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 Answer Sheet No. 17

Sig. of Candidate. _____

Sig. of Invigilator. _____

CHEMISTRY HSSC-I SECTION – A (Marks 17)

Time allowed: 25 Minutes

Revised Syllabus

 Version Number

1	7	2	1
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Note: Section – A is compulsory. All parts of this section are to be answered on the OMR Answer Sheet provided separately. It should be completed in the first 25 minutes and handed over to the Centre Superintendent along with the Question Paper. 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.

- 1) When one mole of each of the following is completely burnt in oxygen. Which will give the largest mass of CO_2 ?

A. Carbon monoxide	B. Diamond
C. Ethane	D. Methane

- 2) Methane reacts with steam to form H_2 and CO as shown: $CH_{4(g)} + H_2O_{(g)} \rightarrow CO_{(g)} + 3H_{2(g)}$
 What volume of H_2 can be obtained from $100cm^3$ of methane at S.T.P?

A. $300cm^3$	B. $200cm^3$
C. $150cm^3$	D. $100cm^3$

- 3) Which one is the correct value of R?

A. $0.0821dm^3 cm^3 K^{-1} mol^{-1}$	B. $0.0821dm^3 atm K^{-1} mol^{-1}$
C. $0.0821dm^3 torr K^{-1} mol^{-1}$	D. $0.0821cm^3 torr K^{-1} mol^{-1}$

- 4) Equal volume of all gases at same temperature and pressure contain number of molecules:

A. Multiple	B. Equal
C. Different	D. No comparison

- 5) NH_3 shows a maximum boiling point among the hydrides of V-A group elements because of:

A. Very small size of nitrogen
B. lone pair of electrons present on nitrogen
C. Enhanced electro negative character of nitrogen
D. Pyramidal structure of NH_3

- 6) Which of the following equation represents the second ionization energy of Na ?

A. $Na_{(g)} \rightarrow Na^{+2}_{(g)} + e^-$	B. $Na_{(s)} \rightarrow Na^{+2}_{(g)} + 2e^-$
C. $Na^+_{(s)} \rightarrow Na^{+2}_{(g)} + e^-$	D. $Na^+_{(g)} \rightarrow Na^{+2}_{(g)} + e^-$

- 7) Pressure remaining constant, at which temperature the volume of a gas will become twice of what it is at $0^\circ C$?

A. $546^\circ C$	B. $200^\circ C$
C. $546K$	D. $0K$

- 8) The maximum number of electrons in a subshell for which $l = 3$ is:

A. 14	B. 10
C. 8	D. 4

- 9) $H-O-H$ bond angle in H_2O is 104.5° and not 109.28° because of:

A. High electronegativity of oxygen	B. Bond pair – bond pair repulsion
C. Lone pair – lone pair repulsion	D. Lone pair – bond pair repulsion

DO NOT WRITE ANYTHING HERE

- 10) For which of the following reactions K_c has units of concentration?
- A. $2A_{(g)} \rightleftharpoons B_{(g)}$ B. $A_{(g)} \rightleftharpoons B_{(g)}$
C. $A_{(g)} \rightleftharpoons 2B_{(g)}$ D. $3A_{(g)} \rightleftharpoons 2C_{(g)}$
- 11) The unit which indicates the largest amount of energy is:
- A. Joule B. Electron volt
C. Calorie D. erg
- 12) Evaporation of water is:
- A. An exothermic change
B. An endothermic change
C. A process where no heat changes occur
D. A process accompanied by chemical reaction
- 13) Corrosion is an electrochemical process which requires:
- I. oxygen II. Water
III. Acidic Vapours IV. Basic Vapours
- A. I B. I, II
C. I, II, III D. I, II, III, IV
- 14) $AgCl$ dissolved with $conc.(2 \times 10^{-2})$. K_{sp} will be:
- A. 3.6×10^{-6} B. 3.6×10^{-5}
C. 7.2×10^{-6} D. 4×10^{-4}
- 15) Which of the following will form an ideal solution?
- A. C_2H_5OH & H_2O B. C_6H_6 & CCl_4
C. $CHCl_3$ & CH_3COOCH_3 D. H_2O & HBr
- 16) Cathodic reaction in the electrolysis of $dil.H_2SO_4$ is always:
- A. Reduction B. Oxidation
C. Decomposition D. Ionization
- 17) 2.5 Fd of electricity is passed through solution of $CuSO_4$. The number of gram equivalents of Cu deposited on the cathode would be:
- A. 1 B. 2
C. 2.5 D. 1.25

For Examiner's use only:

