaction, cathode reaction and net cell reaction of Daniel Cell.

9. A first order reaction has a rate constant $1.15 \times 10^{-3}s^{-1}$. How long will it take for 5g of the reactant to decrease to 3g ?

10. Write the IUPAC name of the following co-ordination compounds.

    (a) $K_3[Fe(CN)_6]$ **(1)**

    (b) $[Ni(CO)_4]$ **(1)**

11. Chloroform is stored in closed, dark coloured bottles completely filled up to the neck. Why ?

12. Phenols are acidic in nature. Give reason.

13. What is meant by diazotization reaction ?

14. Most transition metals form coloured compounds. Why ?

15. Write two differences between DNA and RNA.

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

16. (i) Which of the following is a secondary cell ?

    (a)   Daniel cell

    (b)   Dry cell

    (c)   Lead storage battery   **(1)**

   (ii) What is a fuel cell ?   **(1)**

   (iii) Write the overall cell reaction of a $H_2 - O_2$ fuel cell.   **(1)**

17. The effect of temperature on the rate of a reaction is given by Arrhenius equation.

   (i)   Write the Arrhenius equation.   (1)

   (ii) Define activation energy.   (1)

   (iii) Write the integrated rate expression for a zero order reaction.   (1)

18. Hydrolysis of ester is a pseudo first order reaction.

   (i)   What do you mean by a pseudo first order reaction ?   (1)

   (ii) The molecularity of the reaction

         $2NO + O_2 \longrightarrow 2NO_2$ is _____.   (1)

   (iii) The rate expression for a reaction is $k = [A]^2 [B]^{1/2}$. Find the order of the reaction. (1)

19. (i)   Mention the industrial preparation of $KMnO_4$ from MnO_2.   (2)

   (ii) Draw the structure of Dichromate ion.   (1)

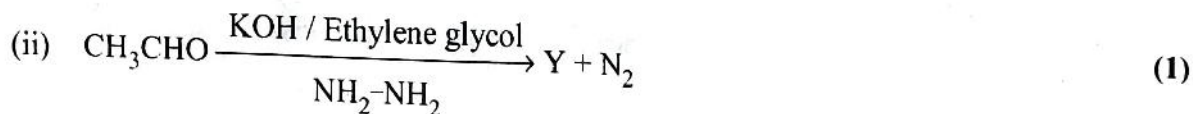20. (i)   Explain one difference between double salt and a co-ordination compound ? (2)

   (ii) What is the co-ordination number of nickel in $[Ni(CN)_4]^{2-}$?   (1)

21. (i)   Mention two reactions that show the acidic character of alcohols.   (2)

   (ii) Name the product obtained when phenol is treated with a mixture of concentrated HNO_3 and concentrated H_2SO_4. (1)

22. Explain hydroboration oxidation reaction of propene with the help of a chemical equation. (3)

23. Identify X, Y, Z in the following reactions :

(i)

COOH on benzene ring $\xrightarrow[\text{Con·H}_2\text{SO}_4]{\text{Con·HNO}_3}$ X   (1)

(ii) $CH_3CHO \xrightarrow[\text{NH}_2-\text{NH}_2]{\text{KOH / Ethylene glycol}} Y + N_2$ (1)

(iii)

COCl on benzene ring $\xrightarrow[\text{Pd} - \text{BaSO}_4]{\text{H}_2} Z + HCl$ (1)

24. (i) How can you prepare Benzaldehyde by Etard reaction ?   (1½)

(ii) Identify the product obtained by the reaction between acetic acid and ethanol ? What is the name of this reaction ?   (1½)

25. (i) What is Hinsberg Reagent Chemically ?   (1)

(ii) What is it used for ? Explain your answer.   (2)

26. (i) Name a fat soluble vitamin ? Which disease is caused by its deficiency ?   (2)

(ii) Name the enzyme used for the conversation of sucrose to glucose and fructose.   (1)

Answer any 4 questions from 27 to 31. Each carries 4 scores.   ($4 \times 4 = 16$)

27. Abnormal values are obtained for certain solutes during the determination of molecular mass by colligative property method.

(i) Mention two reasons for the abnormal molecular mass values.   (1)

(ii) How can this abnormal molecular mass be corrected ? Substantiate your answer.   (2)

(iii) Write any one application of reverse osmosis.   (1)

28. (i) Define galvanic cell. (1)

(ii) Corrosion may be considered as an electro chemical process. Why ? (2)

(iii) Mention two ways to prevent corrosion. (1)

29. (i) Draw the geometrical isomers of $[Pt(NH_3)_2Cl_2]$ and label them as cis and trans. (2)

(ii) Explain homoleptic and heteroleptic complexes. (2)

30. (i) Explain the Friedel-Crafts alkylation reaction of chlorobenzene. Mention the major product in this reaction. (2)

(ii) Identify X and Y in the reaction given below.

(a)

(1)

(b) $CH_3 - Cl + NaI \xrightarrow{\text{Acetone}} Y + NaCl$ (1)
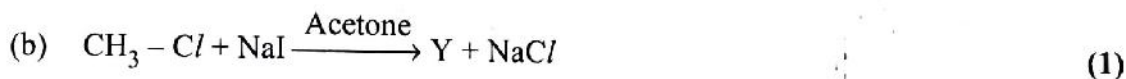
31. Explain the following reactions.

(i) Cannizzaro's reaction (1½)

(ii) Aldol condensation (1½)

(iii) Which among CH_3COOH and $CH_2ClCOOH$ is more acidic ? (1)