

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 കൂട്ടലുകൾ, 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

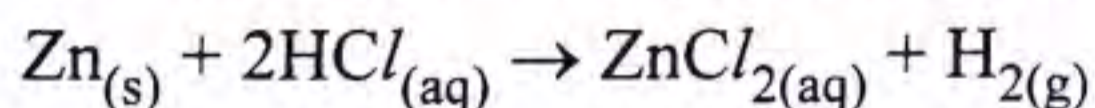
2. Calculate the wavelength of an electron moving with a velocity of 10 m/s. (mass of electron =  $9.1 \times 10^{-31}$  kg)

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 <sub>4</sub>	sp <sup>3</sup>	Tetrahedral
BF <sub>3</sub>	_____	_____
SF <sub>6</sub>	_____	_____

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.

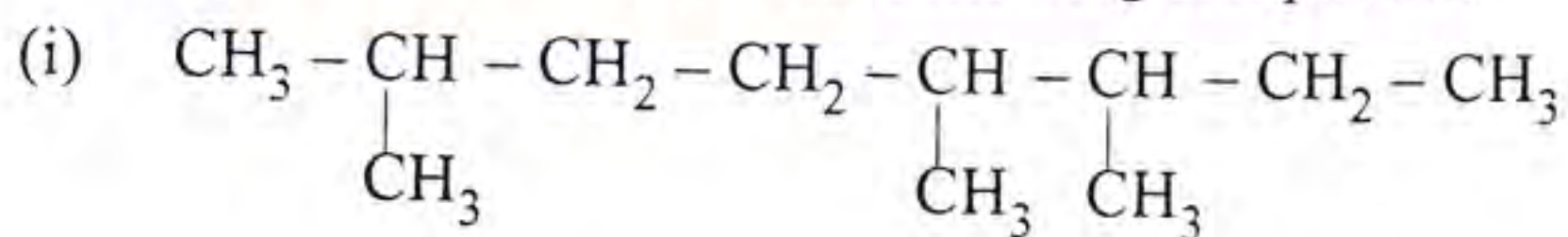
7. Match the compounds in Column A with their properties in Column B :

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

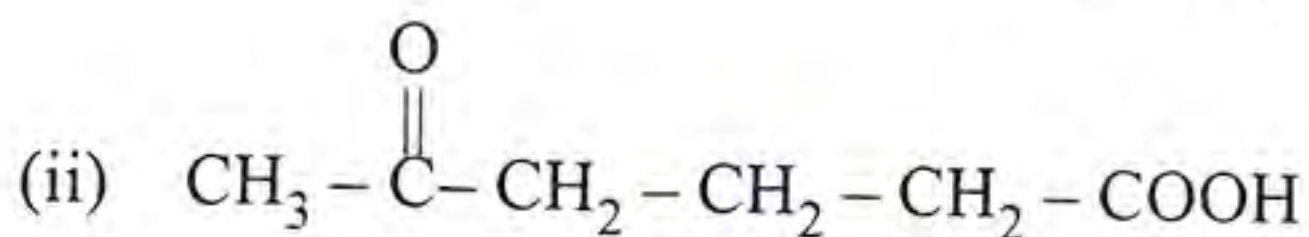


8. Explain the difference in properties of diamond and graphite on the basis of their structures.

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  $\text{H}_2$  and  $\text{O}_2$  respectively.

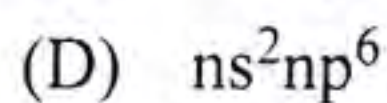
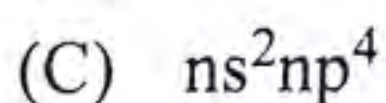
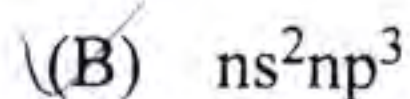
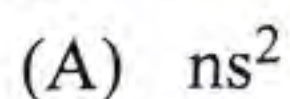
1

(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



(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 :
- $$Fe_{(aq)}^{2+} + Cr_2O_7^{2-}_{(aq)} \rightarrow Fe_{(aq)}^{3+} + Cr_{(aq)}^{3+}$$
21. Explain the classification of hydrides by citing suitable examples
22. (i) Which of the following compound does not show cis-trans isomerism ?  
(A)  $CHCl = CHCl$  (B)  $CH_3CH = CHCH_3$   
(C)  $CH_3CCl = CClCH_3$  (D)  $(CH_3)_2C = CHC_2H_5$  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
- (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 :