Total Marks:

17

Marks Obtained:



CHEMISTRY HSSC-I

18

Revised Syllabus

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 x3 = 21)**
- Calculate the mass in kg and number of charges of 3×10^{50} ions of SO_4^{2-} ions.
 - 16g of methane, 44g of propane and 2g of hydrogen have equal number of molecules but different number of atoms although all four gases have different sizes of molecules. Justify.
 - Write down the electronic configurations of ${}_{24}Cr$, ${}_{29}Cu^{+2}$, ${}_{28}Ni^{+2}$.
 - A photon of light with energy $10^{-19} J$ is emitted by a source of light. Convert this energy into wavelength, frequency and wave number of photon in terms of meters, hertz and m^{-1} respectively.
 - Polar molecules containing a hydrogen atom attached to an electronegative element such as fluorine, oxygen or nitrogen have tendency to unite together by means of hydrogen bonds. Make a graphical representation of some hydrogen bonded compounds containing the elements of group IV, V, VI and VII.
 - The observed dipole moment (u) of HF is 1.90 D. Find the % of ionic character in HF. The distance between the charges is $0.917 \times 10^{-10} m$. Unit positive charge is $1.602 \times 10^{-19} C$.
 - The composition of dry air at sea level is approx. $N_2 = 75.5$, $O_2 = 23.2$, $Ar = 1.3$ in percentage by weight. What is the partial pressure of each component when total pressure is 1.00 atm?
 - Carbon dioxide and sulphur dioxide were allowed to diffuse from the same container at different times under the same conditions of temperature and pressure. Calculate the ratio of their rates.
 - Why the boiling points of ether, ethyl alcohol, and water are in the order of ether < ethyl alcohol < water?
 - Write down two applications of low density and high heat of fusion of ice.

SECTION – C (Marks 21)

(Chapters 7 to 12)

- Q. 3 Answer any SEVEN parts. All parts carry equal marks. (7 x3 = 21)**
- Define equilibrium constant. When:
 - Constant has same units as concentrations.
 - Equilibrium constant has no units.
 - 3.88 moles of NO and 0.88 moles of CO_2 were heated in a flask at certain temperature. At equilibrium 0.11 moles of each product were present. Calculate Kc for the reaction.
 $CO_2 + NO \rightleftharpoons CO + NO_2$
 - The relative strength of hydrogen halides are in the following order: $HI > HBr > HCl$. How can you prove this order on the basis of their conjugate bases?
 - Kw equilibrium constant for water is temperature dependant. Justify.
 - Calculate the pH of an acetic acid. Sodium acetate buffer solution containing 1.0 moles of each component Ka value for acetic acid is 1.8×10^{-5} .
 - What will be the pH of this solution after addition of 0.01 mole of hydrochloric acid gas to $1 dm^3$ volume?

- (v) Define the order of reaction. Explain the zero order and negative order reactions with examples.
- (vi) When a reaction takes place the reactant molecules collide among themselves but so many collisions become fruitless. Explain the phenomenon based upon molecular level and also draw a graph.
- (vii) 250 g of $CuSO_4 \cdot xH_2O$ on heating produced 159.82 g $CuSO_4$. Calculate the percentage of water in $CuSO_4 \cdot xH_2O$. Also determine the value of x.
- (viii) State Raoult's law in three different ways for a non-volatile, non-electrolyte solute in volatile solvent.
- (ix) Balance the following equation by redox reaction in acidic solution $MnO_4^{-1} + H_2O_2 \rightarrow Mn^{+2} + O_2^0$
- (x) State Hess's law. Draw Born Haber cycle to calculate the lattice energy from $Na_{(s)}$ and $Cl_{2(g)}$.

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. How e/m ratio for cathode rays and charge of electron can be determined by JJ Thomson's experiment and Millikan's oil drop experiment, respectively. (07)
- b. Give three main postulates of Plank's quantum theory. How you can prove the following relation for a photon's energy? a. $E \propto \frac{1}{\lambda}$ b. $E \propto \bar{\nu}$ (3+3)

(Question 5 from Chapters 7 to 12)

- Q. 5** a. What are Buffer's? How do Buffers act? Give any two applications of Buffers in Bio-chemistry. (2+3+1)
- b. Give a graphical explanation of Elevation in boiling point of solution. How molar mass of a non-volatile and non-electrolyte solute can be calculated with the help of it. (3+4)

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

- Q. 6** a. How will you explain the relationship between pressure and mole of a gas with the help of Dalton's law of partial pressure? (07)
- b. Give the reasons for the following: (2+2+2)
- i. Reduction of 1 mole of each Zn^{+2} and Ag^+ require different Faradays of electricity.
 - ii. Saline water can be purified by repeated freezing.
 - iii. A salt bridge maintains the electrical neutrality in the cell.

