Indian School Al Wadi Al Kabir

Assessment – 2 (2025-2026)

Class: XI | Subject: Chemistry (043) | Max. marks: 70
Date:30/11/2025 | Set - I | Time: 3 Hours

General Instructions:

Read the following instructions carefully.

1. There are 33 questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 short-answer questions carrying 2 marks each.
4. SECTION C consists of 7 short-answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long-answer questions carrying 5 marks each.
7. All questions are compulsory.
8. 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 Which has the maximum number of atoms? **1**
A. 24 g of C (atomic mass of C=12u)
B. 56 g of Fe (Atomic mass of Fe =56u)
C. 27 g of Al (Atomic mass of Al=27u)
D. 108 g of Ag (Atomic mass of Ag =108 u)

2 Which of the following terms are unitless? **1**
A. Molality B. Molarity C. Mole fraction D. Density

3 An electron has a principal quantum number of 3. The number of its (i) subshells and (ii) orbitals would be respectively: **1**
A. 3 and 5 B. 3 and 7 C. 3 and 9 D. 2 and 5

4 Which of the following has the maximum number of unpaired electrons? **1**
A. Mg^{2+} B. Ti^{3+} C. Fe^{2+} D. V^{3+}
(Atomic number of Mg=12 u, Ti=22u, Fe=26u, V=23u)

5 An electron from one Bohr stationary orbit can go to the next higher orbit: **1**
A. By emission of electromagnetic radiation.
B. By absorption of any electromagnetic radiation.
C. By absorption of electromagnetic radiation of a particular frequency.
D. Without emission or absorption of electromagnetic radiation.

6 Which has the largest first ionization energy? **1**
A. Li B. Na C. K D. Rb

7 Variable valency is characteristic of: **1**
A. Noble gas
B. Alkali metals
C. Transition metals
D. Non-metallic elements

8 In which of the following is the bond angle between the two covalent bonds the maximum? **1**

A. H_2O B. NH_3 C. CO_2 D. CH_4

9 The hybridisation of Carbon involved in Ethyne is **1**

A. sp^2 B. sp^3 C. sp D. sp^3d^2

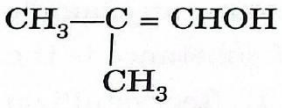
10 Reduction involves: **1**

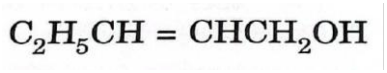
A. Gain of electrons.
B. Addition of Oxygen.
C. Increase in oxidation number.
D. Loss of electrons.

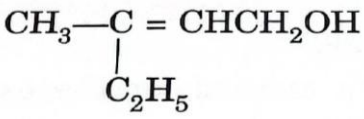
11 Which of the following carbocations has the least stability? **1**

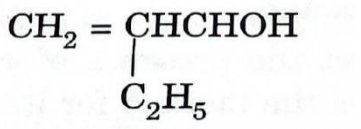
A. Methyl B. Ethyl C. Isopropyl D. tert-butyl

12 The structural formula for 3-Methylpent-2-en-1-ol is **1**

A. 

B. 

C. 

D. 

13 **Assertion (A):** The empirical mass of ethene is half of its molecular mass. **1**

Reason (R): The empirical formula represents the simplest whole-number ratio of various atoms present in a compound.

A. Both A and R are true, and R is the correct explanation of A.
B. Both A and R are true, and 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):** The first ionization enthalpy of Aluminium is lower than that of Magnesium. **1**

Reason(R): The atomic radius of Aluminium is smaller than that of Magnesium.

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, and 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):** The BF_3 molecule is planar, while NF_3 is pyramidal. **1**

Reason(R): The N atom is smaller than the B atom.

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, and 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(A):** Alkanes having more than three carbon atoms exhibit chain isomerism. **1**

Reason(R): All carbon atoms in alkanes are sp^3 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, and 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 **Attempt either option A or B**

A. I. Calculate the energy associated with the first orbit of the He^+ ion. **2**

II. Give the electronic configuration of Chromium. (Z=24)

OR

B. I. Calculate the radius of the first orbit of the He^+ ion. **2**

II. State Aufbau principle.

18 I. Explain the difference in the structure of CO_2 and SO_2. **1**

II. Draw the resonating structures of O_3. **1**

19 I. Calculate the oxidation number of S in $Na_2S_2O_3$. **2**

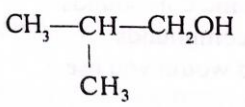
II. Balance the following reaction.

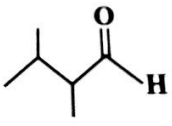
$MnO_4^- + Fe^{2+} \longrightarrow Mn^{2+} + Fe^{3+}$ (In acidic medium)

20 Consider the following reaction that produces electricity in the galvanic cell: **2**

$2Fe^{3+} + 2Cl^- \longrightarrow 2Fe^{2+} + Cl_2$

Write the anode and cathode reactions of the galvanic cell.

21 I. Write the bond line formula of  **2**

II. Write the IUPAC name of 

Section-C

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

22 I. Define molarity. Is it affected by a change in temperature? Give a reason for your answer. **3**

II.A group of geologists during an expedition came across an unknown black solid compound 'U', which looks similar to a known substance 'A'.

The table below summarises the hydrogen and oxygen content of these compounds.

