BSEH - **Marking Scheme**

Chemistry Sample Paper (2025-26) CHE-856 Class: 11th

The answer point given in the marking scheme are not final. These are suggestive and indicative. If the examinee has given different, but appropriate answers then he should be given appropriate marks.

1. (d) Molality (1 Mark)

2. (d) 4 (1 Mark)

3. (b) Balmer (1 Mark)

4. (c) Mg^{2+} (1 Mark)

5. (a) $CH_2(Br) - CH_2(Br)$ (1 Mark)

6. (b) lp – lp > lp – bp > bp – bp (1 Mark)

7. (b) sp^2 (1 Mark)

8. (b) 2 unit (1 Mark)

9. (d) ClO_4^- (1 Mark)

10. +6 (1 Mark)

11. 3 sigma 2 pi (1 Mark)

12. NH_3 (1 Mark)

13. H – $\ddot{\underset{\ddot{}}{S}}$ – H (1 Mark)

14. $Fe_2(SO_4)_3$ (1 Mark)

15. Ag < Hg < Mg < K (1 Mark)

16. (a) Both A and R are true and R is the correct explanation of A. (1 Mark)

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19. When two elements combine to form more than one compound, the masses of one element that combine with a fixed mass of the other element are in ratio of small whole number. (1 Mark)

Example :- Carbon and Oxygen

C O CO_2

12 : 16 12 : 32

16 : 32 = 1 : 2 (1 Mark)

20. $\Delta x . \Delta p \geq \frac{h}{4\pi}$ (1 Mark)

where Δx = uncertainty in position

Δp = uncertainty in momentum

h = Planck's constant

The principal state that the more precisely the position of a particle is known, the less precisely its momentum can be known and vice – versa. (1 Mark)

21. As moves across a period, electrons are added to sand energy level, but the number of protons in the nuclear increase. It increase positive charge of the nucleus pulls the electrons more strongly inwards, resulting in a smaller atomic radius. (2 Mark)

22. Electron gain enthalpy is the tendency of an isolate gaseous atom to accept an electron to form a negative ion. (1 Mark)

Electronegativity is the tendency of the atom of an element to attract shared pair of electrons towards it in a covalent bond. (1 Mark)

23. According to Le Chatelier's principle on addition of H_2 the equilibrium will shift in the backward direction. (2 Mark)

(OR)

A solution that resist changes in pH when small amount of acid or base are added. An example of a buffer solution is a mixture of acetic acid and sodium acetate.

24. (i) $4H^+ + 3e^- + MnO_4^- \rightarrow MnO_2 + 2H_2O$ (1 Mark)

$2\ I^- \rightarrow I_2 + 2e^-$

(ii) $8H^+ + \cancel{6e^-} + 2MnO_4^- \rightarrow 2MnO_2 + 4H_2O$

$6\ I^- \rightarrow 3I_2 + \cancel{6e^-}$

$2MnO_4^- + 6\ I^- + 8H^+ \rightarrow 2MnO_2 + 3I_2 + 4H_2O$ (1 Mark)

(OR)

(i) Exhibits only negative oxidation state :- F(Fluorine) ($\frac{1}{2}$ Mark)

(ii) Exhibits only positive oxidation state :- Cs (Cesium) ($\frac{1}{2}$ Mark)

(iii) Exhibit both negative and positive oxidation state : I(Iodine) ($\frac{1}{2}$ Mark)

(iv) Exhibit neither negative nor positive oxidation state :- Ne (Neon) ($\frac{1}{2}$ Mark)

25. Those isomerism which have the same molecular formula but different functional groups is known as Functional isomers. (1 Mark)

Example :- Molecular formula C_3H_6O

Isomers :- C_2H_5OH (ethane), $CH_3 - O - CH_3$ (Methoxy methane) (1 Mark)

(OR)

(i) 2 hydroxy but – 3en – 1 – oic Acid (1 Mark)

(ii) 5 Bromo cyclohex – 2 en – 1 – ol (1 Mark)

26. (i) The ratio of the no. of moles of a particular component to the total number of moles of all components in a solution. (1 Mark)

(ii) Molarity (M) = $\frac{No.of\ Moles\ of\ solute}{Litre\ of\ the\ solution}$ (1 Mark)

