Roll No. | | | | | | | Answer Sheet No._____

Sig. of Candidate._____ Sig. of Invigilator._____

CHEMISTRY HSSC–I

SECTION – A (Marks 17)

Time allowed: 25 Minutes **Revised Syllabus**

NOTE:- Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It 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 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) What will be the charge on 10g of electrons?

A. 1.7588×10^{11}C B. 1.602×10^{-19}C C. 1.7588×10^{9}C D. 9.65×10^{4}C

(ii) A pressure of 1.47 Psi will be equal to:

A. 760 torrs B. 1 atm C. 10.13 kPa D. 101.325 kPa

(iii) An equimolar mixture of He (4 amu) and methane (16 amu) is present in a cylinder at STP. The ratio of their partial pressures will be:

A. 1:4 B. 4:16 C. 4:1 D. 1:1

(iv) Select the correct statement.

A. Rate of evaporation is independent of temperature

B. Vapour Pressure is independent of Surface Area

C. Rate of evaporation is inversely related to Kinetic energies of molecules

D. Vapour Pressure is independent of nature of liquid.

(v) Select a quantity that contains one mole of Hydrogen atoms.

A. 1.0 $mol\ H_2S$ B. 0.5 $mol\ CH_4$

C. 0.5 $mol\ H_2O$ D. 1.0 $mol\ H_2$

(vi) pH of 0.062 M NaOH solution will be:

A. 1.21 B. 12.79 C. 2.32 D. 10.32

(vii) Mass of 2 mol of Hydrogen atoms will be equal to:

A. 2.016 g B. 4.032 g C. 2.00 g D. 1.008 g

(viii) According to M.O.T, which of the following species resemble to He_2 w.r.t filling of molecular orbitals?

A. Be_2 B. B_2 C. Li_2 D. C_2

(ix) In a volume of 11.207 dm^3 of CO_2 at STP, the mass of Oxygen atoms will be:

A. 32 g B. 16 g C. 48 g D. 26 g

(x) Which of the following factors does not affect actual yield?

A. Side reaction B. Separation techniques

C. Temperature D. Human error

(xi) In a 0.5 molal solution, mass of H_2SO_4 is 49 g. What will be the mass of H_2O in that solution?

A. 1000 g B. 0.5 kg C. 2 kg D. 951 g

(xii) Which of the following series fall in the UV region of H–spectrum?

A. Brackett Series B. Lyman Series C. Paschen Series D. Balmer Series

(xiii) For which reaction the unit of rate constant is the same as that of rate of reaction?

A. First order reaction B. Second order reaction

C. Third order reaction D. Zero order reaction

(xiv) For a particular molecule, its molecular formula is like AB_2E Type its possible geometry may be:

A. Linear B. Angular C. Trigonal planer D. Tetrahedral

(xv) 100 g of 10% W/V solution contains 10 g ethanol in:

A. 90 ml of H_2O B. 90 g of H_2O C. 100 ml of H_2O D. Unpredictable quantity

(xvi) Organic acids are present in fruits and other stuff. Which substance has tartaric acid?

A. Insect bite B. Sour milk C. Apple D. Grapes juice

(xvii) How much mass of Chromium will be deposited by 1.5 Faradays of electricity by the following reaction?
$Cr^{+3} + 3e^- \rightarrow Cr$ [Atomic Mass of Cr=52]

A. 26 g B. 52 g C. 1.5 g D. 78 g

For Examiner's use only:

Total Marks: 17

Marks Obtained:

CHEMISTRY HSSC–I

(Revised Syllabus)

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

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

SECTION – B (Marks 42)

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

(i) **a.** Why $\frac{e}{m}$ ratio of Cathode rays remains the same for all gases? **(01)**

b. Calculate $\frac{e}{m}$ ratio of Proton. **(02)**

(ii) What Pressure is exerted by a mixture containing 2 moles of Oxygen and 32 g of CH_4 in a volume of 20 dm^3 at 0 °C? **(03)**

(iii) K_{sp} for $Mg(OH)_2$ at 25°C is equal to 2×10^{-11}. Find pOH of its saturated solution at this temperature. **(03)**

(iv) **a.** What is molar volume? **(01)**

b. Why is actual yield less than theoretical yield? **(02)**

(v) What are the drawbacks of Valence Bond Theory? **(03)**

(vi) Mention three defects of Bohr's Model. **(03)**

(vii) What is levelling effect? How can it be compensated for? **(01+02)**

(viii) Describe briefly that increase in temperature increases the rate of reaction. **(03)**

(ix) A Galvanic cell is made up of Cu/Cu^{+2} and Zn/Zn^{+2}. **(01+01+01)**

$Cu^{+2} + 2e^- \longrightarrow Cu$ $\quad E^0 = +0.34\ V$ $\quad Zn^{+2} + 2e^- \longrightarrow Zn$ $\quad E^0 = -0.76\ V$

a. Name Anode and Cathode

b. Write down the net reaction

c. Calculate E° cell

(x) Give two examples of each of AB_4, AB_3E and AB_2E_2 type molecules. **(03)**

