

FY-125 Chemistry – First Year HSE March 2026

FIRST YEAR HIGHER SECONDARY EXAMINATION, MARCH 2026

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.
- 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.
- ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും 'കൂൾ ഓഫ് ടൈം' ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിനു 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 4 questions from 1 to 5. Each carries 1 score. ($4 \times 1 = 4$)

- Find the number of significant figures in the measurement, 0.04597 g.
- According to Pauling scale, the element with the highest electronegativity is _____.
- Identify the incorrect Lewis structure.
(a) $\ddot{\text{O}} = \text{C} = \ddot{\text{O}}$ (b) $\text{N}^+ = \ddot{\text{O}}$
(c) $\text{N} \equiv \text{N} :$ (d) $\text{H} - \text{C} \equiv \text{C} - \text{H}$
- Equilibrium constant (K_{eq}) of a reaction depends on :
(a) temperature (b) pressure
(c) catalyst (d) initial concentration
- Write the structural formula of the given compound :
But-2-en-1-ol

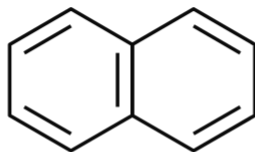
Answer any eight questions from 6 to 15. Each carries 2 scores. ($8 \times 2 = 16$)

- Balanced equation for the combustion of methane is :
 $\text{CH}_4(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$
If 96 g of methane undergoes complete combustion, calculate the mass of carbon dioxide produced.
- Calculate the radius of the third orbit of the hydrogen atom. ($a_0 = 52.9 \text{ pm}$)
- (i) Identify the correct electronic configuration of Carbon from the following : (1)
(a) $1s^2 2s^2 2p_x^2$
(b) $1s^2 2s^2 2p_x^1 2p_y^1$
(ii) Sketch the boundary surface diagram of p_x orbital. (1)
- Mention the two types of hydrogen bonding. Give one example for each type.
- Classify the following into state functions and path functions:
internal energy, heat, work, Gibbs energy
- Explain common ion effect with a suitable example.
- What is meant by disproportionation reactions ? Give one example.
- Explain the detection of sulphur in an organic compound by using sodium fusion extract.

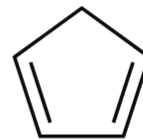
14. Which of the following compounds are aromatic according to Huckel's rule ?



I



II



III

Compounds I, II and III

15. Identify the organic compound formed in the following reactions :

(a) Benzene + CH_3Cl —(Anhyd. AlCl_3)→ (1)

(b) $\text{C}_2\text{H}_5\text{Br}$ + 2Na + BrC_2H_5 —(dry ether)→ (1)

Answer any eight questions from 16 to 26. Each carries 3 scores. ($8 \times 3 = 24$)

16. Define the following :

(i) atomic mass unit (1)

(ii) limiting reagent (1)

(iii) Molarity (1)

17. Explain the results obtained in the photoelectric effect experiment.

18. (i) How does the ionization enthalpy vary from top to bottom in a group in the periodic table ? Write the reason. (2)

(ii) Among Be, Mg and Ca,

(a) Which element has the highest first ionization enthalpy ? ($\frac{1}{2}$)

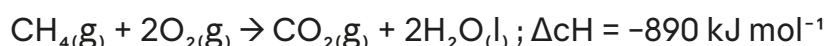
(b) Which element has the most metallic character ? ($\frac{1}{2}$)

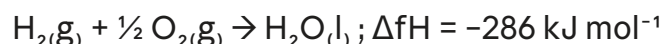
19. (i) Define electron gain enthalpy. (1)

(ii) Which among F and Cl has more negative electron gain enthalpy ? Give reason. (2)

20. Write the Molecular orbital configuration of N_2 . Calculate its bond order and also predict its magnetic behaviour.

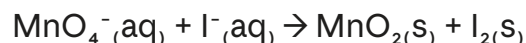
21. Calculate the standard enthalpy of formation of $\text{CH}_4(\text{g})$ from the following data :





22. What are buffer solutions ? Explain the types of buffer solution with the help of suitable examples.

23. Balance the following equation in basic medium :



24. Write the metamers of the compound $\text{C}_4\text{H}_{10}\text{O}$ and give their IUPAC names.

25. Draw Sawhorse projections for the eclipsed and staggered conformations of ethane. Which of these conformations is more stable ?

26. Predict the products obtained when $\text{CH}_3 - \text{CH} = \text{CH}_2$ reacts with the following reagents :

(i) H_2/Ni (1)

(ii) O_3 and then $\text{Zn}/\text{H}_2\text{O}$ (2)

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

27. Describe the information provided by all the four quantum numbers.

28. (i) Write two postulates of VSEPR theory. (1)

(ii) Based on VSEPR theory, explain the shapes of BF_3 , NH_3 & H_2O . (3)

29. (i) Define the following :

(a) Enthalpy (1)

(b) Entropy (1)

(ii) What are spontaneous processes ? Predict the sign of ΔG for such processes. (2)

30. (i) Consider the equilibrium : $\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightleftharpoons 2\text{NH}_{3(g)}$, $\Delta H^\circ = -92.4 \text{ kJ mol}^{-1}$

Explain the effect of pressure and temperature on this equilibrium. (2)

(ii) Calculate the pH of 0.02 M HCl. (2)

31. (i) Briefly explain the following :

(a) Electromeric effect (1)

(b) Inductive effect (1)

(ii) Differentiate homolytic fission from heterolytic fission. (2)