Compound	Hydrogen content	Carbon Content
U	15 g	105 g
A	2 g	30 g

Are these substances the same? Justify

23 I. Why does the metallic character increase as we move down Group 1? **3**

II. Explain why the ionization enthalpy of potassium is less than that of sodium based on their electronic configurations.

III. What is the general outer electronic configuration of p-block elements?

24 I. Why is H_2O a liquid while H_2S is a gas at ordinary temperature? **3**

II. Why is the bond angle in NH_3,107^0?

III. Arrange the following according to the bond length, giving a reason.
H-F, H-Cl, H-Br, H-I

25 I. Write the formula of Mercury (II) chloride. **3**

II. Consider the following cell notation:
$Al_{(s)}/Al^{3+}_{(aq)}//Ni^{2+}_{(qq)}/Ni_{(s)}$. Identify the anode and cathode. Write the anode and cathode half reactions and the net ionic equation for the cell.

26 I. Write two functions of a salt bridge. **3**

II. What do you mean by disproportionation reaction?

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

I. What is the role of copper oxide in the estimation of Carbon and Hydrogen? What does it change the carbon in the compound to?

II. What is a nucleophile? Give an example.

III. Give one example of functional group isomerism?

IV. A student was given the compound $C_6H_4(NH_2)SO_3H$ for elemental analysis. While performing the test for Nitrogen, what colour will he get and why?

28 I. If a liquid compound decomposes at its boiling point, which method can you choose for its purification? It is known that the compound is steam volatile and insoluble in water. **3**

II. Write the structural formula of n-butane and isobutane. What type of isomerism is shown by them?

III. What do you mean by Inductive effect?

Section D

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

29 A mole is a collection of $6.022x10^{23}$ particles, and this number is called the Avogadro number. The mass of this number of atoms is equal to its gram atomic mass.

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

I. What is the mass of 6.022×10^{23} molecules of Naphthalene ($C_{10}H_8$)? Atomic mass of C=12 u, H=1u) **1**

II. How many O atoms are present in 1 mole of Oxygen gas? **1**

OR

How many atoms of Carbon are present in 0.1 mole of $C_{12}H_{22}O_{11}$?

III. Calculate the mass of an atom of Silver. (Atomic mass = 108u) **2**

30 The properties of the elements, such as atomic radii or ionic radii, ionization enthalpy, electron gain enthalpy, and electronegativity, are directly or indirectly related to their electronic configuration and are called periodic properties. A part of the periodic table is given below.

C	N	O	F
	P	S	Cl
		Se	Br
			I

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

I. How does the ionization enthalpy change across the period? Give a reason. **1**

OR

What do you mean by electron gain enthalpy?

II. If Fluorine is in the second period and 17th group, identify the group and period of Br. **1**

III. Among Fluorine and Iodine, which element has a larger atomic radius? Give a reason for your answer. **2**

Section-E

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

31 **Attempt either A or B**

A. Answer the following questions:

I. How many electrons in an atom may have n=4 and ms =+½? **½**

II. Calculate the momentum of a moving particle which has a de Broglie wavelength of 6626×10^{-12} m **1 ½**

III. Calculate the frequency of a photon emitted during a transition from n=4 to n=2 state in the Hydrogen atom. (Planck's constant $h=6.626 \times 10^{-34}$Js) **3**

OR

B. Answer the following questions:

I. Calculate the wavelength of a body of 1g moving at a velocity of 10m/s. ($h=6.626\times10^{-34}$Js) **2**

II. Show that the circumference of the Bohr orbit for the Hydrogen atom is an integral multiple of the de Broglie wavelength associated with the electron revolving around the orbit. **2**

III. Give any two limitations of the Bohr model of the atom. **1**

32 **Attempt either A or B**

A. Answer the following questions:

I. Explain the shape of PCl_5 using VSEPR theory. Why are all P-Cl bond lengths not equal? **2**

II. $BeCl_2$ has a zero-dipole moment even though Be-Cl bonds are polar. Explain **1**

III. Give the electronic configuration of Li_2 according to Molecular orbital theory. Is the molecule stable? **2**

OR

B. Answer the following questions:

I. Calculate the bond order of B_2 according to Molecular orbital theory. Predict the magnetic behaviour of this molecule. **2 ½**

II. Explain the term hybridisation using $CH_2=CH_2$ as an example. **2 ½**

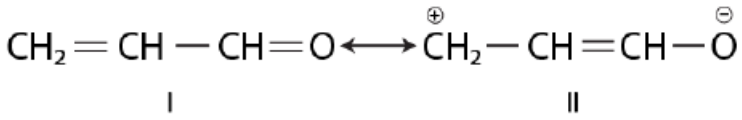
33 **Attempt either A or B**

A. Answer the following questions:

I. What are reactive intermediates? How does bond fission generate them? **2**

II. Draw the resonance structures of $C_6H_5NH_2$. Show the movement of electrons using curved arrows. **2**

III. Resonance structures of propenal are given below. Which of these resonating structures is more stable? Give a reason for your answer. **1**



I II

OR

B. Answer the following questions:

I. Draw the resonating structures of $C_6H_5NO_2$. Show the movement of electrons using curved arrows. **2**

II. Write a short note on the structure and stability of carbocations, taking an example. **2**

III. What is hyperconjugation? **1**