15

Version No.			
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ROLL NUMBER					

⓪	●	⓪	⓪
①	①	①	①
②	②	②	②
●	③	③	●
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	●	⑨

⓪	⓪	⓪	⓪	⓪	⓪	⓪
①	①	①	①	①	①	①
②	②	②	②	②	②	②
③	③	③	③	③	③	③
④	④	④	④	④	④	④
⑤	⑤	⑤	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨	⑨

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.

حصہ اوّل لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر نگران کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پُر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	When two atoms bond with each other through overlapping of their sp^3 hybrid orbitals, predict which bond is formed?	Pure ionic bond	Hydrogen bond	$Pi(\pi)$ covalent bond	sigma (σ) covalent bond	○	○	○	○
2.	The wave number $(\bar{\nu})$ of a radiation having $\lambda = 2\times10^{8}\,nm$ will be:	$0.15\times10^{8}\,nm^{-1}$	$100nm^{-1}$	$0.5\times10^{8}\,nm^{-1}$	$0.1\times10^{8}\,nm^{-1}$	○	○	○	○
3.	How much mass of O_2 is required to react with $27g$ of Aluminum (Al) to produce Al_2O_3? $4Al+3O_2 \rightarrow 2Al_2O_3$	$24g$ of oxygen	$32g$ of oxygen	$8g$ of oxygen	$16g$ of oxygen	○	○	○	○
4.	Splitting of spectral lines in the presence of magnetic field is called:	Photoelectric effect	Zeeman effect	Stark's effect	Compton effect	○	○	○	○
5.	H_2S has a net dipole moment while BeF_2 has zero dipole moment because	Fluorine is more electronegative than sulphur	Berylium is more electronegative than sulphur	H_2S is linear, BeF_2 is angular	H_2S is angular, BeF_2 is linear	○	○	○	○
6.	Which of the following gases does **NOT** obey Dalton's law of partial pressure at STP?.	NH_3 and HCl	He and Ne	H_2 and O_2	H_2 and He	○	○	○	○
7.	The forces present between the ion and water molecules are called:	London dispersion	Dipole-dipole	Ion dipole	Dipole induced dipole	○	○	○	○
8.	By passing H_2S gas through water to make a saturated solution exposed to air produces:	Plastic Sulphur	Amorphous Sulphur	Rhombic Sulphur	Monoclinic Sulphur	○	○	○	○
9.	In $AgCl$ solution, some salt of $NaCl$ is added, resulted the precipitation of $AgCl$ due to:	Leveling effect	Electrolytic effect	Solubility product	Common ion effect	○	○	○	○
10.	If $25dm^3$ of $1mol.dm^{-3}$ of HNO_3 is added to $50dm^3$ of $0.5mol.dm^{-3}$ of KOH solution, what would be the pH of the resulting solution?	09	14	05	07	○	○	○	○

III

	Question	A	B	C	D	A	B	C	D
11.	A buffer solution resists the change in its pH upon adding small amount of strong acid or base. Which of the following is an example of Buffer solution?	Mixture of CH_3COONa and NH_4Cl	Mixture of NH_4Cl and NH_4OH	Mixture of NH_4Cl and NH_4NO_3	Mixture of NH_4Cl and $NaCl$	○	○	○	○
12.	When $NaOH$ solution reacts with aluminum in different physical states, most rapid reaction should occur with:	Aluminum powder	Aluminum Alloy	Aluminum foil	Aluminum cubes	○	○	○	○
13.	The rate equation determined experimentally for this reaction: $(CH_3)_3KBr + H_2O \rightarrow (CH_3)_3KOH + HBr$ rate = $K\left[(CH_3)_3KBr\right]$ Hence it is:	First order reaction	Second order reaction	Fractional order reaction	Pseudo first order reaction	○	○	○	○
14.	Determine the ppm by mass of calcium in 2.5 grams tablet that contains $500mg$ of calcium.	$0.3\times10^9\ ppm$	$0.2\times10^9\ ppm$	$0.2\times10^6\ ppm$	$0.4\times10^6\ ppm$	○	○	○	○
15.	The enthalpy of formation of CO_2 is $-394kJ/mol$. What is the enthalpy change for the reaction $2CO_2 \rightarrow 2C + 2O_2\ \ \Delta H^o = ?$	$+92\,KJ/mol$	$+23KJ/mol$	$+788KJ/mol$	$+184\,KJ/mol$	○	○	○	○
16.	The boiling point of some compounds are given: Compound / Boiling point CH_3OH / 65°C C_6H_6 / 80°C $C_6H_5NH_2$ / 84°C $C_6H_5NO_2$ / 112°C Which one will show the highest vapour pressure?	CH_3OH	$C_6H_5NH_2$	C_6H_6	$C_6H_5NO_2$	○	○	○	○
17.	If a strip of Cu metal is placed in a solution of $FeSO_4$:	Cu and Fe are both dissolved	No reaction takes place	Cu is precipitated out	Fe is precipitated out	○	○	○	○

