



ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

RESOURCES FOR
“SSC-I CHEMISTRY”
ZUEB EXAMINATIONS 2021



PREFACE:

The ZUEB examination board acknowledges the serious problems encountered by the schools and colleges in smooth execution of the teaching and learning processes due to sudden and prolonged school closures during the covid-19 spread. The board also recognizes the health, psychological and financial issues encountered by students due to the spread of covid-19.

Considering all these problems and issues the ZUEB Board has developed these resources based on the condensed syllabus 2021 to facilitate students in learning the content through quality resource materials.

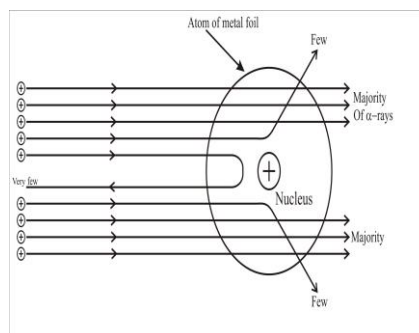
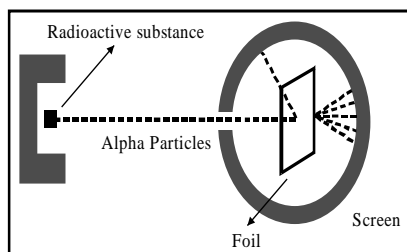
The schools and students could download these materials from www.zueb.pk to prepare their students for the high quality and standardized ZUEB examinations 2021.

The materials consist of examination syllabus with specific students learning outcomes per topic, Multiple Choice Questions (MCQs) to assess different thinking levels, Constructed Response Questions (CRQs) with possible answers, Extended Response Questions (ERQs) with possible answers and learning materials.

ACADEMIC UNIT ZUEB:

Lined writing area with 30 horizontal lines.

S.N O	ERQ	ANSWER	CL	D L E
1.	<p>What is a covalent bond? Explain the types of covalent bond and their characteristics</p>	<p><u>COVALENT BOND:</u> An American chemist 'G.N. Lewis' introduced the idea of covalent bond in 1916. <i>"The bond which is formed by the mutual sharing of electrons is called covalent bond."</i> Covalent bond between two atoms is represented by a short line. (—) for example, the halogens (chlorine atoms) possess an electronic configuration in which there are seven electrons in their outer most shell, and lacking only one electron in order to attain the structure of an inert gas. Following is the structure of chlorine molecule. Following is the structure of HCl in which hydrogen atom completes its duplet and chlorine atom completes its octet by sharing one electron.</p> <p><u>SINGLE COVALENT BOND:</u> The covalent bond in which only one pair of electrons is shared by the bonded atoms, in which each atom has to share one electron is called single covalent bond. This type of bond is represented by a single short line. (—). $\begin{array}{c} \cdot \\ \cdot \\ \text{Cl} \\ \cdot \\ \cdot \end{array} + \begin{array}{c} \cdot \\ \cdot \\ \text{Cl} \\ \cdot \\ \cdot \end{array} \longrightarrow \begin{array}{c} \cdot \\ \cdot \\ \text{Cl} - \text{Cl} \\ \cdot \\ \cdot \end{array}$</p> <p><u>DOUBLE COVALENT BOND:</u> The covalent bond in which two pairs of electrons are shared by the bonded atoms, and each atom has to share two electrons is called double covalent bond. This type of bond is represented by two short lines. (=) $\begin{array}{c} \cdot \\ \cdot \\ \text{O} \\ \cdot \\ \cdot \end{array} + \begin{array}{c} \cdot \\ \cdot \\ \text{O} \\ \cdot \\ \cdot \end{array} \longrightarrow \begin{array}{c} \cdot \\ \cdot \\ \text{O} = \text{O} \\ \cdot \\ \cdot \end{array}$</p> <p><u>TRIPLE COVALENT BOND:</u> The covalent bond in which three pairs of electrons are shared by the bonded atoms, and each atom has to share three electrons is called triple covalent bond. This type of bond is represented by three short lines. (≡) $\begin{array}{c} \cdot \\ \cdot \\ \cdot \\ \text{N} \\ \cdot \\ \cdot \\ \cdot \end{array} + \begin{array}{c} \cdot \\ \cdot \\ \cdot \\ \text{N} \\ \cdot \\ \cdot \\ \cdot \end{array} \longrightarrow \begin{array}{c} \cdot \\ \cdot \\ \cdot \\ \text{N} \equiv \text{N} \\ \cdot \\ \cdot \\ \cdot \end{array}$</p>	K/U	E
2.	<p>Explain Rutherford's Gold Metal foil experiment</p>	<p><u>RUTHERFORD'S ATOMIC MODEL:</u> Lord Rutherford in 1911, performed an experiment to determine the structure of atom. <u>APPARATUS FOR EXPERIMENT:</u> 1- Alpha particles. 2- Gold foil. (0.0004 cm thick) 3- Zinc sulphide screen. 4- Electron Gun. <u>EXPERIMENT</u> In his experiments, Rutherford bombarded alpha particles on very thin metallic gold foil. In order to record experimental observations, he made use of circular screen coated with zinc sulphide.</p>	K/R	M



OBSERVATIONS:

He observed in his experiment that

- Most of the alpha particles were pass through the foil undeflected.
- Very few particles were deflected when passed through the foil.
- One particle out of 8000 particles was deflected at 90°.
- Few particles were deflected at different angles.