(xi) Write down three major differences between pure liquid and liquid-crystals. **(03)**

(xii) What is Hess's law? Give one suitable example. **(01+02)**

(xiii) Calculate ΔH_r for the following reaction where ΔH_f° are 269 kJ, 0 kJ, −393 kJ and −285 kJ for $C_8H_8(l)$, $O_2(g)$, $CO_2(g)$ and $H_2O\ (l)$ respectively: **(03)**

$2C_8H_{18} + 25O_2 \longrightarrow 16CO_2 + 18H_2O$

(xiv) What is reverse osmosis? How is it used in desalination of water? **(01+02)**

(xv) **a.** Draw a diagram to show the effect of Catalyst upon activation energy. **(01)**

b. Define activation energy and catalysis **(02)**

(xvi) Effervescence takes place when carbonated drink bottles are opened. Explain this phenomenon with the help of Henry's law. **(03)**

(xvii) Calculate molality of 20% w/w NaOH solution. **(03)**

(xviii) Define habit of a crystal. How can it be changed? Give one example. **(01+01+01)**

(xix) What is boiling point? How is it affected by decrease and increase in pressure? Give one example in each case. **(01+01+01)**

SECTION – C (Marks 26)

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

Q. 3 **a.** How will you find K_c for the following reaction by means of chemical method?
$CH_3COOH + C_2H_5OH \longrightarrow CH_3COOC_2H_5 + H_2O$ **(05)**

b. Derive an equation for finding radius of an orbit in H-atom. **(05)**

c. Define lattice energy and write down the factors affecting it. **(03)**

Q. 4 **a.** **i)** Define solubility product with suitable example. **(02)**

ii) Find the solubility of $PbSO_4$ in g/dm^3. K_{sp} of $PbSO_4 = 1.96 \times 10^{-8}$ at 25°C. **(03)**
$[Pb = 207, \quad S = 32, \quad O = 16]$

b. BF_3 and NF_3 have identical formulas like MX_3 but different structures. Explain their geometries on the basis of VSEPR theory. **(05)**

c. Define anisotropy with two suitable examples. **(03)**

Q. 5 **a.** **i)** Write Vander Waal's equation and Pressure correction made by him for real gases. **(03)**

ii) What is "a" and "b" in Vander Waal's equation? Write their units. **(03)**

b. Define conjugate solutions. Explain with example, the effect of temperature upon such solutions. **(01+03)**

c. How do the boiling points of halogens vary down the group? Explain with reason. **(03)**

Roll No. | | | | | | | Answer Sheet No._____

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CHEMISTRY HSSC–I

SECTION – A (Marks 17)

Time allowed: 25 Minutes (Old Syllabus)

NOTE: Section–A is compulsory. All parts of this section are to be answered on the question paper itself. It 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 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) The number of isotopes of nickel is:
A. 3 B. 5 C. 6 D. 9

(ii) $101325\ Nm^{-2}$ is equal to:
A. $7.60\ psi$ B. $1\ psi$ C. $101.325\ psi$ D. $14.7\ psi$

(iii) The molecule of CO_2 in dry ice form is:
A. Ionic crystal B. Covalent crystal
C. Molecular crystal D. Metallic crystal

(iv) Quantum number values for $2P$ orbital are:
A. $n = 2, l = 1$ B. $n = 1, l = 2$ C. $n = 1, l = 0$ D. $n = 2, l = 0$

(v) Which of the following spectral series lie in visible region:
A. Balmer series B. Paschen series C. Brackett series D. Pfund series

(vi) Neutron was discovered by:
A. Chadwick B. Gold Stein C. J.J Thomson D. Millikan

(vii) Which of the following molecules is polar?
A. CCl_4 B. SO_2 C. SO_3 D. BF_3

(viii) Bond length of $C = C$ is:
A. $154\ Pm$ B. $120\ Pm$ C. $133\ Pm$ D. $122\ Pm$

(ix) Which of the following contains largest number of particles?
A. $18g\ H_2O$ B. $196g\ H_2SO_4$ C. $22g\ CO_2$ D. $342g\ C_{12}H_{22}O_{11}$

(x) Units of Kc for the reaction $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ will be:
A. $moles\ dm^{-3}$ B. no units C. $moles^{-2}dm^{+6}$ D. $moles^{+2}dm^{-6}$

(xi) Whose solubility will increase with rise in temperature:
A. $NaCl$ B. $LiCl$ C. Li_2CO_3 D. KI

(xii) Which of the following is not a state function?
A. Enthalpy B. Internal energy C. Temperature D. Work done

(xiii) In a reversible exothermic reaction activation energy of forward reaction is:
A. less than backward reaction B. higher than backward reaction
C. equal to backward reaction D. same or not

(xiv) Which of the following can be used in desiccator?
A. Calcium Chloride B. Sodium Chloride
C. Iodine D. Animal Charcoal

(xv) Which ion can be easily hydrolysed?
A. Cl^{1-} B. SO_4^{2-} C. Al^{3+} D. Na^{1+}

(xvi) Which can displace hydrogen from steam?
A. Au B. Cu C. Fe D. Ag

(xvii) The unit of the rate constant is the same as that of rate of reaction in:
A. First order reaction B. Second order reaction
C. Zero order reaction D. Third order reaction

For Examiner's use only:

Total Marks: 17

Marks Obtained:

CHEMISTRY HSSC–I

(Old Syllabus)

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 mass of 10^{-3} moles of $MgSO_4$ [At. Wts. $Mg = 24$, $S = 32$, $O = 16$]

(ii) What features should an ideal solution have?

