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SUPPLEMENTARY *'TARGET PAPER'* 2019
XI – CHEMISTRY
PAPER – I (Science Groups)

Time Allowed: 2 Hours 40 mins.   Max.Marks: 68

SECTION 'B'
(SHORT – ANSWER QUESTIONS)   (Marks: 40)

NOTE: Answer any **TEN** questions from this Section. All questions carry equal marks.

Q-2

i) Define the following:

*Avogadro's Number	*Internal energy	*Mole	*Stoichiometry	*Activation energy
*Limiting reactant	*Surface Tension	*Significant Figures	*Unit cell	*Rounding off
*Threshold energy	*specific rate constant	*Intensive Properties	*Molar Volume	*Hydrogen Bonding
*Latent heat of fusion	*Order of reaction	*Common ion effect		*significant figures
*Enthalpy	*Empirical formula	*Error and deviation	*Bond Energy	*Atomic Mass
*Colligative Properties	*System	*Chemical Kinetics	*Sublimation	*Molarity
*Standard Heat of formation	*Molar volume	*Extensive Properties	*Sublimation	

ii) **Differentiate between the following (ANY TWO)**: *Just Online Institute in Karachi*

*Azimuthal Quantum Number and Principal Quantum Number

*Polar and Non-polar bond

*V.B.T and M.O.T

*Isomorphism & Polymorphism

*Extensive and Intensive Properties

*Balmer and Lyman Series

*Hydration and Hydrolysis

*Molar and Molal Concentrations

*Orbit and Orbital

*Solubility and Solubility Product

*Bonding Molecular Orbital and Anti-bonding Molecular Orbital

*Continuous and Line Spectrum

*E.N. & Electron affinity

*Exothermic and Endothermic reactions

*Sigma and Pi Bond

*Exponential Notation and Significant figures

*Molecular and Empirical Formula

*Crystalline and Amorphous Solids   ***Reversible and irreversible reactions**

iii) Define the term concentration? Discuss the various units of concentration. **OR 3.86 gram of NaOH is dissolved in 2.5 dm³ of solution. Find its molarity. OR How is chemical equilibrium established? How is equilibrium constant used to predict the direction of a reversible reaction.**

iv) **Give reasons for *ANY FOUR* of the following:**

*Glycerine is distilled at reduced pressure.

*Ionic compounds have higher melting points.

*Chemical equilibrium is dynamic in nature.

*pressure of a gas collected over water is not the true pressure.

*No liquid ionic compounds are known but many of the known covalent compounds are liquids & gases.

*Aqueous solution of NH_4Cl is acidic and whereas Na_2CO_3 is basic.

*A positive catalyst increases the rate of reaction.   *Ice is a solid but it floats on water.

*Spilled water evaporate more quickly than a water on a surface.

*The rates of diffusion of CO_2 and C_3H_8 gases are the same.

*p-p sigma bond is stronger than s-p sigma bond.   ***Powdered zinc reacts more rapidly.**

*A pressure cooker is used for rapid cooking.   ***H_2S is a gas while H_2O is a water at room temperature**

*water forms concave meniscus but mercury forms convex meniscus.
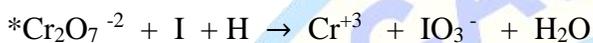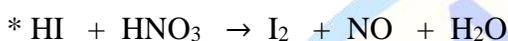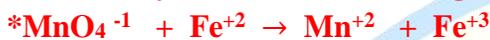
*Food is preserved in refrigerator.
Evaporation is a cooling Process.
*I.P. value of Nitrogen is greater than I.P. Value of Oxygen.
Honey is more viscous than water.
The ability of an ion to form hydrate depends on its charge density.

v) **Balance any ONE of the following Chemical equation by Ion-electron Method?**
*$MnO_4^{-1} + Fe^{+2} \rightarrow Mn^{+2} + Fe^{+3}$

* $HI + HNO_3 \rightarrow I_2 + NO + H_2O$

*$Cr_2O_7^{-2} + I + H \rightarrow Cr^{+3} + IO_3^- + H_2O$

* $Cr_2O_4^{-2} + I^- \rightarrow Cr^{+3} + IO_3^-$ (Basic Medium)

* $Cr(OH)_3 + SO_4^{-2} \rightarrow CrO_4^{-2} + SO_3^{-2}$

OR

Discuss the ionic character of Covalent bond? **OR Name ANY FOUR series in the Hydrogen Spectrum?**

vi) **a) Find the pH of 1.0×10^{-3} M NaOH Solution? OR** Write the rate expressions
for the following: (i) $PCl_5 \rightarrow PCl_3 + Cl_2$ (ii) $2NO + O_2 \rightarrow 2NO_2$

