Indian School Al Wadi Al Kabir
Final Examination (2025-2026)

Class: XI | Subject: Chemistry (043) | Max. marks: 70
Date: 22/02/2026 | Set - I | Time: 3 hours

General Instructions:

Read the following instructions carefully.

(a) There are 33 questions in this question paper with internal choice.

(b) SECTION A consists of 16 multiple-choice questions carrying 1 mark each.

(c) SECTION B consists of 5 short-answer questions carrying 2 marks each.

(d) SECTION C consists of 7 short-answer questions carrying 3 marks each.

(e) SECTION D consists of 2 case-based questions carrying 4 marks each.

(f) SECTION E consists of 3 long answer questions carrying 5 marks each.

(g) All questions are compulsory.

(h) Use of log tables and calculators is not allowed.

Section-A

Questions 1 to 16 are multiple-choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

1. A hydrocarbon 'X' was found to contain 80% by mass of Carbon and its molar mass is 30 u. 'X' is _____ 1
   A. CH_4
   B. C_2H_4
   C. C_2H_6
   D. C_2H_2

2. $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$ 1
   What will be the volume of CO_2 liberated at STP by oxidation of 20 g of Glucose?
   (Molar mass of Glucose = 180 u; 1 mol of gas at STP occupies 22.4 L Volume)
   A.12L B. 22.4L
   C. 14.93L D. 16L

3. The uncertainty in the uncertainty principle is 1
   A. Position of electron
   B. Velocity of electron
   C. Momentum of an electron
   D. All of the above

4. As per the IUPAC, the element with atomic no 119 would be named as: 1

A. Ununseptium B. Ununennium
C. Ununoctium D. Unseptium

5. In NO_3^- ion, the number of bond pairs and lone pairs of electrons on the nitrogen atom is 1

A.2,2 B. 3,1
C. 1,3 D.4,0

6. The work done when three moles of an ideal gas undergo spontaneous expansion into a vacuum will be, 1

A. 5 Joules B. zero Joules
C. -6 Joules D. 9 Joules

7. Acidity of B_2H_6 can be explained based on which of the following concepts? 1

A. Arrhenius concept
B. Bronsted Lowry concept
C. Lewis concept
D. Bronsted Lowry, as well as the Lewis concept

8. Which of the following is a redox reaction? 1

A. $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$
B. $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl_2 + 2NH_4OH$
C. $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$
D. $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$

9. Consider the following reaction: 1

$Zn + Cu^{2+} \rightarrow Zn^{2+} Cu$

With reference to the above, which one of the following is the correct statement?

A. Zn is reduced to Zn^{2+}ions. B. Zn is oxidised to Zn^{2+}ions
C. Zn^{2+} ions are oxidised to Zn D. Cu^{2+}ions are oxidised to Cu

10 Distillation under reduced pressure is generally used to purify those liquids which 1

A. have very low boiling points.
B. is volatile.
C. have high boiling points and decompose below their boiling points.
D. have a large difference in their boiling points.

11. Out of the following, which one is the correct order of stability of carbocations? 1

A. 1° > 2° > 3° B. 3° > 2° > 1°
C. 2° > 3° > 1° D. 1° > 3° > 2°

12. Which of the following hydrocarbons has the highest boiling point? 1

A. Isobutane B. Butane
C. Neopentane D. n-Hexane

13. Assertion(A): Mg^{2+} is smaller than Na^{+} 1
Reason(R): The effective nuclear charge of Mg^{2+} is more than that of Na^{+}

Select the most appropriate answer from the options given below:
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

14. Assertion(A): In HF, the oxidation state of F is -1 1
Reason (R): F is the most electronegative and will exhibit an oxidation state of -1 in its compounds.

Select the most appropriate answer from the options given below:
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

15. Assertion (A): Carbocations are electron-deficient species. 1
Reason (R): Carbocations have a sextet of electrons in the valence shell of the positively charged carbon.

Select the most appropriate answer from the options given below:
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

16. Assertion: Acetylene is acidic in nature. 1
Reason: In acetylene, carbon is sp-hybridised.

Select the most appropriate answer from the options given below:
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, but R is not the correct explanation of A.
(C) A is true, but R is false.
(D) A is false, but R is true.

Section-B

Questions No. 17 to 21 are very short-answer questions, each carrying 2 marks.