Molecular Mass = NaOH = 1 x 23 + 1 x 16 + 1 x 1 = 40u

Molarity = $\frac{\frac{5}{40}}{\frac{250}{1000}} = \frac{5}{40} \times \frac{1000}{250} = 0.5M$ (1 Mark)

27. (i) The sign of ΔH is negative because bond formation releases energy. In this reaction two chlorine atom forms a bond to create chlorine molecule. ($\frac{1}{2}$ Mark)

The sign of ΔS is also negative because the number of gaseous molecule decrease from two to one. ($\frac{1}{2}$ Mark)

(ii) ΔG^0 = - RTLnK (1 Mark)

ΔG^0 = - 8.314 J $K^{-1}mol^{-1}$ x 300K x Ln10 (1 Mark)

= - 8.314 x 300 x 2.303 = -5705.74 J mol^{-1} (1 Mark)

(Deduct ($\frac{1}{2}$) marks if unit is not mention)

28. (i) pH is a scale used to specify the acidity or basicity of an aqueous solution. (1 Mark)

(ii) $[OH^-] = [KOH] = 0.002M = 2 \times 10^{-3}M$ (1 Mark)

$pOH = -\log_{10}[OH^-]$

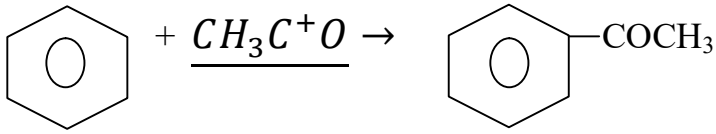
$pOH = -\log_{10}(2 \times 10^{-3})$ $pOH \approx 2.7$

pH + pOH = 14, pH = 14 – pOH = 14 – 2.7 = 11.3 (1 Mark)

(Deduct ($\frac{1}{2}$) marks if unit is not mention)

29. (i) $CH_3Br + OH^- \rightarrow CH_3OH + Br^-$ (1 Mark)

The hydroxide(OH^-) ion acts as a nuclophile.

(ii)  (1 Mark)

CH_3C^+O acts as a nuclophile.

$NO_2CH_2CH_2O^-$ is more stable than $CH_3CH_2O^-$ because of the I effect of the nitro group. (1 Mark)

(OR)

Resonance effect is defined as the withdrawl or releasing of electrons related to a certain substituents through the process of the delocalisation of pi – electron. (1 Mark)

Types of Resonance effect :-

Positive Resonance Effect (+R) :- Electron donating group increase electron density in the molecule. (1 Mark)

Example :- NH_2 group donates electron to the benzene rings.

Negative Resonance effect :- (-R) Electron withdrawing groups decrease electron density in the molecule. (1 Mark)

Example :- NO_2 group withdraw electron from the benzene ring.

30. (i) $CH_3\text{-}C \equiv CH + H_2O \xrightarrow[333k]{Hg^{2+}/H^+} CH_3 - \underset{\underset{O}{\|}}{C} - CH_3$ (1 Mark)

(ii) Ozonolysis is a reaction between ozone and an alkane or an alkyne. Ozone adds across the multiple bond to form an ozonide which decompose to give carbonyl compound. (1 Mark)

For example :-

$$CH_2 = CH_2 + O_3 \rightarrow \underset{\underset{O}{|}}{CH_2} \quad \underset{\underset{O}{|}}{CH_2} \xrightarrow{Zn/H_2O} 2HCHO$$ (1 Mark)

(O bridges the two CH$_2$ groups)

(OR)

(i) The name of the Alkane is n – heptane. (1 Mark)

(ii) When 1,2 dichloroethane is treated with alcoholic KOH it undergoes dehydrohalogenation. (1 Mark)

$CH_2Cl - CH_2Cl + 2KOH\ (alc.) \rightarrow CH \equiv CH + 2KCl + 2H_2O$(1 Mark)

31. (i) Extensive properties are those that depend on the amount of substance present in the system. Example :- Mass, Volume (1 Mark)

(ii) The unit of ΔG is expressed in Joules or Kilojoules. ΔH can be approximated by ΔU. (1 Mark)

(iii) $\Delta G = \Delta H - T\Delta S$ (1 Mark)