**b) Derive the value of 'R' in TWO different Unit Systems? _OR_ How is Buffer Solution prepared? _OR_
Derive both forms of General gas equation/Ideal Gas Equation from Gas Laws? _OR_ Compare the rates of
diffusion of He and SO_2? _or_ CH_4 and SO_2? OR** Discuss Planck's Quantum theory?

vii) **Write the postulates of Kinetic Molecular Theory of Gases**? **OR Write down the postulates of Arrhenius
Theory of Ionisation? OR** State and Explain Activation Energy? **OR Calculate the Standard Heat of
Formation of Acetic acid from the following data:**
*$C + 2H_2 \rightarrow CH_4$ $\Delta H_{f=}$?
*$C + O_2 \rightarrow CO_2$ $\Delta H_{f=}$ -394 KJ/mol
*$H_2 + \frac{1}{2}O_2 \rightarrow H_2O$ $\Delta H_{f=}$ -286 KJ/mol
*$CH_4 + 2O_2 \rightarrow 2CO_2 + 2H_2O$ $\Delta H_{f=}$ -890 KJ/mol

OR
$3Mg + N_2 \rightarrow Mg_3N_2$ $\Delta H_{f=}$?

Given: (i) $3Mg + 2NH_3 \rightarrow Mg_3N_2 + 3H_2$ $\Delta H_{f=}$ - 371 KJ/mol

**   (ii) $\frac{1}{2}N_2 + \frac{3}{2}H_2 \rightarrow NH_3$ $\Delta H_{f=}$ - 46 KJ/mol**

viii) Describe the Chadwick experiment for the discovery of Sub-atomic Particle? **OR**
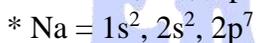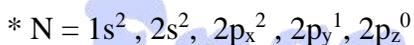**What is Dipole moment with its unit? Explain it in CO_2 and H_2O molecules.   OR**
**Helium takes 5 seconds to effuse from a hole of 10 dm^3 container. How long would it take for oxygen to effuse
from the same container at the same pressures and temperatures.**

ix) **What do you mean by Exothermic and Endothermic Reactions. Illustrate it with the help of diagram and give
one example of each. OR What is Orbital Hybridisation? Predict the shapes of following molecules on the basis
of HOT: *H_2O *BF_3 *NH_3 *$BeCl_2$ *CH_4 OR
What do you understand by the term Ionisation Potential, Electron Affinity and Electronegativity? How
E.N. can be used to predict the nature of bonds between the atoms.**

x) State the rule which is violated in the following electronic configurations:
* $N = 1s^2, 2s^2, 2p_x^2, 2p_y^1, 2p_z^0$
* $Na = 1s^2, 2s^2, 2p^7$
OR What are the applications of Law of equilibrium? Explain with examples.   OR
Do as directed: (*ANY FOUR*)
*Arrange 4s, 3p, 3d, 2p, 1s and 7p by $n + l$ rule.
*Arrange 4 Quantum Numbers to 2 electrons in 3p orbitals or He atom.
*State Hund's Rule? Also write the stable electronic configuration of Z = 24, 29, 42, Br $^-$ (Z=35) or Ga^{+3} (Z=31)
*Which rule or principle is violated in $1s^2, 2s^3, 2p^5$ *or* $1s^2, 2s^2, 2p_x^2$
*Solve by using exponential notation: 43100 + 3900 + 2100
*Which law is related to given statement ''we can easily identify that a person just entered in the room is
wearing perfume''.   ***Association of water molecules through hydrogen bond (Draw the Diagram only)**
*Draw the shape of orbital for which $l = 0$ and $l = 1$?   *Draw dot & cross structures of $CHCl_3$ and C_2H_4
**OR A Voltaic cell (Emf = 0.34 V) is made up of Standard Hydrogen Electrode and Copper electrode is
represented by:**

Pt H_2 / $2H^+$ aq. (1M) || Cu^{+2} aq. (1M) / Cu

- Draw the Complete diagram of this cell, showing the direction of electron flow in the circuit.
- Write the Half Cell reactions and overall cell reaction.
- Determine the Reduction Potential of Copper mentioning its sign.

xi) **What is an Ionic Bond and Lattice Energy? Write the formation of NaCl from sodium atom and Chlorine atom along with the energy changes involved. Also discuss its Stability.**

OR

State and Explain Dalton's Law of Partial Pressures with application.