17 A. A solution has been prepared by dissolving 5.6g of KOH to obtain 250 ml of solution. Calculate the molarity of the solution. (Atomic mass of K=39 u, O=16u, H=1u) 2

OR

B. How many grams of Cl_2 are required to react with 0.4 g of H_2 to yield HCl completely? Also, calculate the amount of HCl formed.

$H_2 + Cl_2 \longrightarrow 2HCl$
(atomic mass of H=1 U, Cl=35.5u)

18. (i) Out of O and S, which has a higher negative electron gain enthalpy, and why? 2
(ii) Arrange I, F, Cl, Br in the increasing order of atomic size.

19. What shapes are associated with the following hybrid orbitals? 2
(a) sp^2 (b) sp^3d (c) sp (d) sp^3d^2

20. (i) Explain why the reaction 2
$2H_2O_{2(aq)} \longrightarrow 2\ H_2O(l) + O_2\ (g)$ is considered as a disproportionation reaction.
(ii) Define oxidation and reduction in terms of electrons.

21. Draw the resonance structures of Aniline. 2

Section-C

Questions No. 22 to 28 are short-answer questions, carrying 3 marks each.

22. (a) Define a mole. 3
(b) Why is molarity temperature-dependent?
(c) Define molality.

23. (a) What will be the wavelength of the ball of mass 0.1 kg moving with a velocity of 10m/s? 3
($h=6.626x10^{-34}Js$)
(b) Define Pauli's exclusion principle.

24. (a) Write the general electronic configuration of group 17 elements. 3
(b) Explain why Be has a higher ionization enthalpy than B.
(c) Lithium shows a diagonal relationship with which element and why?

25. (a) Calculate the temperature above which the reduction of metal oxide becomes spontaneous. 3
$MO + C \longrightarrow M + CO$
Given $\triangle H=180$ kJ/mol; $\triangle S=90$ J/K/mol
(b) What is meant by the enthalpy of formation?

26. (a) What will be the value of $\Delta G^{\ominus}$ for the reaction $A + B \rightleftharpoons C + D$ 3
($R = 8.314JK^{-1}mol^{-1}$) $Kc = 10^2$
(b) Calculate the pH of a solution whose $[H_3O^+]$ is 10^{-4}.

27. 3

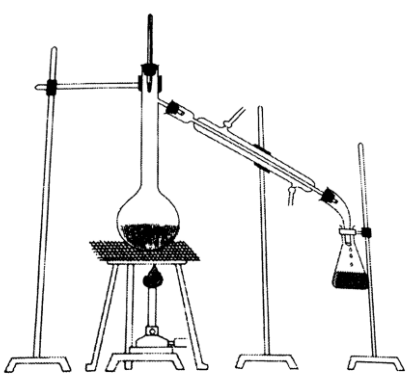
Attempt **any 3** questions from the following.

(a) Draw the structure of 3-Oxopentanal.

(b) Which among the following free radicals is more stable and why?

$(C_6H_5)_2\dot{C}H$ or $C_6H_5\dot{C}H_2$

(c) Identify the separation technique shown in the diagram? What is the criterion to use this method?

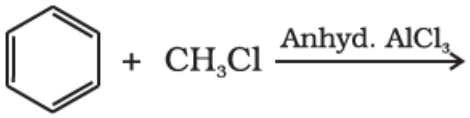


(d) What is a nucleophile? Give one example.

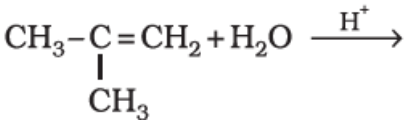
28. 3

(a) Give the main product of the following reaction

(i)



(ii)



(b) Why does Benzene show electrophilic substitution?

(c) How will you convert Benzene to Acetophenone?

Section D

Questions No. 29 & 30 are case-based/data-based questions carrying 4 marks each.

