

Version No.			

ROLL NUMBER						



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1	1	1	1
2	2	2	2
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4	4	4	4
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6	6	6	6	6	6	6
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Answer Sheet No. _____

Sign. of Candidate _____

Sign. of Invigilator _____

CHEMISTRY HSSC–I
SECTION – A (Marks 17)
Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. **Do not use lead pencil.**

Q.1 Fill the relevant bubble for each part. Each part carries one mark.

- Plasma is the mixture of:
 - Electrons and protons only.
 - Electrons and positive ions.
 - Electrons and beta two particles.
 - Neutrons and protons.
- The electrode potential of metals are:

$$\text{Mg}^{2+} + 2\text{e}^{-} \longrightarrow \text{Mg} \quad E^{\circ} = -2.71 \text{ v}$$

$$\text{Ag} \longrightarrow \text{Ag}^{+} + 1\text{e}^{-} \quad E^{\circ} = -0.8 \text{ v}$$
 Cell potential (emf) of the cell formed by these two will be:
 - + 3.51 v
 - 3.51 v
 - + 1.91 v
 - 1.91 v
- At constant Pressure what will be the change in temperature when the volume of a gas will become twice of what it is at 0°C?
 - 546°C
 - 200°C
 - 546 K
 - 273 K
- Rate equation for a reaction $2\text{A} \longrightarrow \text{product}$ is $\text{Rate} = \text{K} [\text{A}]^2$. Unit of specific rate constant for this reaction is:
 - $\text{mol}^2\text{dm}^{-6} \text{S}^{-1}$
 - $\text{mol}^{-1}\text{dm}^3 \text{S}^{-1}$
 - mol dm^{-3}
 - S^{-1}
- A substance which itself is not a catalyst but increases the activity of a catalyst is called:
 - Enzyme
 - inhibitor
 - Promoter
 - Poisoner

6. Diamond is a bad conductor of electricity because:
 A. It has a tight structure B. It has a high density
 C. It has no free electrons D. It is transparent to light
7. Mixture containing $0.01 \text{ mole}/300\text{cm}^3$ of NH_4Cl and $0.1 \text{ mole}/400\text{cm}^3$ of NH_4OH having $\text{pK}_b = 5$ has pH of:
 A. 4.00 B. 4.12
 C. 9.88 D. 10.00
8. 5g of urea (M.wt = 60) is dissolved in 250 cm^3 of its solution. Concentration of solution will be:
 A. 5 % w/w B. 5 % v/w
 C. 0.34 M D. 0.34m
9. The gaseous element X exists in diatomic form. One volume of the element X combines with two volume of hydrogen to form two volume of gaseous hydride. What is the formula of hydride of X.?
 A. HX_2 B. HX_3
 C. H_2X D. HX
10. The number of bonds in one molecule of Nitrogen is:
 A. one σ and one π B. one σ and two π
 C. three σ only D. two σ and one π
11. Splitting of spectral lines by placing the excited atom in electric field is called:
 A. Zeeman effect B. Stark effect
 C. Photoelectric effect D. Compton effect
12. In the ground state of an atom, the electron is present:
 A. in the valence shell B. in the second shell
 C. nearest to the nucleus D. farthest from the nucleus
13. Which one of the following exists in the solid state as a giant covalent lattice?
 A. ice B. iodine
 C. silicon (IV) oxide D. dry ice
14. pH of $1 \times 10^{-4} \text{ M}$ solution of Phosphoric acid is:
 A. 1.10 B. 2.02
 C. 3.52 D. 4.13
15. In which substance does nitrogen exhibit the highest oxidation state?
 A. NO B. N_2O
 C. N_2O_4 D. NaNO_2
16. The heat of neutralization of the given reaction is -57.3 kJ
 $\text{NaOH} + \text{HCl} \longrightarrow \text{NaCl} + \text{H}_2\text{O}$
 What is the heat of neutralization of the following reaction?
 $\text{Fe}(\text{OH})_2 + 2\text{HCl} \longrightarrow \text{FeCl}_2 + 2\text{H}_2\text{O}$
 A. -57.3kJ B. -114.6kJ
 C. -228kJ D. -28.6kJ
17. Which of these samples of gas contains the same number of atoms as 1g of hydrogen molecule? (At. Mass $\text{C} = 12$, $\text{O} = 16$, $\text{H} = 1$, $\text{Ne} = 20$)
 A. 22 g of CO_2 B. 8 g of CH_4
 C. 20 g of Ne D. 8 g of O_3