CONCLUSIONS

1. Since most of the alpha particles were passed through the foil undeflected, therefore, it was concluded that most of the atom is empty.
2. The positive charge in the atom is concentrated in extremely dense region, which he called the nucleus. This was from the fact that α - particles after collision with a heavy positively charged nucleus had bounced back

According to Rutherford's model, an atom consisted of two parts.

- a) Nucleus.
- b) Extra nuclear part.

The protons and neutron reside in the nucleus and the electrons revolve in extra nuclear part in various orbits.

DEFECTS OF RUTHERFORD'S THEORY

1. If an electron continuously revolves around the nucleus it should emit energy continuously and finally it should fall in the nucleus.
2. If the electrons emit energy continuously, they should form continuous spectrum. But actually line spectrum is obtained.

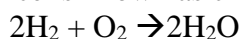
3. Describe chemical reaction along with its types

Chemical Reaction:

A process in which chemical change in the nature and composition of some substances occurs is called a chemical reaction.

OR

The process in which reactants are combined to form product which is a new substance is known as chemical reaction.



K/A

E

		<p><u>Types of Chemical Reactions:</u> There are five types of chemical reactions</p> <ol style="list-style-type: none"> 1. Decomposition Reaction 2. Addition Reaction 3. Displacement Reaction 4. Double Displacement Reaction 5. Combustion Reaction <p><u>1. DECOMPOSITION REACTION:</u> The process in which single reactant is broken up or split up into two or more than two simpler products on heating is known as decomposition reaction. For example; $2\text{KClO}_3 \longrightarrow 2\text{KCl} + 3\text{O}_2$</p> <p><u>2. ADDITION REACTION / COMBINATION REACTION:</u> The process in which two or more than two reactants are combined together to form single product is known as addition reaction. For example; $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$ $\text{N}_2 + 3\text{H}_2 \longrightarrow 2\text{NH}_3$</p> <p><u>3. DISPLACEMENT REACTION:</u> The process in which single element or a radical in a compound is displaced by another element or a radical is known as displacement reaction. For Example; $\text{Cu} + \text{ZnSO}_4 \longrightarrow \text{CuSO}_4 + \text{Zn}$</p> <p><u>4. DOUBLE DISPLACEMENT REACTION:</u> Two compounds exchange their radicals, so that two new compounds are formed. The process in which both the elements or a radical in a compound is displaced by each other or exchanging their radicals. For Example; $\text{HCl} + \text{AgNO}_3 \longrightarrow \text{HNO}_3 + \text{AgCl}$</p> <p><u>5. COMBUSTION REACTION:</u> When fuel burns in the presence of oxygen it forms oxide of carbon and water this process is known as Combustion Reaction. Lot of amount of heat release during this process which shows the reaction is exothermic. For Example; $\text{C}_{(s)} + \text{O}_{2(g)} \longrightarrow \text{CO}_{2(g)} + \text{Heat}$ $\text{CH}_4 + 2\text{O}_2 \longrightarrow \text{CO}_2 + 2\text{H}_2\text{O} + \text{Heat}$</p>		
4.	State the properties of group V A and VI A	<p><u>FIFTH GROUP (VA) CARBON FAMILY</u> <i>This group includes N, P, As, Sb and Bi. They have following characteristic properties.</i></p> <ol style="list-style-type: none"> 1. Their valence shell contains five electrons. 2. They have the tendency to gain three electrons and form tri “–” ion. 3. In these elements “N” and “P” are non-metals, “As” and “Sb” are Metalloids and “Bi” is a metal. 4. Except “N” all exist in more than one allotropic form. 5. They form ionic as well as co-valent compounds. 	K/U	M

