ME 625

Reg. No. : .....

Name : .....

FIRST YEAR HIGHER SECONDARY MODEL EXAMINATION, JUNE 2022

Part – III

CHEMISTRY

Maximum : 60 Scores

Time : 2 Hours

Cool-off Time : 15 Minutes

General Instructions to Candidates :

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

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിട്ട് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

Score

Answer any 8 questions from 1 to 11. Each carries 2 scores : **(8×2=16)**

1. Write any two properties of cathode rays.

2. i) Mention the principle which restricts the number of electrons in an orbital as two. **(1)**

   ii) Define orbital. **(1)**

3. Explain sp^3 hybridisation. Give an example of a molecule in which the central atom is in sp^3 hybridisation.

4. Explain the structure of H_2O molecule on the basis of VSEPR theory.

5. i) Define oxidation and reduction in terms of oxidation number. **(1)**

   ii) Identify the oxidising and reducing agent in the following redox reaction

   $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$. **(1)**

6. i) Which one of the following is an electron precise covalent hydride ?

   (a) CH_4 (b) B_2H_6

   (c) H_2O (d) NH_3 **(1)**

   ii) What is Calgon ? **(1)**

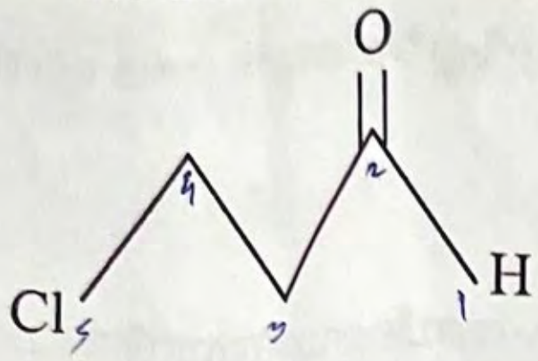
7. Match the following :

Column A	Column B
(a) Quick lime	(p) $CaSO_4$
(b) Plaster of Paris	(q) $CaSO_4.2H_2O$
(c) Dead burnt plaster	(r) CaO
(d) Gypsum	(s) $CaSO_4.\frac{1}{2}H_2O$

Score

8. Discuss the structure and bonding in diborane (B_2H_6) molecule.

9. i) Write the IUPAC name of



(1)

ii) Draw the structure of pent-3-en-2-ol. (1)

10. i) Arrange the following carbocations in the increasing order of their stability

$CH_3 - \overset{+}{C}H_2$, $(CH_3)_3\overset{+}{C}$, $\overset{+}{C}H_3$, $(CH_3)_2\overset{+}{C}H$ (1)

ii) Name the factors which influence the stability of carbocations. (1)

11. Mention any two applications of green chemistry in day to day life.

Answer any 8 questions from 12 to 23. Each carries 3 scores : (8×3=24)

12. A compound contains 4.07% hydrogen, 24.27% carbon and 71.65% chlorine. Its molar mass is 98.96 g. What are its empirical and molecular formulas ?

13. i) Distinguish molarity and molality of a solution. (2)

ii) Among molarity and molality which one is temperature dependent ? (1)

14. i) What are representative elements ? (1)

ii) What are isoelectronic species ? Give suitable examples. (2)

15. i) Define electron gain enthalpy. (1)

ii) Chlorine has more negative electron gain enthalpy than flourine. Explain. (2)

16. Write the postulates of kinetic molecular theory of gases.

Score

17. i) A vessel of 120 ml capacity contains a certain amount of gas at 35°C and 1.2 bar pressure. The gas is transferred to another vessel of volume 180 ml at 35°C. What would be its pressure ? (2)

ii) What is the effect of temperature on viscosity of liquids ? (1)

18. i) An example for intensive property is

(a) Mass

(b) Volume

(c) Density

(d) Heat capacity (1)

ii) Calculate standard enthalpy of formation ($\Delta H_f°$) of CO from the following data using Hess's law.

$C_{(graphite, s)} + O_{2(g)} \rightarrow CO_{2(g)}$ $\Delta_r H° = -393.5$ kJ mol^{-1}

$CO_{(g)} + \frac{1}{2} O_{2(g)} \rightarrow CO_{2(g)}$ $\Delta_r H° = -283.0$ kJ mol^{-1} (2)

19. Account for the following :

i) $AlCl_3$ can act as Lewis acid. (1)

ii) pH of NH_4Cl in water is less than 7. (1)

iii) Addition of acetate ions to acetic acid decreases the concentration of hydrogen ions [H^+]. (1)

20. i) Name the different types of redox reactions. (2)

ii) Write the chemical reaction takes place when Zn rod is dipped in dil HCl. (1)

Score

21. i) What is temporary hardness ? (1)

ii) Suggest two methods for the removal of temporary hardness. (2)

22. i) Write the major and minor products formed in the following reaction :

$CH_3 - CH = CH_2 + H - Br \rightarrow$ (2)

ii) Write the rule which governs the formation of major product. (1)

23. Define the following terms :

i) Green house effect. (1)

ii) Biological Oxygen Demand (BOD). (1)

iii) Eutrophication. (1)

Answer any 5 questions from 24 to 31. Each carries 4 scores : **(5×4=20)**

24. i) Discuss the postulates of Bohr model of hydrogen atom. (3)

ii) Using s, p, d, f notations describe the orbital with the following quantum numbers :

a) $n = 2, l = 1$. = 2P (½)

b) $n = 3, l = 2$. 3d (½)

25. i) Represent the MO configuration of N_2 molecule. (2)

ii) Differentiate intermolecular and intramolecular hydrogen bonding using suitable example. (2)

26. i) State the first law of thermodynamics and write its mathematical expression. (2)

ii) Define Gibb's energy. (1)

iii) Give the relationship between the Gibb's energy change (ΔG) and entropy change (ΔS) of a reaction. (1)

Score

27. i) State Le-Chatelier's principle. (1)

ii) Dihydrogen gas is obtained from natural gas by partial oxidation with steam as per following endothermic reaction.

$CH_{4(g)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + 3H_{2(g)}$

Write an expression for Kp for the above reaction. (1)

iii) Describe the effect of the following in the equilibrium.

$CH_{4(g)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + 3H_{2(g)}$.

a) Increasing the pressure. (1)

b) Increasing the temperature. (1)

28. i) Describe the Solvay process for the manufacture of sodium carbonate. ($Na_2CO_3 \cdot 10H_2O$). (2)

ii) Beryllium shows anomalous properties. Give reason. (2)

29. i) What is borax bead test ? (2)

ii) CCl_4 cannot be hydrolysed by water. Why ? (1)

iii) CO_2 is a gas but SiO_2 is a solid. Explain. (1)

30. i) Name a method used for the estimation of nitrogen in an organic compound. (1)

ii) How will you detect the presence of chlorine in an organic compound ? (2)

iii) Suggest a method used for the separation of chloroform and aniline. (1)

31. i) Discuss the Huckel rule for aromaticity. (2)

ii) Draw the Sawhorse projection formula for the eclipsed and staggered conformations of ethane. (2)