OR **60 cm^3 of hydrogen gas were collected over water at 15^0 C and 767 torr pressure. What volume will the dry gas occupy at S.T.P? (Vapor pressure of water at 15^0 C is 15.7 torr)** *OR* **50 cm^3 of hydrogen gas was collected at 27^0 C at a pressure of 800 torr pressure. Calculate its volume at S.T.P?**

OR **For the gaseous equilibrium.**

$2NO_{(g)} + O_{2(g)} \leftrightarrow NO_{2(g)}$ ΔH = -ve

Predict only the directions in which the reaction will proceed after the following changes are brought about an equilibrium.**

(i) increasing the concentration of NO   **(ii) decreasing the concentration of NO_2**

(iii) increasing the temperature   **(iv) increasing the pressure**

xii) **Define Oxidising and Reducing Agent? In this reaction which substance is a reducing agent?**

$2Fe + 3Cl_2 \longrightarrow 2FeCl_3$. Also find the oxidation number of the following:

*Mn in MnO_4^- ***N in NCl_3**   ***Fe in $Fe_2(SO_4)_3$**   *** P in H_3PO_4**

*S in $Na_2S_2O_3$ ***Cr in $K_2Cr_2O_7$**   ***O in OF_2**   ***O in KO_2**

OR **Will $PbCrO_4$ precipitate from a solution prepared by mixing 200cm^3 of 2.5 x 10^{-4} M $Pb(NO_3)_2$ and 600 cm^3 of 1.5 x 10^{-8} M K_2CrO_4? (K_{sp} of $PbCrO_4$ = 1.8 x 10^{-14}).**

OR **On what factors does the solubility of substance depends? K_{sp} of CaF_2? Is 5.3 x 10^{-9} mol^3/dm^9 and its molecular mass is 78 g/mol. Find its:**

*Solubility in mol/dm^3 ***Solubility in g/dm^3**

xiii) **What weight of *NaCl* will be obtained when 100 gram of *Na_2CO_3* is treated with the 100 grams of *HCl*.**

OR

For the reaction: **$3Mg + N_2 \longrightarrow Mg_3N_2$**

1.5gm of each reactant i.e. Mg and N_2 are used; what is the amount of Mg_3N_2 formed and which element is the limiting reactant?

OR

Calculate the wave number of spectral lines of hydrogen gas when an electron jumps from n = 4 to n = 2. (R_H = 109, 678 cm^{-1}) OR

2.273 g of a gas at 27^0 C and 900 torr pressure occupies a volume of 1.4 dm^3. Calculate the molecular mass of the gas.

xiv) **When 4000 joule of heat is added to a gaseous system at a constant pressure of 101300 N/m^2 ; its internal energy increases by 500 J. Calculate the change in the volume of the system.**

OR

Calculate the no. of molecules of CO_2 at S.T.P when 6.1 gm marble is reacted with 2.8 g hydrochloric acid,
$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$

OR **If 250 ml of 1M HCl solution is diluted to 1000 ml. What would be the molarity of diluted solution and also calculate its pH.   OR**

a) Calculate the no. of atoms of Na in 9.2 grams of Sodium? OR A container holds 9gm of H_2O. How many water molecules are present? Also calculate the total no. of atoms.

b) Calculate the mass in grams of 3.01 x 10^{20} molecules of Glucose? OR Calculate the no. of atoms present in 7.2gm of Calcium? *OR* Calculate the mass and no. of molecules in 18000 cm^3 of H_2S at S.T.P?

xv) **Using the significant figure rules, simplify:** $\dfrac{56 \times 725 \times 273}{760 \times 298}$ *OR* $\dfrac{2.417 \times 8.123}{4.956}$ *OR* Give the significant figures of the following: *46.75   *0.00067   *506.40   *76000

OR

What is the density of the CH_4 gas at 127^0 C and 3.50 torr Pressure. [C = 12 a.m.u, H = 1 a.m.u] OR

An organic compound producing air pollution contains 8.73% carbon. 77.45% chlorine and 13.82% fluorine; find the molecular formula of the compound if its molecular mass is 137.5 (Atomic mass: C = 12, Cl = 35.5, F = 19)

OR For the reaction $C + O_2 \rightarrow CO_2$; Calculate the amount of grams of CO_2 produced when 50gm each of carbon and oxygen react together. OR What is Radioactivity? Write the names and properties of the three types of radiations emitted from radioactive substances.

SECTION 'C'
(DETAILED-ANSWER QUESTIONS)   (Marks: 28)

NOTE: Attempt any **TWO** question from this Section. Draw diagram where necessary.