(iii) Describe Linde's method of liquification.

(iv) According to kinetic molecular theory, the kinetic energy is directly proportional to the absolute temperature of gas. How it justifies Boyle's law?

(v) What type of intermolecular force is present in Chloroform and Acetone mixture? Explain briefly by drawing structures.

(vi) Write down equations showing bombardment of ${}^{1}_{0}n$ with Nitrogen and Copper.

(vii) Bond angle of $NH_3$is 107.5° and NH_4^+ is 109.5° . Justify these values by drawing structures.

(viii) Calculate heat of formation of ethyl alcohol from following information:

(a) Heat of combustion of ethyl alcohol is $-1367\ kJ/mol$.
(b) Heat of formation of $CO_2$is $-393.7\ kJ/mol$.
(c) Heat of formation of water is $-285.8\ kJ/mol$.

(ix) What information do we get about extent of chemical reaction by knowing value of equilibrium constant?

(x) From the pairs (a) $HCl\ and\ H_2O$ (b) $C_2H_5OH\ and\ H_2O$ (c) $CH_3OH\ and\ H_2O$

(i) Choose zeotropic and azeotropic mixtures.
(ii) Mention type of deviation (if any).

(xi) (a) What will be the value of $E°$ cell for the reaction $Cd^{2+} + Fe \longrightarrow Cd + Fe^{2+}$
(b) Is this reaction feasible? [Reduction potentials, $Cd = -0.403V$, $Fe = -0.44V$]

(xii) How can order of reaction be determined by half life method?

(xiii) Write down the advantages of Gooch Crucible.

(xiv) SiC is an important ceramic material. It is produced by allowing sand (SiO_2) to react with C at high temperature ($SiO_2 + 3C \longrightarrow SiC + 2CO$) when 100 kg sand is reacated with excess of Carbon, 51.4 kg o SiC is produced. What is the percentage yield? [At. Wts. $Si = 28$, $C = 12$, $O = 16$]

(xv) Explain briefly Hexagonal close packing in the structure of metals with the help of a diagram.

(xvi) What characteristics plasma should have?

(xvii) Calculate $\bar{\nu}$ of first line, second line and limiting line in Lyman Series.

(xviii) Classify the following as $AB_3$and AB_4 type of molecules. Also draw their structures.

(a) SO_2 (b) PH_3

(xix) Define: (a) Negative Catalysis (b) Auto Catalysis

SECTION – C (Marks 26)

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

Q. 3 **a.** What expression did Bohr derived for the radius of nth orbit of hydrogen atom? **04**

b. Define following: **1.5+1.5**

(i) Specific rate Constant

(ii) Order of reaction

c. The boiling points of some hydrides are given: **03**

Substance	**Boiling point** (K)
CH_4	109
NH_3	240
H_2O	373

Suggest reasons for the difference in their boiling points in terms of intermolecular forces present between them.

d. **(i)** calculate value of $\mathcal{R}$ at STP. **02+01**

(ii) what are physical meanings of this value?

Q. 4 **a.** Calculate the lattice energy of Potassium Bromide by using the information given below: **03**

Reactions	$\Delta H/kJ\ mol^-$
$K_{(s)} + \frac{1}{2}Br_{2(l)} \longrightarrow K^+Br^-_{(s)}$	−392
$K_{(s)} \longrightarrow K_{(g)}$	+90
$K_{(g)} \longrightarrow K^+_{(g)} + e^-$	+420
$\frac{1}{2}Br_{2(l)} \longrightarrow Br_{(g)}$	+112
$Br_{(g)} + e^- \longrightarrow Br^-_{(g)}$	−342

b. Specify anode and cathode of Silver Oxide battery and also write down the reactions **02**

c. State and explain Raoult's law for solutions having one volatile component. **05**

d. **(i)** Draw molecular orbital energy diagram for O_2 **02+01**

(ii) State whether it is paramagnetic or diamagnetic?

Q. 5 **a.** Balance following equation by Oxidation number method: **04**

$Br_2 + NaOH \longrightarrow NaBr + NaBrO_3 + H_2O$

b. Prove that $P' = \frac{a}{v^2}$ **03**

c. Calculate mass of urea in $100g$ of H_2O (water) in 0.3 molal solution. **03**

[At. Masses. $N = 14$, $H = 1$, $C = 12$, $O = 16$]

d. Define following: **1.5+1.5**

(i) Law of Mass action

(ii) Distribution Law