



CHEMISTRY HOSC-I
SECTION - A (Marks 17)

17

Time allowed: 25 Minutes

Version Number 3 0 9 3

Note: Section - A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

- Q. 1 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.
- Which of the following is NOT true for a colloid?
A. Can pass through ultra-filter paper
B. Its particles can't be seen under ordinary microscope
C. It is heterogeneous
D. Scatters light
 - 100g of 25% (w/w) NaOH contains 25g of NaOH in:
A. 90g of water
B. 100g of solution
C. 100g of water
D. 125g of water
 - How many moles of oxygen are needed for complete combustion of two moles of methane?
A. 3
B. 10
C. 4
D. 6
 - What volume of SO_2 at room temperature and pressure is produced on heating 3 moles of zinc sulphide (ZnS) if reaction takes place as follows $2ZnS_{(s)} + 3O_{2(g)} \longrightarrow 2ZnO_{(s)} + 2SO_{2(g)}$
A. $60dm^3$
B. $67.24dm^3$
C. $22.414dm^3$
D. $57.2dm^3$
 - To which mixture of gases Dalton's law of partial pressure is NOT applicable?
A. CH_4 & C_2H_6
B. HCl & NH_3
C. CO & CO_2
D. CO_2 & N_2
 - For an ideal gas, number of moles per litre in terms of its pressure P , gas constant R , and temperature T is:
A. P/RT
B. RT/P
C. PT/R
D. PRT
 - The forces present between the ions and water molecules are called:
A. London dispersion forces
B. Ion - dipole forces
C. Dipole - dipole force
D. Dipole - induced dipole
 - The example of monoclinic system is:
A. Graphite
B. Diamond
C. Sugar
D. Sulfur
 - The Avogadro's Constant is the number of:
A. Electrons needed to deposit 24g of Mg
B. Atoms in 24g of Mg
C. Atoms in 1g of He
D. Molecules in 35.5g of Chlorine
 - The number of nodes in p orbitals are:
A. 2
B. 4
C. 1
D. 3
 - In the formation of N_2^{+1} , the electron is removed from:
A. π_{2py} orbital
B. π_{2y}^* orbital
C. δ_{2px} orbital
D. δ_{px}^* orbital
 - Change in enthalpy of a system at constant pressure can be calculated by the following relationship:
A. $\Delta H = \Delta E - d$
B. $\Delta H = \Delta E + d$
C. $\Delta H = \Delta E + P\Delta V$
D. $\Delta H = \Delta E - PV$
 - For a given process $P\Delta V$, when there is no appreciable volume change, change in internal energy becomes equal to:
A. ΔP
B. qp
C. ΔH
D. ΔV
 - In order to decompose 9g of water 142.5kJ of heat is required. Hence enthalpy of formation of water is:
A. $-285kJ$
B. $+285kJ$
C. $-142.5kJ$
D. $+142.5kJ$
 - Oxidation state of S in $Na_2S_2O_3$ is:
A. +3
B. +4
C. +1
D. +2
 - A fuel cell operates at _____ temp.
A. Medium
B. Robm
C. Low
D. High
 - The number of coulombs required for the deposition of 107.8g of silver is:
A. 193000
B. 10000
C. 96500
D. 48250



CHEMISTRY HSSC-I

17

Time allowed: 2:35 Hours

Total Marks Sections B, C and D: 68

NOTE: The Questions of sections B, C and D are to be answered on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

SECTION – B (Marks 21)

(Chapters 1 to 6)