Q-3

a) Write Short Notes on Any TWO of the following:
*Heisenberg's Uncertainity Principle   ***Surface Tension**   *Electronegativity
*Vapour Pressure   ***Crystal Systems**   *Quantum Number   ***Covalent bond and its types**
OR
What are Ideal and Non-ideal gases? Explain the causes of non-ideal behavior of gases especially at high pressures and low temperatures. OR State Le-chatelier's Principle. Apply this principle to the manufacture of NH_3 by Haber's Process.

b) Define Electrolyte, Electrode, Electrode Potential and Standard Electrode Potential? What is the electrode potential of Zinc and How it is determined experimentally.
OR
When the equilibrium was attained for the reaction $A + B \equiv 2C$, the concentration of $[A] = [B] = 4$ mol/dm^3 and that of $[C] = 6$ mol/dm^3, Calculate K_c and initial concentration of A and B. **OR Find the pH of 2M CH_3COOH solution which is 1.3% ionized? OR What is the H^+ and OH^- ion concentration of a solution having pH equal to 7.86?**

c) State the postulates of Bohr's Atomic Model. Derive an expression for the *Total Energy* OR *Radius* of the electron in the nth orbit? Also calculate the radius of 3rd orbit? ($a_0 = 0.529A$)

Q-4

a) Consider the following experimental data:

S.No.	[A] mol.dm^{-3}	[B] mol.dm^{-3}	Rate mol.dm^{-3}sec^{+1}
1.	0.10	0.10	8×10^{-4}
2.	0.20	0.10	16.0×10^{-4}
3.	0.10	0.20	16.0×10^{-4}

*Write rate expression.
*Determine the order of reaction.
*Calculate the rate constant of the reaction.
OR

State and Explain first law of thermodynamics. Prove that $q_p = \Delta E + P\Delta V = \Delta H$ and $W = P \Delta V$ OR

If the initial rate for the decomposition of NO_2 (Nitrogen dioxide) $2NO_2 \longrightarrow 2NO + O_2$ is 4.5×10^{-9} mole per liter per second.
 i) Write the rate equation.   **ii) Calculate the rate constant**
iii) Calculate the rate constant when the concentration of NO_2 is doubled.

b) **Define rate of reaction. List the factors affecting rate of chemical reaction and explain any TWO of them.**
OR Discuss the effect of light and catalyst on the rate of reaction? Also Explain how the rate of the following reaction is determined by the chemical method. $CH_3COOC_2H_5 + H_2O \longrightarrow CH_3COOH + C_2H_5OH$ **OR**
Name the crystal system which has the following axes and angles:
   • **$a = b = c$; $\alpha = \beta = \gamma = 90^0$**
   • **$a = b \neq c$; $\alpha = \beta = \gamma = 90^0$**
   • **$a \neq b \neq c$; $\alpha = \beta = \gamma = 90^0$**
   • **$a = b \neq c$; $\alpha = \beta = 90^0, \gamma = 120^0$**

c) What do you understand by the term Common ion effect? Explain its application in Qualitative salt analysis.
OR
What are Cathode rays? How were cathode rays discovered by Discharge Tube Experiment. Did they depend upon the nature of gas filled inside the tube.

Q-5

a) **What are the Postulates of Electron pair repulsion theory? Explain the Shape of NH_3, BF_3 and H_2O (or C_2H_4) on the basis of this theory.**
   OR
   State and Explain the Law of Mass Action. Derive an expression for the equilibrium constant K_c for the reaction. $aA + bB \equiv cC + dD$. Also give the relationship between K_p and K_c.
   OR
   9.2gm of ethyl alcohol, 3.6gm of acetic acid, 1.1gm of ethyl acetate and 9.0gm of water were mixed and allowed to attain equilibrium. If $K_c = 4$, what was the concentration of the resulting mixture?
   OR **What is meant by electrolysis? Discuss the electrolysis of $CuCl_2$ with necessary electrode reactions?**

b) **What are Roentgen-rays? Discuss their origin and also describe their relationship with the atomic number.**
   OR
   What is Dative bond? Illustrate it with the formation of: (i) $POCl_3$ (ii) CH_3NO_2 (iii) NH_4^+

c) **State and Explain Graham's Law of Diffusion?**
   OR
   Describe Gold foil Experiment with its Conclusion for the discovery of nucleus in an atom. Also mention its drawbacks. OR
   State the following Laws in terms of K.M.T:
   *Boyle's Law   *Charle's Law
   *Dalton's Law of Partial Pressures

-------------------- **BEST OF LUCK** --------------------

Marked with **'RED BOLD'** are the **'MOST IMPORTANT'** Questions.