ROLL NUMBER					

SUPPLEMENTARY TABLE

Atomic No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Symbol	H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca
Mass No	1	4	7	9	11	12	14	16	19	20	23	24	27	28	31	32	35.5	40	39	40

CHEMISTRY HSSC–I

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

NOTE: Answer any FOURTEEN parts from Section 'B' and attempt any TWO questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Answer any FOURTEEN parts from the following. All parts carry equal marks. (14 x 3 = 42)

(i) The percentage yield of the given reaction is 80% $2Al + 3Cl_2 \rightarrow 2AlCl_3$ How many grams of $AlCl_3$ will be actually obtained from 3.70 moles of Aluminium metal?

(ii) Discuss the given relationship with formula:
(a) Energy and wavelength **(b)** Frequency and wavelength

(iii) How are Bohr's defects partially covered by dual nature of electron and Heisenbug's uncertainty principle?

(iv) Methane, Ammonia and Water are AB_4 type molecules but they have different molecular geometries. Give reason with their structures.

(v) Unit cell is primarily concerned with the shape of crystal. Calculate number of Cl^- ions and Na^+ ions in unit cell of $NaCl$

(vi) Calculate the density of methane gas at temperature of $373K$ when confined by a pressure of $2.105\ atm$.

(vii) How is kinetic molecular theory applied in the explanation of:
(a) Velocity of molecules **(b)** Diffusion of gases

(viii) Practically explain the effect of decrease of pressure on boiling point by using example of glycerine.

(ix) Water shows different behaviour as compared to other liquids. Interpret the anomalous behaviour of water.

(x) How can liquid crystals be differentiated from pure liquids and crystalline solids? (write on point each)

(xi) Describe the term "Allotropy" with special reference to the allotropes of Sulphur.

(xii) When $1.8g$ of glucose is burned in calorimeter in the presence of oxygen at pressure of $25atm$ at $25°C$. The temperature of water rises to $31.52°C$. Heat capacity of calorimeter $= 4.312kJK^{-1}$. Calculate the heat of combustion of the glucose.

(xiii) Common ion effect operates best in the purification of $KClO_4$ and purification of $NaCl$. Justify with chemical reaction in each case.

(xiv) Consider the following gas phase reaction $SO_2 + Cl_2 \rightleftharpoons SO_2Cl_2 + Heat$ write three changes that would derive the equation to the product side.

(xv) Briefly explain the effect of catalyst on activation energy by representing with energy diagram.

(xvi) For reaction, $NO_2 + CO \rightarrow NO + CO_2$ Rate $= K[NO_2]^2$ propose the mechanism for the reaction with the rate equation and identify the rate determining step.

(xvii) Why a solution has lower vapour pressure than a pure solvent? Describe on a particle basis.

(xviii) Briefly describe the factors affecting the London Dispersion forces.

(xix) Using the following data. Calculate the enthalpy of combustion of ethanol (C_2H_5OH)

$\Delta H°f \ for \ C_2H_5OH = -277.0kJmol^{-1}$

$\Delta H°f \ for \ CO_2 = -393.5kJmol^{-1}$

$\Delta H°f \ for \ H_2O = -285.5kJmol^{-1}$

(xx) Balance the given redox reaction by oxidation number method. $Cu + H_2SO_4 \rightarrow CuSO_4 + SO_2 + H_2O$

SECTION – C (Marks 26)

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

Q. 3 **a.** What is hybridization? Why is there a need of this concept? Explain the structure of Ethyne $(CH \equiv CH)$ molecule on the basis of hybridization.

b. The general gas equation $PV = nRT$ is not applicable to real gases. Derive an equation that will be followed by real gases. (Vander Wall's equation)

Q. 4 **a.** What are Buffer solutions? Elaborate buffer action in acid-base reaction with suitable example. Write two applications of buffer solutions on industrial scale.

b. What is the effect of temperature on solubility? How the variation of solubility related with temperature predicted by the heat of solution? Give example. Draw with the graph of solubility curve as well.

Q. 5 **a.** What are fuel cells? Explain the construction and working of hydrogen-oxygen fuel cells with chemical reaction.

b. How much (NH_4Cl) Ammonium chloride will be formed by mixing $120g$ of Ammonium nitrate with a solution of $52g$ of $NaCl$? $NH_4NO_3 + NaCl \rightarrow NH_4Cl + NaNO_3$

SUPPLEMENTARY TABLE

Atomic No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Symbol	H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca
Mass No	1	4	7	9	11	12	14	16	19	20	23	24	27	28	31	32	35.5	40	39	40