



B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

SET-1

ANNUAL EXAMINATION 2026

SUBJECT- CHEMISTRY (043)

Class: XI
Date: 20/02/2026

Duration: 3 Hrs
Max. Marks: 70

General Instructions:

- (1) There are 33 questions in all. All questions are compulsory.
- (2) This question paper has five sections: Section A, Section B, Section C, Section D and Section E.
- (3) All the sections are compulsory.
- (4) Section A contains sixteen questions, twelve MCQ and four Assertion Reasoning based of 1 mark each, Section B contains five questions of two marks each, Section C contains seven questions of three marks each, Section D contains two case study-based questions of four marks each and Section E contains three long answer questions of five marks each.
- (5) There is no overall choice. However, an internal choice has been provided in one question in Section B, one question in Section C, one question in each CBQ in Section D, and all three questions in Section E. You have to attempt only one of the choices in such questions.
- (6) Use of calculators is not allowed.

SECTION-A

(16 X 1=16 Marks)

1. Which of the following compounds has the +7 oxidation state of Mn?
(a) KMnO_4 (b) K_2MnO_4
(c) MnO_2 (d) MnO
2. Which quantum number specifies the shape of an orbital?
(a) Principal quantum number (b) Azimuthal quantum number
(c) Magnetic quantum number (d) Spin quantum number
3. Which type of bond is present in N_2 molecule?
(a) Single covalent bond (b) Double covalent bond
(c) Triple covalent bond (d) Hydrogen bond
4. Identify the IUPAC name of $\text{CH}_3\text{-CH(OH)-CH=CH}_2$.
(a) Butane (b) But-3-en-2-ol
(c) 2-Butene (d) Propene
5. The type of reaction is given below.
 $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}; \quad \Delta H = -25 \text{ kJ}$
(a) Exothermic reaction (b) Endothermic reaction
(c) Neutral reaction (d) No reaction

6. Which Of the following compounds have 13 sigma bonds?
 (a) CH₄ (b) C₂H₆
 (c) C₃H₈ (d) C₄H₁₀
7. Which element has an electronic configuration [Ne]3s²?
 (a) Sodium (b) Magnesium
 (c) Chlorine (d) Fluorine
8. What is the oxidation state of carbon in CO₂?
 (a) +4 (b) - 4
 (c) +2 (d) 0
9. The SI unit for pressure is:
 (a) Pascal (b) bar
 (c) atmosphere (d) none
10. Find out the number of neutrons, protons, and electrons of ¹⁷Cl³⁵ respectively.
 (a) 20, 20, 17 (b) 17, 17, 20
 (c) 20, 17, 17 (d) 18, 17, 17
11. What does it indicate having a less than 10⁻³ equilibrium constant?
 (a) the reaction occurs faster (b) the rate of backward reaction is faster
 (c) both the backward and forward reactions are equal (d) reaction may be slower than usual
12. A reaction is given by aA + bB → cC + dD. How do you represent K_c?
 (a) $\frac{[A]^a[B]^b}{[C]^c[D]^d}$ (b) $\frac{[C]^c[D]^d}{[A]^a[B]^b}$
 (c) $\frac{[A][B]}{[C][D]}$ (d) $\frac{[C][D]}{[A][B]}$

For Questions 13 and 16, two statements are given –one labelled Assertion (A) and other labelled Reason (R). Select the correct answer to these questions from the options as given below.

- (a) If both Assertion and Reason are true and Reason is correct explanation of Assertion.
 (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
 (c) If Assertion is true but Reason is false.
 (d) If both Assertion and Reason are false.

13. Assertion (A): The boiling point of water is highest due to intermolecular hydrogen bonding.

Reason (R): Intra molecular hydrogen bonding increases the intermolecular forces of attraction.

14. Assertion (A): Nitrobenzene undergoes substitution reactions readily.

Reason (R): Nitrobenzene is an aromatic compound with a delocalized π-electron system.

15. Assertion: Chain isomerism is observed in compounds containing four or more than four carbon atoms

Reason: Only alkanes show chain isomerism

16. Assertion: 1.001 has four significant figures.

Reason: All numbers right to the decimal point are significant.

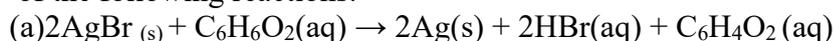
SECTION-B

(5 X 2=10 Marks)

17. What is the difference between the term molality and molarity? 2
18. What is the oxidation number of the underlined elements in each of the following compound? 2



19. Identify the substance oxidised, reduced, oxidising agent and reducing agent for each of the following reactions:



2

20. Explain homogeneous equilibria with an example.

2

21. Out of staggered and eclipsed structure of ethane, which one is more stable and why?

2

OR

Convert the Following (i) Benzene to Toluene (ii) Propene to Propane.

