



B.K. BIRLA CENTRE FOR EDUCATION

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

SET-1

ANSWER KEY

ANNUAL EXAMINATION 2026

SUBJECT- CHEMISTRY (043)

Class: XI
Date:20/02/2026

Duration: 3 Hrs
Max. Marks: 70

SECTION-A

(16 X 1=16 Marks)

1. (a) KMnO_4
2. (b) Azimuthal quantum number
3. (C) Triple covalent bond
4. (b) But-3-en-2-ol
5. (a) Exothermic reaction
6. (d) C_4H_{10}
7. (b) Magnesium
8. (a) +4
9. (a) Pascal
10. (c) 20, 17, 17
11. (b) the rate of backward reaction is faster
12. (b) $\frac{[\text{C}]^c[\text{D}]^d}{[\text{A}]^a[\text{B}]^b}$
13. c
14. a
15. A
16. c

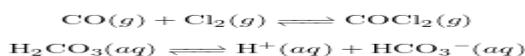
SECTION-B

(5 X 2=10 Marks)

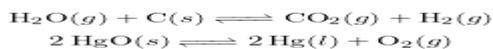
17. Molarity (M) is moles of solute per liter of **solution**, while molality (m) is moles of solute per kilogram of **solvent**, making molality temperature-independent (mass doesn't change with temp) and molarity temperature-dependent (volume changes with temp) 2
18. (i) +4 (ii) +6
19. AgBr reduced and it is OA $\text{C}_6\text{H}_6\text{O}_2$ is oxidized and it is RA. 2

20. Homogeneous equilibria refer to reversible chemical reactions where all reactants and products are present in the same physical phase (i.e., all gases, all liquids, or all solutes in an aqueous solution).

Homogeneous equilibrium is a chemical equilibrium in which all the reactants and products are of the same phase. For instance



Heterogeneous equilibrium involves species that are of different phase. For example



2

21. Staggered is more stable due to less repulsion.

2

OR

(i) F C Reaction (ii) Addition reaction

2

SECTION-C

(7 X 3=21 Marks)

Relationship between K_c and K_p

$$K_c = \frac{[\text{C}]^c[\text{D}]^d}{[\text{A}]^a[\text{B}]^b}$$

• ideal gas law:

$$PV = nRT$$

$$P = \frac{n}{V} RT$$

$$K_p = \frac{(P_C)^c (P_D)^d}{(P_A)^a (P_B)^b} = \frac{\left(\frac{n}{V} RT\right)^c \left(\frac{n}{V} RT\right)^d}{\left(\frac{n}{V} RT\right)^a \left(\frac{n}{V} RT\right)^b}$$

Plugging this into the expression for K_p

$$K_p = K_c (RT)^{\Delta n} \quad \text{😊}$$

Where

$\Delta n = (\text{moles of gaseous product}) - (\text{moles of gaseous reactant})$

22. .

3

23.

1) Reduction MnO_4^- in acid solⁿ



2) Reduction of MnO_4^- in neutral solⁿ



3) Reduction of MnO_4^- in basic solⁿ



4) C

3

2.2 (i) Calculate the total number of electrons present in one mole of methane.
 (ii) Find (a) the total number and (b) the total mass of neutrons in 12g of ^{12}C .
 (Assume that mass of a neutron = 1.675×10^{-27} kg).
 (iii) Find (a) the total number and (b) the total mass of protons in 34 mg of NH_3 at STP.
 Will the answer change if the temperature and pressure are changed?

Handwritten solution:

(i) CH_4
 $^6\text{C} = 6$
 $^1\text{H} = 4(1) = 4$
 $n = \frac{N_0}{N_A}$
 $1 = \frac{N_0}{N_A}$
 $N_0 = 6.023 \times 10^{23} \times 10$
 $N_0 = 6.023 \times 10^{24}$ electrons.