$\Delta G = -10.5 - (298 \times -0.0441)$

$\Delta G = -10.5 + 13.14\ KJ = 2.64\ KJ$ (1 Mark)

(Deduct $(\frac{1}{2})$ marks if unit is not mention)

(OR)

(i) $\Delta H < 0$ and $\Delta S > 0$ spontaneous at all temperature. $(\frac{1}{2}$ Mark)

(ii) $\Delta H > 0$ and $\Delta S < 0$ non-spontaneous at all temperature. $(\frac{1}{2}$ Mark)

(iii) $\Delta H < 0$ and $\Delta S < 0$ spontaneous at low temperature. $(\frac{1}{2}$ Mark)

(iv) $\Delta H > 0$ and $\Delta S > 0$ spontaneous at high temperature. $(\frac{1}{2}$ Mark)

32. (i) Correct order of relative stability of carbon ions:- (1 Mark)

Stability of carbonion increase with the presence of electron withdrawing group.

$CCl_3 < CHCl_2 < CH_2Cl < CH_3CH_2 < CH_3$

(ii) Homolytic fission of CH_3Cl results in the formation of two free radicals:- (1 Mark)

$CH_3Cl \rightarrow CH_3 + Cl$

(iii) $(CH_3)_3C^+$ is sp^2 hybridized a trigonal planar geometry. (1 Mark)

$(CH_3)_3C^-$ is sp^3 hybridized with a tetrahedral geometry. (1 Mark)

(OR)

Ph_3C^+ is more stable than $(CH_3)_3C^+$ due to resonance stabilization. (2 Mark)

33. (i) The de Broglie equation relates the wavelength of a particle to its momentum. (1 Mark)

$\lambda = \frac{h}{p}$ or $\frac{h}{mv}$ h = Plank's constant, p = momentum of particle

m = masses of particle, v = velocity of particle

(ii) K. E = $\frac{1}{2}mv^2$, $v = \sqrt{\frac{2KE}{m}}$ (1 Mark)

$$v = \sqrt{\frac{2\times3.0\times10^{-25}}{9.1\times10^{-31}}} = \sqrt{\frac{6.0\times10^{-25}}{9.1\times10^{-31}}} = \sqrt{6.59\times10^{5}} = 811.78m$$

$$\lambda = \frac{h}{mv} = \frac{6.626\times10^{-34}}{9.1\times10^{-31}\times811.78} = \frac{6.626\times10^{-3}}{7.387\times10^{-2}} = 8.47\times10^{-6}$$ (1 Mark)

(Deduct (1) marks if unit is not mention)

(iii) The Aufbau principle states that electrons are filled in an atom in increasing order of energy. (2 Mark)

(OR)

(i) The square of wave function represents the probability density of finding a particle at specific location in space. (1 Mark)

(ii) It was unable to explain the different spectra lines given off by gases of different atoms or molecules. It does not describe the structure of atoms with more than one electron. (1 Mark)

It is not able to describe different types of atom such as alkanes and halogens. (1 Mark)

(iii) $\frac{1}{\lambda} = R_H\left(\frac{1}{n_1^2-n_2^2}\right) = 1.097\times10^7\left[\frac{1}{2^2}-\frac{1}{4^2}\right] = 1.097\times10^7\left[\frac{4-1}{16}\right]$

$$\frac{1}{\lambda} = 1.097\times10^7\left(\frac{3}{16}\right) = 2.056875\times10^6 m^{-1}$$

$\lambda = \frac{1}{2.056875\times10^6} \approx 4.86\times10^{-7}m$ (1 Mark)

$\lambda = 486 \times 10^{-7} m = 486$ nm (1 Mark)

(Deduct (1) marks if unit is not mention)

34. (i) The BeH_2 molecule has a zero dipole moment because of its linear structure. The two Be – H bonds are equal in magnitude but points in opposite direction so cancel each other. (1 Mark)

(ii)

