Reg. No. : .....

Name : .....

FY-25

FIRST YEAR HIGHER SECONDARY EXAMINATION, JUNE 2022

Part – III

CHEMISTRY

Time : 2 Hours

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 നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

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

1. (i) Choose the correct set of quantum numbers from the following :

(A) $n = 1, l = 0, m = 0, s = +\frac{1}{2}$

(B) $n = 2, l = 2, m = -2, s = +\frac{1}{2}$

(C) $n = 3, l = 1, m = -2, s = 1$

(D) $n = 1, l = 1, m = -1, s = -\frac{1}{2}$ **1**

(ii) Sketch the shape of 2s orbital. **1**

2. Calculate the wavelength of an electron moving with a velocity of 10 m/s. (mass of electron = 9.1×10^{-31} kg)

3. With the help of Fajans rules, explain why the ionic compound LiC*l* exhibit covalent character.

4. Complete the following table :

Molecule	Hybridisation of central atom	Shape of molecule
CH_4	sp^3	Tetrahedral
BF_3	_____	_____
SF_6	_____	_____

5. Consider the following redox reaction :

$Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)}$

Identify the oxidizing agent and reducing agent in the above reaction.

6. What is Heavy water ? Give any one use of it.

7. Match the compounds in Column A with their properties in Column B :

Column A	Column B
(a) $Na_2CO_3 \cdot 10\,H_2O$	(i) Forms plastic mass when water is added.
(b) $NaHCO_3$	(ii) Preparation of bleaching powder.
(c) $Ca(OH)_2$	(iii) Forms soda ash on heating.
(d) $CaSO_4 \cdot \frac{1}{2} H_2O$	(iv) Used in fire extinguishers

8. Explain the difference in properties of diamond and graphite on the basis of their structures.

9. Write the IUPAC names of the following compounds :

(i) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - CH_2 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - CH_3$ **1**

(ii) $CH_3 - \overset{\displaystyle O}{\overset{\|}{C}} - CH_2 - CH_2 - CH_2 - COOH$ **1**

10. Distinguish electrophiles from nucleophiles. Give one example for each of them.

11. What is acid rain ? Write any one of its adverse effect to the environment.

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

12.

(i) How many significant figures are present in 0.0025 ? **1**

(ii) State and illustrate the law of multiple proportions. **2**

13. Consider the reaction in which 3 g of hydrogen reacts with 30 g of oxygen to form water under suitable conditions.

(i) Find the number of moles of H_2 and O_2 respectively. **1**

(ii) Identify the limiting reagent and calculate the amount of water produced in the reaction. **2**

14. (i) Which of the following represents the general outer electronic configuration of group 15 elements ? **1**

(A) ns^2 (B) ns^2np^3

(C) ns^2np^4 (D) ns^2np^6

(ii) Explain the variation of the atomic radii of elements as we move from top to bottom in a group in the periodic table. Give reason. **2**

15. (i) Define electronegativity. **1**

(ii) Name any one scale to express the electronegativity of elements. **1**

(iii) Which is the most electronegative element in the periodic table ? **1**

16. Derive ideal gas equation.

17. (i) What is meant by critical temperature of a gas ? **1**

(ii) Critical temperatures of two gases A & B are 5.3 K and 405.5 K respectively. Which one of this can be liquified easily ? Give reason. **2**

18. (i) Which of the following is not correct for the isothermal and free expansion of an ideal gas ?

(A) $W = 0$ (B) $q = 0$

(C) $P_{ex} = 0$ (D) $\Delta U \neq 0$ **1**

(ii) Calculate the amount of work done during the expansion of an ideal gas from 2 litre to 10 litre against a constant external pressure of 1 atm. **2**

19. (i) For a chemical reaction, the reaction quotient (Q_c) is greater than the equilibrium constant (K_c). Predict the direction of reaction. **1**

(ii) Predict the effect of change in pressure and temperature in the following reaction at equilibrium :

$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}, \Delta H = -92.38 \text{ kJ/mol.}$$ **2**

20. Balance the following redox reaction in acidic medium :

$$Fe^{2+}_{(aq)} + Cr_2O^{2-}_{7\,(aq)} \rightarrow Fe^{3+}_{(aq)} + Cr^{3+}_{(aq)}$$

21. Explain the classification of hydrides by citing suitable examples

22. (i) Which of the following compound does not show cis-trans isomerism ?

(A) $CHCl = CHCl$ (B) $CH_3CH = CHCH_3$

(C) $CH_3CCl = CCl\,CH_3$ (D) $(CH_3)_2\,C = CHC_2H_5$ **1**

(ii) Draw the Newman projections of eclipsed and staggered conformations of ethane. **2**

23 (i) Excess concentration of which of the following in water causes the disease called 'Blue baby syndrome' ?

(A) Fluoride (B) Chloride

(C) Nitrate (D) Sulphate **1**

(ii) What is smog ? How is classical smog different from photochemical smog ? **2**

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

24. Write the postulates of Bohr's model for Hydrogen atom. Mention any two demerits of the model.

25 Write the molecular orbital configuration of N_2. Calculate its bond order and predict its magnetic behaviour.

26 (i) Define entropy. **1**

(ii) Explain by giving reason whether entropy increases or decreases in the following processes :

(a) A liquid crystallises into a solid. **1**

(b) Temperature of a crystalline solid is raised from 0 K to 115 K. **1**

(iii) Write the equation showing the relationship between entropy and Gibb's energy. **1**

27. (i) Which of the following is a Lewis acid ?

(A) HO^- (B) F^-

(C) NH_3 (D) BCl_3 **1**

(ii) What are buffer solutions ? Give example. **2**

(iii) Which of the following is a salt of weak acid and strong base ?

(A) CH_3COONa (B) NH_4Cl

(C) CH_3COONH_4 (D) $(NH_4)_2SO_4$ **1**

28. (i) Write any two similarities between Lithium and Magnesium. **2**

(ii) Describe the biological importance of sodium and calcium. **2**

29. What happens when :

(i) Borax is heated. **2**

(ii) Boric acid is added to water. **1**

(iii) Diborane is treated with ammonia. **1**

30. (i) Which of the following method is used for the quantitative estimation of halogens in an organic compound ?

(A) Dumas method (B) Kjeldahl's method

(C) Carius method (D) Lassaigne's method **1**

(ii) Briefly explain the principles of the following techniques used in the purification of organic compound :

(a) Sublimation **1**

(b) Crystallization **1**

(c) Distillation **1**

31. (i) Propene reacts with HBr to form a mixture of two products. Identify and write the major and minor product in the mixture. **2**

(ii) Complete the following equations :

(a)  $+ CH_3Cl \xrightarrow{\text{Anhydrous } AlCl_3} ?$ **1**

(b)  $+ 3H_2 \xrightarrow[\Delta]{Ni} ?$ **1**