Federal Board HSSC-I Examination
Chemistry Model Question Paper
(Curriculum 2006)

Time allowed: 2.35 hours

Total Marks: 68

Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**.
Write your answers on the allotted/given spaces.

SECTION – B (Marks 42)

Q.2 Attempt all parts from the following. All parts carry equal marks. (14 × 3 = 42)

- i. The bond angles of H₂O and NH₃ are not 109.5° like that of CH₄. Although O and N atoms are SP³ hybridized like C. Mention the angles of both and give reason. (1+2)

OR

Justify that Bohr's equation for the wave number can explain the spectral lines of Lyman, Balmer and Paschen series. (1+1+1)

- ii. How to find standard electrode potential? Explain briefly. (1.5+1.5)
- iii. Calculate molality of aqueous solution of sulfuric acid from the following data. (1+2)

Molar mass	Molarity	Density in g/Cm ³
98	18	1.84

OR

Calculate the molecular mass of the solute by using $\Delta P/P^0 = X_2$? (1+2)

- iv. Interpret why water and ethanol can mix easily in all proportions. (1+2)
- v. Justify that the distance gaps between different orbits of an atom go on increasing from the lower to the higher orbits. (1+2)

OR

The melting and boiling points of hydrazine (N₂H₄) are much higher than those of ethane (C₂H₄). Suggest one reason for each compound in terms of the intermolecular forces each compound possesses. (1.5+1.5)

- vi. Describe hybridization in acetylene (C₂H₂) molecule. Also draw diagram of hybridized orbitals of the molecule. (1.5+1.5)
- vii. Derive the units for general gas constant 'R' in general gas equation. (1.5+1.5)
- a. When the pressure is in Nm⁻² and volume in m³.
- b. When energy is expressed in ergs.

OR

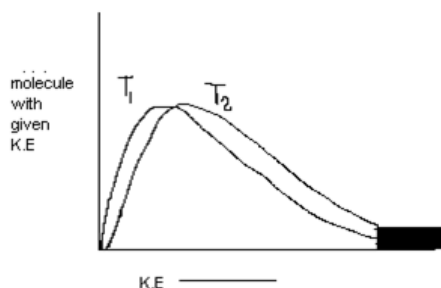
Consider the Standard electrode potentials (1+1+1)

Ag⁺/Ag = 0.7994V, Fe³⁺/Fe = 0.771V

Write the half-cell reactions at each electrode. Also write overall reaction.

- viii. As both NF₃ and BF₃ are tetra atomic molecules but have different geometry. Explain each according to VSEPR theory. (1.5+1.5)

- ix. Benzene (C_6H_6) is an aromatic hydrocarbon which exists as a liquid at room temperature. Using the following standard enthalpy changes: (1.5+1.5)
 Heat of formation of $CO_2 = -393$ KJ / mol
 Heat of formation of $H_2O = -286$ KJ / mol
 Heat of combustion of $C_6H_6 = -3268$ KJ / mol
 Calculate the enthalpy change of formation of C_6H_6 .
- x. What is reverse osmosis? Give any one daily life application. (1+2)
- xi. Consider this graph and explain on the basis of Maxwell Boltzmann curve of kinetic energy. Why does rate of reaction increase with the increase in temperature? (1+2)

