Roll No: | | | | | | | Answer Sheet No: _____

Signature of Candidate: _____ Signature of Invigilator: _____

Federal Board HSSC-I Examination
Chemistry Model Question Paper

SECTION – A

Time allowed: 25 minutes Marks: 17

Note: Section-A is compulsory and comprises pages 1-2. 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 Encircle the correct option i.e. A / B / C / D. All parts carry equal marks.

i. The number of atoms present in a molecule determine its.
A. Molecularity B. basicity
C. acidity D. atomic

ii. 22.4 dm^3 of CO_2 is _____ 22.4 dm^3 of SO_2.
A. Heavier than B. Lighter than
C. Equal to D. None of these

iii. Three quantum number have been derived from equation of
A. de-Broglie's equation B. Plank's equation
C. schrodinger'wave equation D. Heisenberg' equation

iv. Splitting of spectral lines when atom is subjected to magnetic field is called
A. Seeman's effect B. Stark's effect
C. Photo electric effect D. Compton effect

v. According to VESPR model, the geometry of molecule having 5 bond pair in outer most shell will be
A. Triangular B. Square planner
C. Trigonal bipyramidal D. Octahedral

vi. Geometry of molecule will be pyramidal, when number of electrons pairs in outer most shell of central atom is
A. 3 bond pair, one lone pair B. 2 bond pair, 2 lone pair
C. 1 bond pair, 3 lone pair D. 3 lone pair, 1 bond pair

vii. Value and the units of gas constant R in SI system is
A. 0.0821 $dm^3\ K^{-1}\ atm^{-1}$ B. 82.1 cm^3 atm K^{-1}
C. 8.31 Nm $K^{-1}\ mol^{-1}$ D. 8.31 Cal $K^{-1}\ mol^{-1}$

viii. For a gas where volume and pressure are 1 dm^3 and 2atm respectively, what should be its new volume, when pressure is increased to 6 atm at constant temperature?
A. 1/2 dm^3 B. 1/3 dm^3
C. 1/4 dm^3 D. 2/3 dm^3

DO NOT WRITE ANYTHING HERE

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ix. Which one is false for evaporation?

A. surface phenomena B. continuous
C. endothermic D. exothermic

x. MgO and CsF have both atomic ratio 1:1 in their crystals, such property is

A. Polymorphism B. Isomorphism
C. isotropy D. allotropy

xi. In which of the following equilibrium will K_c and K_p have the same value:

A. $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ B. $N_2 + 3H_2 \rightleftharpoons 2NH_3$
C. $2CO + O_2 \rightleftharpoons CO_2$ D. $N_2 + O_2 \rightleftharpoons 2NO$

xii. In buffer solution, the concentration of acid is 10 times the concentration of salt added, the pH of this solution is

A. pKa + 1 B. pKa – 1
C. pKa + 2 D. pKa – 2

xiii. The unit of rate constant for 2^{nd} order reaction is

A. $mole.dm^{-3}.sec$ B. $mole.dm^3sec$
C. $mole.dm^3.sec^{-1}$ D. $mole^{-1}.dm^3.sec^{-1}$

xiv. 5.85g of NaCl in 1 litre of water, the concentration of solution will be

A. 0.1M B. 1m
C. 1M D. 0.1N

xv Which of the following solutions will have highest boiling point:

A. 1 molal solution NaCl B. 1 molal solution of MgI_2
C. 1 molal solution $AlCl_3$ D. CCl_4

xvi. Change in enthalpy of a system can be calculated by following relationship

A. $\Delta H = \Delta E + PV$ B. $\Delta H = \Delta E - PV$
C. $\Delta H = \Delta E - d$ D. $\Delta H = \Delta E + d$

xvii. In electrolytic solution conductance of electricity is due to

A. Free electrons B. Ions
C. metals D. Electrodes

For Examiner's use only

Q. No.1: Total Marks:	17
Marks Obtained:	

Federal Board HSSC-I Examination
Chemistry Model Question Paper

Time allowed: 2.35 hours | Total Marks: 68

Note: Sections 'B' 'C' and 'D' comprise pages 1-2 and questions therein 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)

(From Chapter 1 – 6)

Q.2 Attempt any SEVEN parts. All parts carry equal marks. $(7 \times 3 = 21)$

i. Calculate the number of +ve and –ve ions dispersed when 2.35 X 10^{22} molecules of H_2SO_4 were dissolved in solution.

ii. Why is theoretical yield is always greater than actual yield?

iii. What is the origin of positive and X-rays?

iv. Calculate the frequency of limiting line in Balmer series.

v. Explain hybridization in BF_3 , also draw its structure.

vi. Energy of sigma 2px in O_2 molecule is lower than Pi 2py and 2pz, however this order is reversed in N_2. Justify.

vii. Derive the expression for pressure correction ($P=an^2/ v^2$) in vander waals equation.

viii. Equal volumes of HCl and SO_2 are confined in a porous container, what would be the comparative rates of diffusion of these gases through the porous wall. Molar Mass of HCl: 36.5gm/mol and SO_2 64gm/mol

ix. Why the London dispersion forces increases by increasing the atomic and molecular size.

x. Differentiate b/w Isomorphism and Polymorphism with example.

SECTION – C (Marks 21)

(From Chapter 7 – 12)

Q.3 Attempt any SEVEN parts. All parts carry equal marks. $(7 \times 3 = 21)$

i. Following reaction was studied at 25^0C, Calculate its K_p and K_c

$2NO_{(g)} + Cl_{2\,(g)} \rightleftharpoons 2NOCl_{(g)}$

The partial pressures at equilibrium were found to be P_{NOCl}= 1.2atm, P_{NO}=5.0x 10^3 atm and P_{Cl2}=3x 10^{-1} atm

ii. How does equilibrium constant explain the extent of chemical reaction?

iii. Prove the following relationship for conjugate acid-base pair.

$K_a \times K_b = K_w$

iv. Define hydrolysis. Justify that the aqueous solution of $CuSO_4$ is acidic and CH_3COONa is basic?

v. What is energy of activation? Also describe the role of catalyst in a chemical reaction.

vi. Rate of reaction gets increased by temperature. Describe on molecular level using *Boltzman* curve.

vii. Calculate the molality of 15% (w/w) of Urea $(NH_2)_2CO$ solution.

viii. Why the addition of non-volatile, non-electrolyte solute increases the boiling point.

ix. Balance the following equation by half reaction method in acidic media.

$S_2O_8^{-2} + Cr^{+3} \longrightarrow SO_4^{-2} + Cr_2O_7^{-2}$

x. What is first law of thermodynamics? Drive the expression for the enthalpy change of the chemical system at constant pressure.

SECTION – D (Marks 26)

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

(Q.4. From chapters 1 to 6)

Q.4 a. Derive Bohr's equation for the radius of n^{th} orbit of electron in Hydrogen atom. Also calculate radius of of Li^{+2} ion. (7)

b . Draw molecular orbital diagrams for O_2, O_2^{-2} and O_2^{+2} and explain their paramagnetic or diamagnetic behavior. (6)

(Question 5 From Chapters 7 to 12)

Q.5 a. Describe the quantitative aspect of freezing point depression graphically. (6)

b. What is Standard Hydrogen Electrode? How can it help to find electrode potential of zinc? (7)

(Question 6: Part a from chapters 1 to 6 Part b From Chapters 7 to 12)

Q.6 a. Compare the properties of covalent and Ionic solids in tabular form. (6)

b. Define Raoult's law. How can it explains the solubility of completely miscible system of two volatile components in one another. (7)