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Answer Sheet No. 19

Sig. of Candidate. _____

Sig. of Invigilator. _____

CHEMISTRY HSSC-I

SECTION - A (Marks 17)

Time allowed: 25 Minutes

(Old Syllabus)

Version Number

1	7	9	1
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Note: Section - A is compulsory. All parts of this section are to be answered on the OMR Answer Sheet provided separately. It should be completed in the first 25 minutes and handed over to the Centre Superintendent along with the Question Paper. 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.

- 1) The volume occupied by 2.8 grams of nitrogen gas at S.T.P is:
A. 2.24 dm^3 B. 22.4 dm^3 C. 1.12 dm^3 D. 224 dm^3
- 2) The technique used to separate the products of organic synthesis from water is called:
A. Filtration B. Crystallization
C. Chromatography D. Solvent extraction
- 3) The wave number of light emitted by certain source is $2 \times 10^6 \text{ m}^{-1}$. The wave length of the light is:
A. 500 nm B. 500 m C. 200 nm D. $5 \times 10^7 \text{ m}$
- 4) ${}^{14}_7\text{N} + {}^1_0\text{n} \rightarrow {}^{11}_5\text{B} + {}^4_2\text{He}$, what is 'x' ?
A. Beta rays B. Gamma rays C. α - particles D. X-rays
- 5) The energy of electron in the first orbit of hydrogen is:
A. $-0.544 \times 10^{-18} \text{ J}$ B. $-2.18 \times 10^{-18} \text{ J}$ C. $-0.242 \times 10^{-18} \text{ J}$ D. $-0.136 \times 10^{-18} \text{ J}$
- 6) Which one is not a state function?
A. Enthalpy B. Heat C. Internal energy D. Pressure
- 7) If an acid has $pK_a = 3.4$, what will be pK_b for its conjugate base?
A. 8.4 B. 10.6 C. 12.3 D. 3.4
- 8) Molecular ions are produced by bombarding a gas with high energy.
A. Electron Beam B. Gamma-rays C. X-rays D. Neutrons
- 9) When water freezes at 0°C , its density decreases due to:
A. Cubic Structure of ice B. Empty spaces in the structure of ice
C. Change of bond length D. Change of bond angles
- 10) Iodine is solid at room temperature due to:
A. Small molecular size B. Non polar nature
C. Strong dipole forces D. Greater polarizability
- 11) The molal boiling point constant is the ratio of the elevation in boiling point to:
A. Molarity B. Molality
C. Mole fraction of solute D. Mole fraction of solvent
- 12) If the temperature of an object is -546°C , then what will be the temperature on kelvin scale?
A. 0 k B. -273 k C. 546 k D. 273 k
- 13) The Quantum number values for 4d orbital is:
A. $n = 4, \ell = 1$ B. $n = 4, \ell = 0$ C. $n = 4, \ell = 2$ D. $n = 4, \ell = 3$
- 14) On comparing the masses of 0.4 moles of ozone and 0.4 moles of oxygen atoms, it is observed that:
A. Mass of ozone is greater than oxygen atom B. Mass of oxygen atom is greater than ozone
C. Both have equal masses D. Both contain different number of molecules
- 15) The number of moles of solute in 2 dm^3 of 3M solution are:
A. 1.5 B. 0.666 C. 3.0 D. 6.0
- 16) An Excess of aqueous Silver Nitrate (AgNO_3) is added to Barium Chloride (BaCl_2) and precipitate is removed by filtration. What are the main ions in filtrate?
A. Ag^+ and NO_3^- only B. Ag^+ , Ba^{+2} and NO_3^-
C. $\text{Ba}^{+2} + \text{NO}_3^-$ only D. Ba^{+2} , NO_3^- and Cl^- ions
- 17) A real gas obeying Vander Waal's equation will behave ideal if:
A. Both 'a' and 'b' are large B. Both 'a' and 'b' are small
C. 'a' is small and 'b' is large D. 'a' is large and 'b' is small

For Examiner's use only:

Total Marks:

17

Marks Obtained:

IHS 1609



CHEMISTRY HSSC-I

(Old Syllabus)

20

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE: Sections B and C comprise pages 1 – 2. Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly. Periodic table will be provided on demand.