29. Orbitals are regions or spaces where there is maximum probability of finding the electrons. Qualitatively, these orbitals can be distinguished by their size, shape, and orientation. An orbital of smaller size means there is a greater chance of finding the electron near the nucleus. Shape and orientation mean the direction in which the probability of finding an electron is maximum. Atomic orbitals can be distinguished by Quantum numbers. Each orbital is designated by three Quantum numbers n, l, and m*l*, which define energy, shape, and orientation, but these are not sufficient to explain the spectra of multi-electron systems. The spin quantum number determines the spin of electrons. Spin angular momentum of an electron has two orientations related to the chosen axis, which are distinguished by spin quantum numbers, m_s, which can take values + ½ and -½ 4

Based on the information provided above, answer the following questions:

I. How many orbitals are present in the 3rd shell? How many electrons can be accommodated in them to the maximum?

II. Write the electronic configuration of Cu^+(Atomic number =29)

OR

Write the electronic configuration of Cr^{3+} (Atomic number =24)

III. a. How many radial and angular nodes are present in the 2p orbital?

b. Draw the shape of the dz^2 orbital.

30. Thermodynamics involves energy changes in chemical reactions and other processes. Internal energy is total energy stored in a substance. We can specify the absolute value of volume, but not the absolute value of internal energy. We can measure only the change in internal energy. Work done on the system is taken as positive and work done by the system is taken as negative, heat absorbed by the system is positive and heat given out by the system is negative $\Delta U = Q + W$ according to the first law of thermodynamics. ΔH is measured at constant pressure. ΔU is measured at constant volume. ΔS, ΔG, ΔH and temperature helps to decide spontaneity of the process. 4

I. For an Equilibrium $H_2O(l) \rightleftharpoons H_2O(g)$ What is the sign of ΔH and ΔS?

OR

(a) What is the criterion for spontaneity in terms of entropy change?

(b) For the process, $2H(g) \longrightarrow H_2(g)$, what is the sign of ΔS?

II. Why does an ideal crystal have the lowest entropy, and a gaseous state have the highest entropy?

II. If 701 J of heat is absorbed by the system and 394 J of work is done by the system, what is the value of ΔU?

Section-E

Questions No. 31 to 33 are long-answer type questions carrying 5 marks each.

31. Attempt either A or B 5

A.

I. Arrange the compounds in the increasing order of bond angle - CCl_4, $BeCl_2$, BCl_3.

II. Find the bond order of N_2 using molecular orbital theory.

III. Describe hybridisation in the SF_6 molecule.

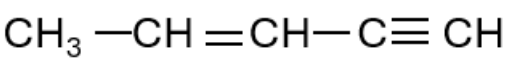
OR

B.

I. Give a reason: SO_2 is angular but SO_3 is planar

II. Find the bond order in F_2 using Molecular orbital theory.

III.What is the total number of σ and Π bonds in



32. Attempt either A or B 5

A. Answer the following questions:

I. How can you predict whether the net reaction proceeds in the forward reaction by comparing the values of Kc and Qc?

II. (a) Based on Le Chatelier's principle, explain how the pressure can be adjusted to increase the yield of Ammonia in the following reaction.

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

(b) What will be the effect of the addition of Argon to the above reaction mixture at constant volume?

III. An equilibrium mixture

$2SO_2 + O_2 \rightleftharpoons 2\ SO_3$ contained in a 1 L flask at 600 ^{0}C was found to contain 0.5 mol of SO_2, 0.1 mol of O_2, and 5 mol of SO_2.Calculate Kc at 600^0 C

OR

B. Answer the following questions:

I. What are buffer solutions? Give an example of an acidic buffer.

II. Consider the reaction

$$½\ N_2 + O_2 \rightleftharpoons NO_2 + \text{heat.}$$

What is the effect of the following on the equilibrium?

(i) Decrease in temperature

(ii) Addition of N_2

(iii) Decrease in concentration of O_2

III. Write the expression for Kp for the reaction

$$CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$$

33. Attempt either A or B. 5

A. Answer the following questions:

I. Complete the reaction

$C_2H_2 + 2HBr$

II. How would you carry out the reaction:

Benzene to Nitrobenzene

III. Write the mechanism of the addition of HBr to Propene.

OR

B. Answer the following questions:

I. Write the equations for the following reactions.
   (a) 1-Bromopropane is heated with alcoholic KOH
   (b) Benzene is treated with concentrated Sulphuric acid and Nitric acid
   (c) Ethene is treated with an aqueous potassium permanganate solution (cold)

II. Give the reaction involved in the preparation of propane from $CH_3CH_2CH_2COONa$.

III. Compound A reacts with Ozone followed by Zn/H_2O, to give two moles of CH_3CHO. Identify A and write the reaction involved.