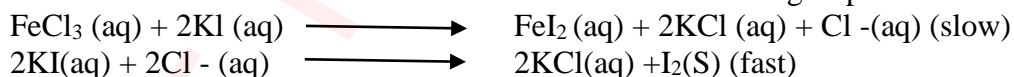


OR

- State Dalton's law. Also write its two applications. (1+2)
- xii. An aqueous solution of ammonium Chloride is acidic and that of sodium acetate is basic in nature. Give reason with the help of equation. (1+2)
- OR**
- Distinguish between heat capacity and specific heat capacity. (1.5+1.5)
- xiii. Ionic Crystals are brittle in nature but metals are malleable in nature. Give one reason of each. (1.5+1.5)
- xiv. Lattice energies of $LiCl$ and KCl are 833 kJ/mol and 690 kJ/mol, respectively. Discuss why is lattice energy of $LiCl$ greater than KCl ? (1.5+1.5)

OR

Chemical kinetics is concerned with rates of chemical reactions and factors that affects the rates of chemical reactions. Consider the following steps of reactions:



- a. Write the rate expression for the above reaction.
- b. Give the order of reaction for the above reaction. (2+1)

SECTION – C (Marks 26)

Note: Attempt all questions. Marks of each question are given within brackets.

- Q.3** Derive the equation for the radius of nth orbit of hydrogen atom using Bohr's model. (2+5)

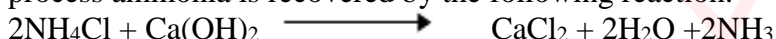
OR

Draw the hybridization and VSEPR geometries along with lone pair, bond pair and total electron pair of the following: [As=33, Cl=17, O=8, B=5, H=1, F=9]

(3+2+2)

- i. AsCl₃
- ii. H₂O
- iii. BF₃

- Q.4** Ammonia Solvay process is used to manufacture sodium carbonate. During this process ammonia is recovered by the following reaction. (3+3)

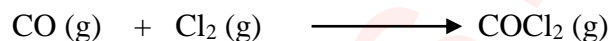


When 100 g of ammonium chloride and 150 g calcium hydroxide are used then (At. Mass N=14 H=1 Cl= 35.5 Ca=40)

- i. Calculate the mass in kg of ammonia produce during chemical reaction.
- ii. Calculate the excess mass in gram of one of the reactants left unreacted.

OR

Phosgene (COCl₂) is a toxic gas. This gas is prepared by the reaction of carbon monoxide with chlorine. (4+2)



The following data were obtained for kinetic study of this reaction.

Experiment	Initial [CO]	Initial [Cl ₂]	Initial rate (moles dm ⁻³ s ⁻¹)
1	1.000	0.100	1.29 × 10 ⁻²⁹
2	0.100	0.100	1.30 × 10 ⁻³⁰
3	0.100	1.000	1.30 × 10 ⁻³⁰

- i. Use the above data of the table and deduce the order of the reaction with respect to CO and Cl₂ by showing all calculations.
- ii. Write a rate law/equation for this reaction.

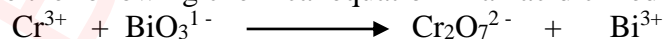
- Q.5** Consider the following reaction:



- i. Derive expression of K_c for the above reaction
- ii. Calculate equilibrium concentration of N₂. The equilibrium concentration of H₂ and NH₃ are 1.0 moldm³ and 0.5 moldm⁻³ respectively. K_c of above reaction at 25°C is 1.85 × 10⁻³. (3+3)

OR

Balance the following chemical equation in an acidic medium by showing all steps.



(1x6=6)

- Q.6** Explain Born Haber's cycle to calculate lattice energy and draw its cycle. (4+3)

* * * * *

SUPPLEMENTARY TABLE

Atomic No	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Symbol	H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si
Mass no	1	4	7	9	11	12	14	16	19	20	23	24	27	28
Atomic No	15	2	16	17	18	19	20	31	32	33	34	35	36	37
Symbol	P	He	S	Cl	Ar	K	Ca	Ga	Ge	As	Se	Br	Kr	Rb
Mass no	31	4	32	35	40	39	40	70	73	74	79	80	84	85
Atomic No	38	49	50	51	52	53	54	55	56	81	82	83	84	85
Symbol	Sr	In	Sn	Sb	Te	I	Xe	Cs	Ba	Tl	Pb	Bi	Po	At
Mass no	88	115	119	122	128	127	131	133	137	204	207	208	209	210