2

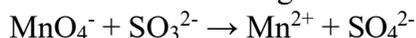
SECTION-C**(7 X 3=21 Marks)**

22. Derive the relationship between K_p and K_c for a gaseous reaction.

3

23. Balance the following redox reaction in an acidic medium using the ion-electron method:

3



24. (i) Calculate the total number of electrons present in one mole of ethane.

3

(ii) Find (a) the total number and (b) the total mass of neutrons in 7 mg of ^{14}C . (Assume that mass of a neutron = $1.675 \times 10^{-27}\text{kg}$).

25. Calcium carbonate reacts with aqueous HCl to give CaCl_2 and CO_2 according to the reaction given below: $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$. What mass of CaCl_2 will be formed when 250 mL of 0.76 M HCl reacts with 1000 g of CaCO_3 ? Name the limiting reagent. Calculate the number of moles of CaCl_2 formed in the reaction.

3

26. Write the mechanism of addition of HBr to Propene by Markovnikov Rule.

3

27. Explain $C_p - C_v = R$

Or

Explain the terms (i) Entropy (ii) Enthalpy (iii) Internal energy of the system

3

28. Explain the resonance effect with the help of Phenol and Benzoic acid.

3

SECTION-D**(2 X 4= 8 Marks)****Case Study Based Questions**

Read the passage and answer the questions below:

4

29. Orbitals are region or space where there is maximum probability of finding electrons. Qualitatively, these orbitals can be distinguished by their size, shape and orientation. An orbital of small size means there is more chance of finding the electron near the nucleus. Shape and orientation means the direction in which probability of finding electron is maximum. Atomic orbitals can be distinguished by quantum numbers. Each orbital is designated by three quantum numbers n , l and m_l (magnetic quantum number) which define energy, shape and orientation but these are not sufficient to explain spectra of multi-electron atoms. Spin quantum number (m_s) determines the spin of electron. Spin angular momentum of electron has two orientations relative to chosen axis which are distinguished by spin quantum numbers m_s which can take values $+1/2$ and $-1/2$.

Value of 'l'	0	1	2	3	4
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Notation for subshell	s	p	d	f	g
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- (a) How many orbitals are associated with $n = 3$?
 (b) Describe the orbitals represented by $n = 2, l = 1$
 (c) How many electrons are possible in an orbital?
 (d) What is shape of 's' and 'p' orbitals?

Read the passage and answer the questions below:

Hydrocarbons are divided into alkanes, alkenes, and alkynes based on the type of bonds they contain. Alkanes are saturated hydrocarbons, while alkenes and alkynes are unsaturated. The reactivity of hydrocarbons depends on the type of bond and the functional groups attached.

30. (a) Why are alkenes more reactive than alkanes? 2
 (b) Write the IUPAC name of $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_3$ 1
 (c) Write general formula of alkene. 1

SECTION E

31. (a) According to IUPAC nomenclature, write the name and symbol for the elements with the following atomic numbers. 3+2
 (i) 100 (ii) 111 (iii) 115
 (b) Which of the following species will have the largest and the smallest size?
 (i) Al , Al^{3+} (ii) Mg , Mg^{2+}

OR

- (a) Use the periodic table to answer the following questions.
 (i) Identify an element with five electrons in the outer subshell.
 (ii) Identify an element that would tend to lose two electron.
 (iii) Identify an element that would tend to gain one electron.

(b) Why do elements in the same group have similar physical and chemical properties?

32. (a) Explain the ozonolysis of propene followed by zinc dust distillation. Write the reaction. 3+2
 (b) Explain the mechanism of the nitration reaction of benzene.

OR

- (a) Explain Friedel-Craft alkylation and acylation reactions.
 (b) (i) Depict ethane in the staggered form of Newman's projection.
 (ii) Write the molecular formula of the 6th member of the alkene series.
 (iii) Write the IUPAC name of the products obtained by the ozonolysis of but-2-ene.

33. (a) Write Lewis dot symbols for atoms of the following elements: Al, Na, B, F 2+3
 (b) Define the Octet rule. Write its significance and limitations.

OR

- (a) Discuss the shape of the following molecules using the VSEPR model:
 BeCl_2 , BCl_3
 (b) Write the molecular electronic configuration of O_2 .

-----ALL THE BEST -----