Species	Orbital Configuration	Bond order	Magnetic Properties
O_2	$(\sigma_2 s)\ (\sigma_2 s^*)$	2	Paramagnetic
	$(\sigma_2 p)\ (\sigma_2 p^*)$		(1 Mark)
	$(\pi_2 p)\ (\pi_2 p^*)$		
O_2^-	$(\sigma_2 s)\ (\sigma_2 s^*)$	1.5	Paramagnetic
	$(\pi_2 p)\ (\pi_2 p^*)$		(1 Mark)
	$(\sigma_2 p)$		
O_2^{2-}	$(\sigma_2 s)\ (\sigma_2 s^*)$	1	Diamagnetic
	$(\sigma_2 p)$		(1 Mark)
	$(\pi_2 p)^4\ (\pi_2 p^*)^4$		(1 Mark)

(OR)

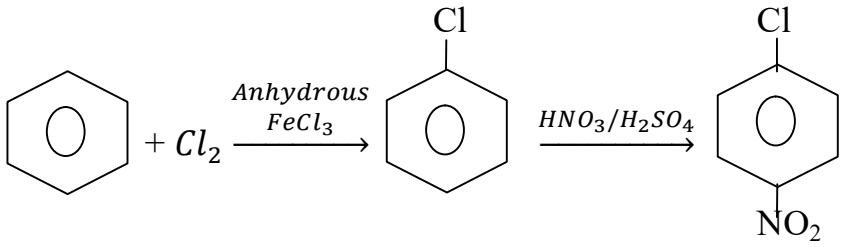
(i) The hybridisation of PCl_5 molecule is sp^3d Axial bond in PCl_5 are longer than equilateral bond due to greater repulsion. The axial bond repulsion from three equatorial bonds while the equatorial bonds repulsion form two axial bonds. The increased repulsion causes the axial bond to stretch and becomes longer. (3 Mark)

(ii)

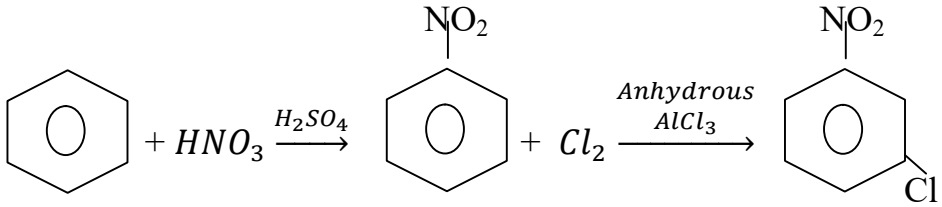
Sigma bond	**Pi bond** (2 Mark)
Formed by head on overlap	Formed by sideways overlap of p-orbital
Sigma bond are strong bond	Pi bond are weak bond

The electron cloud is symmetrical	The electron cloud is not symmetrical.

35. (i) Benzene to p – nitrochlorobenzene. (1 Mark)



Benzene to m – nitrochlorobenzene (1 Mark)



(ii) Wurtz Reaction:- (1 Mark)

$$CH_3Cl + 2Na + CH_3Cl \xrightarrow[333k]{dry\ eth} CH_3 - CH_3 + 2NaCl$$

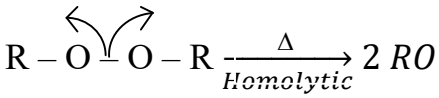
Decarboxylation reaction :- (1 Mark)

$$CH_3COONa + NaOH \xrightarrow{CaO} CH_4 + Na_2 + CO_3$$

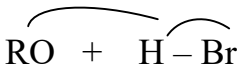
(iii) Huckel's Rule states that for a planer, cyclic conjugated molecule to be aromatic it must have 4n + 2π electron , where n is a non – negative integer. (1 Mark)

(OR)

When a polar molecule is attached to an unsymmetrical alkene in the presence of organic peroxide, the negative half of the molecule is attached to the carbon atom that has more hydrogen atom than that of other unsaturated carbon atom. (1 Mark)

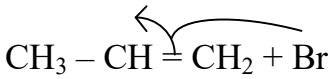


peroxide



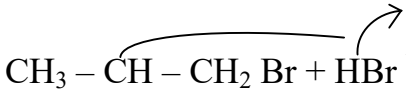
(1 Mark)

Step – I



(1 Mark)

Step – II



(1 Mark)

In case of HCl and HI it is not observed because H – Cl bond is strong free radical produced from peroxide may not broke into form Cl. In case of H – I bond is weak and broken free radical produced from peroxide to form I. But it prefers combine to form I_2 rather than double bond of Alkene. (1 Mark)