		<p><u>SIXTH GROUP(VIA) OXYGEN FAMILY</u> <i>This group includes O, S, Se, Te and Po. They have following properties.</i></p> <ol style="list-style-type: none"> 1. Their valence shell contains six electrons. 2. They have the tendency to gain two electrons. 3. They form di²⁻ ions. 4. In these elements “O” and “S” are non-metals, “Se” and “Te” are metalloids and “Po” is metal. 5. They form ionic as well as covalent compound. 		
5.	<p>Define Solubility then list the factors affecting solubility and elaborate any two of them.</p>	<p>SOLUBILITY: “The amount of solute required to saturate 100 grams of a solvent at a particular temperature is called solubility.</p> <p>The solubility of substances is affected by the following factors.</p> <ol style="list-style-type: none"> 1- Temperature 2- Pressure (For gases) 3- Nature of Solute and Solvent. <p>1. Solubility and Temperature: The solubility of solids and “partially miscible liquids” increases in liquids with the rise in temperature. For example; The solubility of sugar in water at 0°C is 179g/100ml whereas at 100°C it is 487g/100ml. But the solubility of gases decreases in liquid with the increase in temperature. For this reason when a glass of cold water is warmed, bubbles of air are seen on the inside of the glass.</p> <p>2. Solubility and Pressure: Henry studied the solubility of gases in liquids and gave a law called Henry’s law. <i>“The solubility of a gas in a liquid is directly proportional to the pressure of gas.” i.e</i></p> $m \propto P$ <p style="text-align: center;">or $m = KP$</p> <p><i>In the preparation of bottled soft drinks, CO₂ gas is dissolved under high pressure (Slightly higher than 1 atm). When the bottles are opened, pressure decreases, so solubility of CO₂ decreases, hence bubbles of CO₂ come out of solution.</i></p> <p><i>Note: The solubility of solids and liquids are not affected by pressure.</i></p> <p>3. Solubility and Nature of Solute and Solvent: <i>To explain the effect of nature of solute and solvent on solubility, there is a general principle “Like dissolve like”. An ionic or a polar covalent compound dissolves in a polar solvent. A non-polar compound dissolves in a non-polar solvent. For example</i></p> <ol style="list-style-type: none"> 1- <i>Table salt dissolves readily in water but it is insoluble in Benzene</i> 2- <i>Fats and oil are insoluble in water but they are soluble in ether.</i> 	K/A	D

6.	<p>State Faraday's law of Electrolysis and explain any one of them.</p>	<p>INTRODUCTION: Michael Faraday's in 1833, studied the quantitative aspect of electrolysis. He discovered that there exists a definite relationship between the amount of current passed through a solution and the quantity of the substance decomposed or produced by this current.</p> <p>STATEMENT: The amount of substance either deposited or liberated at an electrode in an electrolytic cell, during electrolysis is directly proportional to the amount of electricity that passes through the cell.</p> <p>EXPLANATION: If "W" is the weight or amount of a substance deposited or liberated and "A" refers to ampere of current that is passed for "t" seconds, then according to the law.</p> <p>Mathematically, $W \propto A \times t$</p> <p>OR $W = Z A t$ Eq (i)</p> <p>Where, "Z" is a constant known as electrochemical equivalent of a substance (electrolyte). W= amount of metal deposited A = Current in ampere T = Time in second</p> <p>If one ampere of current is passed just for one second then equation (i) implies that. $W = Z$</p> <p>Thus, electrochemical equivalent is the amount of a substance deposited or liberated in 1 ampere current passing for 1 second (i.e. one coulomb). Its S.I unit is kg / coulomb. Each element has its own electrochemical equivalent.</p>	K/U	M
7.	<p>What is Salt? On the basis of chemical properties describe its three kinds with examples</p>	<p>SALT: The neutralization product of acids and base other than water is called salt. $NaOH_{(aq)} + HCl_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$</p> <p>TYPES OF SALT: On the basis of chemical nature, salt has three types.</p> <ol style="list-style-type: none"> 1. Normal salt 2. Acidic salt 3. Basic salt <p>1. NORMAL SALTS: The salts, which are obtained by the complete neutralization of acid by a base, are called normal salts. These salts do not have replaceable hydrogen atoms or hydroxyl groups. Example: NaCl, NaNO₃, K₂SO₄ etc are normal salts.</p> <p>2. ACIDIC SALTS: The salts which are obtained by the partial neutralization of acid by a base are called acidic salts. These salts contain replaceable hydrogen atoms and they further react with bases to form normal salts. Example: NaHSO₄, KHCO₃ etc are acidic salts.</p>	K	E

		3. BASIC SALTS: The salts, which are obtained by the partial neutralization of base by an acid, are called basic salts. These salts contain replaceable hydroxyl groups and they further react with acids to form normal salts. Example: Mg(OH)Cl, Zn(OH)Cl etc are acidic salts.			
8.	Write down any four differences between covalent bond and co-ordinate covalent bond	COVALENT BOND		CO-ORDINATE COVALENT BOND	
		1. Definition			
		It is formed by the mutual sharing of electrons between atoms.		The co-ordinate covalent bond is formed by one sided sharing of electrons.	
		2. Bond Formation			
		Bond is formed between the similar or dissimilar atoms, when electrons are mutually shared.		Bond is formed between two unlike atoms, one having an electron pair available for sharing and other must accept that electron pair.	
		3. Nature of Bond			
		Bond may be polar or non-polar		Bond is always polar	
		4. Character			
		Bond is associated with only covalent character because there is no electron transfer.		Bond is associated with the ionic and covalent character because of partial transfer of electrons.	
		5. Denotation			
		Single pair is denoted by (—), double pair is denoted by (⇒) and for triple pair of electrons (≡)		It is denoted by an arrow (→)	
		6. Solubility			
They are usually insoluble in water		They are sparingly soluble in water.			
				K/R/ A	E