

Reg. No. :

Name :

FY-25

FIRST YEAR HIGHER SECONDARY EXAMINATION, JUNE 2022

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 കുട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- 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

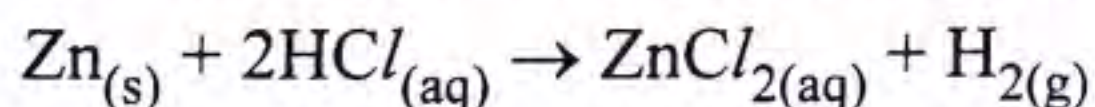
2. Calculate the wavelength of an electron moving with a velocity of 10 m/s. (mass of electron = 9.1×10^{-31} kg)

3. With the help of Fajans rules, explain why the ionic compound LiCl 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 :



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

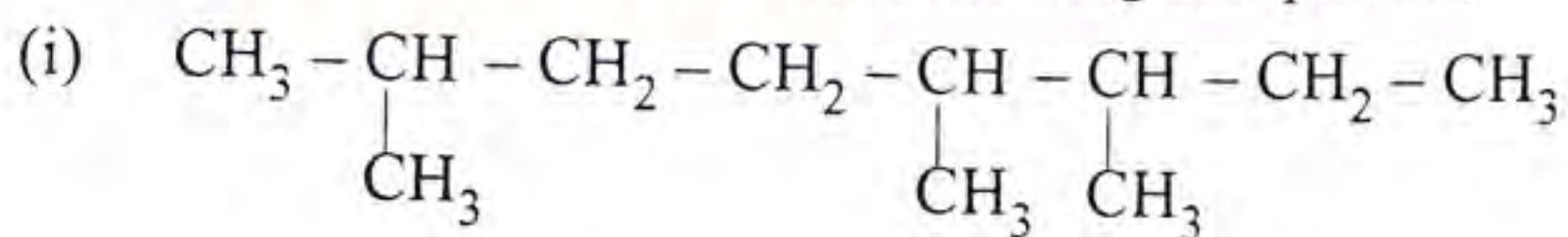
6. What is Heavy water ? Give any one use of it.

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

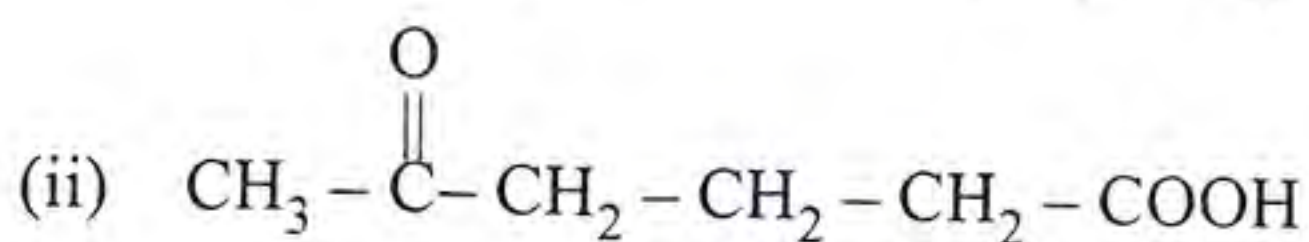
Column A	Column B
(a) Na ₂ CO ₃ · 10 H ₂ O	(i) Forms plastic mass when water is added.
(b) NaHCO ₃	(ii) Preparation of bleaching powder.
(c) Ca(OH) ₂	(iii) Forms soda ash on heating.
(d) CaSO ₄ · $\frac{1}{2}$ H ₂ O	(iv) Used in fire extinguishers

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 :



1



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) $P_{\text{ex}} = 0$ (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 :

$$\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightleftharpoons 2\text{NH}_{3(g)}, \Delta H = -92.38 \text{ kJ/mol.}$$
 2
20. Balance the following redox reaction in acidic medium :

$$\text{Fe}_{(\text{aq})}^{2+} + \text{Cr}_2\text{O}_7^{2-}{}_{(\text{aq})} \rightarrow \text{Fe}_{(\text{aq})}^{3+} + \text{Cr}_{(\text{aq})}^{3+}$$
21. Explain the classification of hydrides by citing suitable examples
22. (i) Which of the following compound does not show cis-trans isomerism ?
 (A) $\text{CHCl} = \text{CHCl}$ (B) $\text{CH}_3\text{CH} = \text{CHCH}_3$
 (C) $\text{CH}_3\text{CCl} = \text{CClCH}_3$ (D) $(\text{CH}_3)_2\text{C} = \text{CHC}_2\text{H}_5$ 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
- (ii) What is smog ? How is classical smog different from photochemical smog ?

1

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

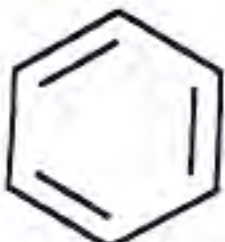
(iii) Which of the following is a salt of weak acid and strong base ?

(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)  + $\text{CH}_3\text{Cl} \xrightarrow{\text{Anhydrous AlCl}_3} ?$ 1
- (b)  + $3\text{H}_2 \xrightarrow[\Delta]{\text{Ni}} ?$ 1
- _____