(ii) Number of neutrons
 ^{12}C M.N = 14
 A.N = 6
 neutron = 8
 $\frac{N_0}{N_A} = \frac{G.W}{M.W} \times \frac{q.C}{q.C}$
 $N_0 = 6.023 \times 10^{23} \times \frac{1}{12} \times 8$
 $N_0 = 24 \times 10^{20}$
 $N_0 = 2.4 \times 10^{21}$ neutrons

(iii) 1 n = 1.675×10^{-27} kg
 $2.4 \times 10^{21} \text{ n} = x$
 $x = 1.67 \times 10^{-27} \text{ kg} \times 2.4 \times 10^{21}$
 $x = 4.08 \times 10^{-6} \text{ kg}$
 Total mass = $4.08 \times 10^{-6} \text{ kg}$

24.

NCERT Exercise Page No. 28 Some Basic Concepts of Chemistry
Problem 1.35:- Calcium carbonate reacts with aqueous HCl to give CaCl_2 and CO_2 according to the reaction, $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
What mass of CaCO_3 is required to react completely with 25ml of 0.75 M HCl?

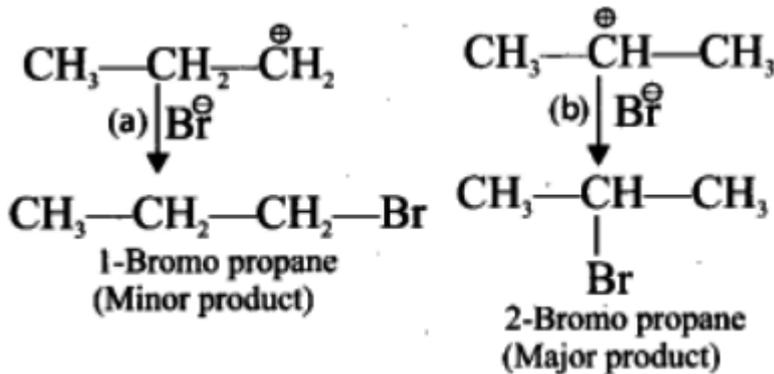
Handwritten solution:

Molarity = $\frac{\text{No. of moles of HCl}}{\text{Total volume of solution in l}}$
 $V_1 = 1\text{L} = 1000\text{ml}$
 $M = 0.75\text{M}$ or 0.75mol L^{-1}
 $0.75\text{mol L}^{-1} = \frac{n_{\text{HCl}}}{1\text{L}}$ (1) $n_{\text{HCl}} = \frac{\text{actual mass of HCl}}{\text{molar mass of HCl}}$
 $n_{\text{HCl}} = \frac{W_{\text{HCl}}}{M_{\text{HCl}}}$
 $n_{\text{HCl}} = \frac{W_{\text{HCl}}}{36.5\text{g/mol}}$
 molar mass of HCl = $1\text{g/mol} + 35.5\text{g/mol} = 36.5\text{g/mol}$

25.

NCERT SOLUTION EXPLAINED IN ENGLISH

3



26.

3

$C_p = \left(\frac{dQ}{dT} \right)_p$
 or, $dQ = C_p dT$
 From equation $dQ = C_p dT = dU + PdV$
 Again, from equation (2) $dU = C_v dT$
 $C_p dT = C_v dT + PdV$
 For one mole of gas ($\mu = 1$) equation,
 $PV = RT$
 $PdV = RdT$
 From equations $(C_p - C_v)dT = RdT$
 or $C_p - C_v = R$

27.

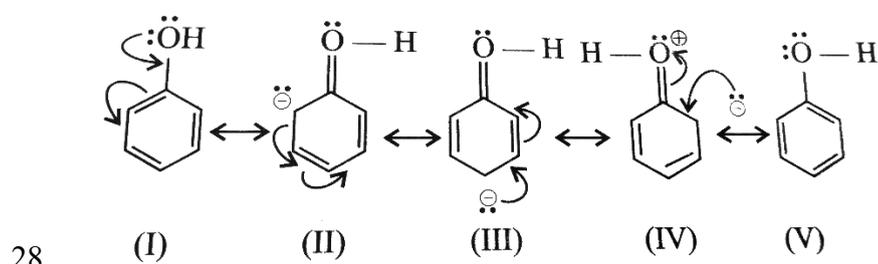
Or

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

Lecture Note By Dr. S.P

| Enthalpy | Entropy |
|--|--|
| Enthalpy is the sum of internal energy and flows energy. | Entropy is the measurement of the randomness of molecules. |
| It is a kind of energy. Its unit is Jmol^{-1} . | It is a property. Its unit is JK^{-1} . |
| Enthalpy is positive for endothermic processes. | Entropy is positive for spontaneous processes. |
| Enthalpy is negative for exothermic processes. | Entropy is negative for non-spontaneous processes. |
| The system favour minimum enthalpy. | The system favour maximum entropy. |

3



3

SECTION-D

(2 X 4= 8 Marks)

Case Study Based Questions

29.