Q. 2 Answer any SEVEN parts. All parts carry equal marks. (7 x 3 = 21)

- (i) How much silver chloride will be formed by mixing 120g of silver nitrate with a solution of 52g of NaCl ? [At.Mass: Ag = 107.8amu, Cl = 35.5amu, N = 14amu, O = 16amu]
- (ii) a) Ice floats on water. Justify it. (02)
b) Why water is a liquid and H_2S is a gas at room temperature? (01)
- (iii) a) Why is $4s$ orbital lower in energy than $3d$ orbital?
b) What is the distance travelled by the electron when it goes from $n = 8$ to $n = 2$? Also indicate the region of spectra in which emitting lines will fall.
- (iv) Write down the three main defects of Bohr's Model.
- (v) Use the VSEPR theory to predict the shape of the each of the following BeF_2 , BH_3 , CCl_4 .
- (vi) How does MOT explain the different bond orders of F_2 and F_2^{-2} species?
- (vii) A certain mass of H_2 gas collected over water at $6^\circ C$ and $765mmHg$ pressure occupies a volume of $35cm^3$. Calculate its dry volume at (STP) (vapour pressure of water at $6^\circ C = 7mmHg$)
- (viii) How much energy is required to make electron of H-atom to jump from $n = 2$ to $n = 4$?
- (ix) How will you explain the two practical applications regarding the effect of pressure on the boiling point of a liquid?
- (x) Give comparison of Molecular crystals and metallic crystals.

SECTION – C (Marks 21)

(Chapters 7 to 12)

Q. 3 Answer any SEVEN parts. All parts carry equal marks. (7 x 3 = 21)

- (i) Give the industrial application of Lechatelier's principle using Haber's process as an example.
- (ii) An aqueous solution containing 100g of ethanol per dm^3 of solution has a density of $0.984gcm^{-3}$. Calculate the mole fraction of each component.
- (iii) The pH of a 0.1M solution of an acid is 2.85. Calculate the ionization constant K_a of the acid.
- (iv) Define and briefly describe the levelling effect of water in an acid base reaction.
- (v) Phosgene is a toxic gas. This gas is prepared by the reaction of carbon-monoxide with chlorine.
 $CO_{(g)} + Cl_{2(g)} \longrightarrow COCl_{2(g)}$ The following data were obtained from kinetic study of this reaction.

Experiment	Initial [CO]	Initial [Cl ₂]	Initial rate (mol dm ⁻³ / s)
1	1.00	0.100	1.29×10^{-29}
2	0.100	0.100	1.30×10^{-30}
3	0.100	1.00	1.30×10^{-30}

Write rate law for this reaction.

- (vi) What is hydrolysis? Write the equations of hydrolysis for NH_4^{+1} and CN^{-1} . (1+1+1)
- (vii) Glucose and normal saline solutions are isotonic with blood plasma. Glucose solution is composed of 5g of glucose in $100cm^3$ of solution and saline solution is composed of 9g of sodium chloride in $100cm^3$ of solution. Calculate the molarity of these solutions.
- (viii) Define and explain reverse osmosis dealing with daily life application.
- (ix) Balance the following equation by ion electron method in acidic medium
 $Cr_2O_7^{2-} + Cl^- \longrightarrow Cr^{+3} + Cl_2$
- (x) Methane is the major substance in natural gas. How much heat is released when 20g of methane burns in excess of air under standard conditions? The standard enthalpies of CO_2 , H_2O and CH_4 are $-393.5kJ mol^{-1}$, $285.8kJ mol^{-1}$ and $74.6kJ mol^{-1}$ respectively.

SECTION – D (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks. (13 x 2 = 26)

(Question 4 from Chapters 1 to 6)

- Q. 4** a. The total energy E of an electron is the sum of kinetic energy and potential energy. Derive the formula of energy of an electron present in n^{th} orbit. (07)
- b. Explain the hybridization plan in CH_4 , $CH_2 = CH_2$ and $CH \equiv CH$ (2+2+2)

(Question 5 from Chapters 7 to 12)

- Q. 5** a. What is solubility product? Give its applications for any two precipitation reactions. (2+2.5+2.5)
- b. Explain the effects of concentration, temperature and surface area on reaction rates. (2+2+2)

(Question 6 Part (a) from Chapters 1 to 6 and Part (b) from Chapters 7 to 12)

- Q. 6** a. Explain: (04+04)
- i. The low density and high heat of fusion of ice
- ii. Illustrate the conductivity of a metallic crystal using "electron sea theory".
- b. Calculate the masses of Cu and O_2 produced by electrolysis of $CuSO_4$ solution on passing 5 ampere of current for 2 hrs. What would be: (2.5+.2.5)
- i. The volume of O_2 at STP.
- ii. Mass of Cu deposited
- Following reaction occur at electrodes
- At anode $2H_2O \longrightarrow O_2 + 4H^+ + 4e^-$
- At Cathode $Cu^{+2} + 2e^- \longrightarrow Cu^0$

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