SECTION – B (Marks 42)

Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 5 to 6 lines. (14 x 3 = 42)

- (i) Calculate the number of gram atoms in:
 - a. 35 grams of Hydrogen gas
 - b. 0.1 kg of carbon
- (ii) Explain briefly the following with reference to crystallization process:
 - a. Preparation of saturated solution.
 - b. Decolourization of undesirable colours of the solid.
- (iii) Explain briefly why diamond is hard and electrical insulator?
- (iv) Differentiate between:
 - a. Sigma and π bond.
 - b. Theoretical and actual yield.
- (v) State and explain briefly Graham's law of diffusion on the basis of kinetic molecular theory.
- (vi) a. Define Solubility and Solubility curve.
b. Briefly describe discontinuous Solubility curve.
- (vii) Hydrogen atom and He^+ are both monoelectronic systems, but the size of He^+ is much smaller than Hydrogen atom. Why?
- (viii) Calculate the mass of Urea (H_2NCONH_2) in 100 gram of water in 0.3 Molal solution.
- (ix) Describe electrolysis of molten sodium chloride to extract sodium metal.
- (x) a. Define Unit Cell.
b. How the idea of crystal lattice is developed from the concept of unit cell?
- (xi) Give reason:
 - a. Whichever gas is used in discharge tube, the nature of cathode rays remain the same.
 - b. Water vapours do not behave ideally at 273 k.
- (xii) How do you measure the enthalpy of reaction by using glass calorimeter?
- (xiii) Calculate value of general gas constant (R) at S.T.P, when you have:
 - a. One mole of ideal gas
 - b. 2.0 moles of ideal gas.
- (xiv) If water has only a very weak Hydrogen bonding then briefly explain its effects on our lives.
- (xv) Ascorbic acid contains 40.92% carbon, 4.58% Hydrogen and 54.5% of oxygen by mass. What is empirical formula of Ascorbic acid? (The atomic mass of C=12 amu, H=1 amu and O=16 amu)

- (xvi) a. What is Solubility product?
 b. Derive the Solubility expression for sparingly soluble PbF_2 .
- (xvii) Differentiate between:
 a. Zero order and 1st order reaction.
 b. Homogeneous and heterogeneous catalysis.
- (xviii) a. What is electrochemical series?
 b. How this series can be used to predict the feasibility of a chemical reaction?
- (xix) Give reasons:
 a. Rate of chemical reaction is an ever changing parameter under the given conditions.
 b. The dipole moment of CO_2 is zero but that of H_2O is 1.85D.

SECTION – C (Marks 26)

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

- Q. 3** a. Silicon carbide (SiC) is prepared by the reaction of Sand (SiO_2) with carbon at high temperature:
 $SiO_2 + 3C \rightarrow SiC + 2CO$
 When 100 kg sand is reacted with excess of carbon, 51.4 kg of Silicon carbide is produced.
 What is the % age yield of Silicon carbide? 05
- b. Justify that greater quantity of (CH_3COONa) in acetic acid decreases the dissociation power of acetic acid and hence the pH also decreases. 04
- c. Briefly describe Silver Oxide Battery. 04
- Q. 4** a. Transition temperature is exhibited both by elements and by compounds. Explain. 04
- b. What is the distance travelled by electron when it goes from $n=2$ to $n=3$ and $n=9$ to $n=10$ in hydrogen gas. 04
- c. During contact process, the conversion of SO_2 to SO_3 is achieved by the following reversible reaction: $2SO_2 + O_2 \xrightleftharpoons{V_2O_5} 2SO_3$ $\Delta H = -194 \text{ kJ / mole}$
- (i) What is effect of change of temperature on equilibrium stage? 02
- (ii) How does the change in pressure or volume shift equilibrium position of reaction? 02
- (iii) What is role of catalyst in this reaction? 01
- Q. 5** a. Define Ionization Energy. Name factors influencing the Ionization Energies. 01+02
- b. Justify the following increasing order Ionization Energy: $Mg < Mg^+ < Mg^{2+}$ 04
- c. Define Lattice Energy. Calculate the Lattice Energy of potassium bromide using information given in the following table: 01+05

Reactions	ΔH kJ mole^{-1}
$K_{(s)} + \frac{1}{2} Br_{2(l)} \rightarrow K + Br_{(s)}$	-392
$k_{(s)} \rightarrow k_{(g)}$	+90
$k_{(g)} \rightarrow k^+_{(g)} + e^-$	+420
$\frac{1}{2} Br_{2(l)} \rightarrow Br_{(g)}$	+112
$Br_{(g)} + e \rightarrow Br^-_{(g)}$	-342