4

- (a) 9
- (b) 2p
- (c) 2
- (d) Spherical and dumbbell

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) $\text{Sp}^2 > \text{Sp}^3$ 2
- (b) pent-2-ene 1
- (c) C_nH_{2n} 1

SECTION E

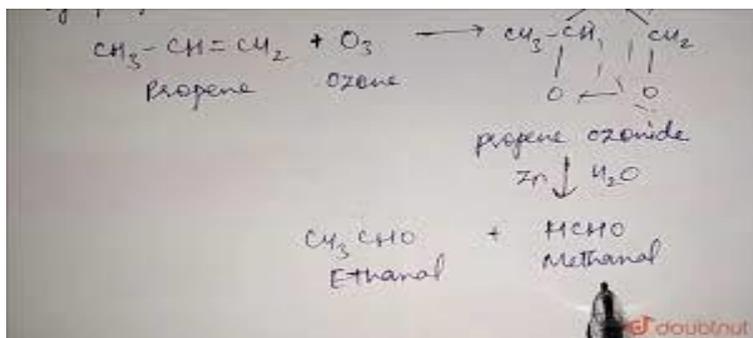
31. (a) 3+2
- (i) unnilnilium
 - (ii) unununium
 - (iii) ununpentium
- (a) (i) Al and Al^{3+} (ii) Mg and Mg^{2+}

OR

(a) Use the periodic table to answer the following questions.

- (i) N
- (ii) Mg
- (iii) F

(b) Due to the same valence electron



Mechanism of Electrophilic Substitution Reaction in Nitration

3+2

OR



(b) (i)



- (ii) C7H14
- (iii) Ethanal

33. (a)

| | |
|----------------------------------|---|
| ${}_{12}\text{Mg} = 2, 8, 2$ | Lewis symbol = $\overset{\cdot\cdot}{\text{Mg}}$ |
| ${}_{11}\text{Na} = 2, 8, 1$ | Lewis symbol = $\overset{\cdot}{\text{Na}}$ |
| ${}_5\text{B} = 2, 3$ | Lewis symbol = $\cdot\overset{\cdot}{\text{B}}\cdot$ |
| ${}_8\text{O} = 2, 6$ | Lewis symbol = $\overset{\cdot\cdot}{\underset{\cdot\cdot}{\text{O}}}$ |
| ${}_{35}\text{Br} = 2, 8, 18, 7$ | Lewis symbol = $\cdot\overset{\cdot\cdot}{\underset{\cdot\cdot}{\text{Br}}}\cdot$ |

2+3

(b)

Octet Rule : to get 8 electron in the outermost orbit

PCl₅ SF₆ IF₇ are the example of limitation of octet rule.

OR

(a) BeCl₂

SP hybridization

Linear shape

BCl₃

SP² hybridisation

Trigonal planar

(b) The configuration is determined by filling the molecular orbitals with the total number of electrons
 $\sigma 1s < \sigma 1s^* < \sigma 2s < \sigma 2s^* < \sigma 2p < \pi 2p < \pi 2p^* < \sigma 2p^*$
 $\sigma 1s$ end-sub is less than $\sigma 1s^*$ end-sub raised to the * power is less than $\sigma 2s$ end-sub is less than $\sigma 2s^*$ end-sub raised to the * power is less than $\sigma 2p$ end-sub is less than $\pi 2p$ end-sub is less than $\pi 2p^*$ end-sub raised to the * power is less than $\sigma 2p^*$ end-sub raised to the * power

$\sigma 1s < \sigma 1s^* < \sigma 2s < \sigma 2s^* < \sigma 2p < \pi 2p < \pi 2p^* < \sigma 2p^*$

. The two electrons in the highest occupied molecular orbital

occupy separate degenerate orbitals with parallel spins, which accounts for oxygen's paramagnetism