IMPORTANT QUESTION FOR SECTION C **IX CHEMISTRY**

1. **Write down any four differences between covalent bondand co- ordinate covalent bond**

COVALENT BOND	**CO-ORDINATE COVALENT BOND**
1. Definition	
It is formed by the mutualsharing of electrons between atoms.	The co-ordinate covalent bondis 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 is water.

2. State Faraday's lawof Electrolysisand explain any one of them.

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.

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 thecell.

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.

Mathematically,

$W \alpha A \times t$

OR $\mathbf{W = Z A t}$ …… Eq (i)

Where, "Z" is a constant known as electrochemical equivalent of asubstance (electrolyte).

W= amount of metal depositedA = Current in ampere

T = Time in second

If one ampere of current is passed just for one second then equation (i) implies that.

W = Z

Thus, electrochemical equivalent is the amount of a substance deposited or librated 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.

3. Define Solubility then list the factors affecting solubility andelaborate anytwo of them.

SOLUBILITY:
"The amount of solute required to saturate 100 grams of a solventat a particular temperature is called solubility.

The solubility of substances is affected by the following factors.1- Temperature
2- Pressure (For gases)
3- Nature of Solute and Solvent.

1. Solubility and Temperature:
The solubility of solids and "partially miscible liquids" increases inliquids with the rise in temperature. For example;
The solubility of sugar in water at 0°C is 179g/100ml whereas at100°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.

2. Solubility and Pressure:
Henry studied the solubility of gases in liquids and gave a law called
Henry's law.

"The solubility of a gas in a liquid is directly proportional to thepressure of gas." i.e

$$m \propto P$$

or

$$m = KP$$

In the preparation of bottled soft drinks, CO_2 gas is dissolved underhigh pressure (Slightly higher than 1 atm). When the bottles are opened, pressure decreases, so solubility of CO_2 decreases, hence bubbles of CO_2 come out of solution.

***Note:** The solubility of solids and liquids are not affected bypressure.*

3. Solubility and Nature of Solute and Solvent:
To explain the effect of nature of solute and solvent on solubility, there is a general principle "Like dissolve like". An ionic or a polarcovalent compound dissolves in a polar solvent. A non-polar compound dissolves in a non-polar solvent. For example
1- Table salt dissolves readily in water but it is insoluble inBenzene
Fats and oil are insoluble in water but they are soluble inether.

4. State the properties ofgroup V A and VI A

FIFTH GROUP (VA) CARBON FAMILY

This group includes N, P, As, Sb and Bi. They have followingcharacteristic properties.

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.

They form ionic as well as co-valent compounds.

SIXTH GROUP(VIA) OXYGEN FAMILY

This group includes O, S, Se, Te and Po. They have followingproperties.

1. Their valence shell contains six electrons.
2. They have the tendency to gain two electrons.
3. They form di"–" 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. What is acovalent bond?Explain the types of covalent bondand their characteristics

COVALENT BOND:

An American chemist 'G.N. Lewis' introduce the idea of covalentbond in 1916.

"The bond which is formed by the mutual sharing of electrons iscalled covalent bond."

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 theirouter 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 completeits duplet and chlorine atom completes its octet by sharing one electron.

SINGLE COVALENT BOND:

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 iscalled single covalent bond.

This type of bond is represented by a single short line. (—).

$$Cl + Cl \qquad Cl\ \ Cl$$

DOUBLE COVALENT BOND:

The covalent bond in which two pair of electrons are shared by thebonded atoms, and each atom has to share two electrons is called double covalent bond.

This type of bond is represented by a two short lines. (=)

$$O + O \qquad O = O$$

TRIPLE COVALENT BOND:

The covalent bond in which three pairs of electrons are shared bythe bonded atoms, and each atom has to share three electrons iscalled triple covalent bond.

This type of bond is represented by a three short lines. (≡)

$$N + N \qquad N \equiv N$$

6. **Explain Rutherford'sGold Metal foil experiment**

RUTHERFORD'S ATOMIC MODEL:

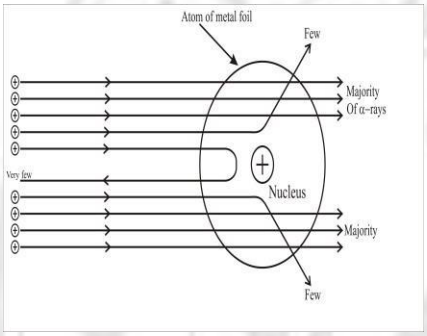
Lord Rutherford in 1911, performed an experiment to determine thestructure of atom.

APPARATUS FOR EXPERIMENT:

1- Alpha particles.
2- Gold foil. (0.0004 cm thick)3- Zinc sulphide screen.
4- Electron Gun.

EXPERIMENT

In his experiments, Rutherford bombarded alpha particles on verythin metallic gold foil. In order to record experimental observations, he made use of circular screen coated with zinc sulphide.

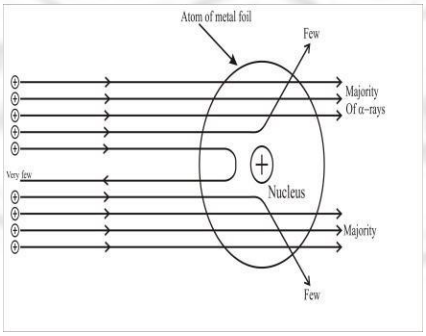


Radioactive substance

Alpha Particles

Screen

Foil



OBSERVATIONS:

He observed in his experiment that

- Most of the alpha particles were pass through the foilundeflected.
- Very few particles were deflected when passed through thefoil.
- One particle out of 8000 particles was deflected at 90^{o}.
- 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 theatom is empty.

2. The positive charge in the atom is concentrated in extremelydense 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 electronsrevolve in extra nuclear part in various orbits.

DEFECTS OF RUTHERFORD'S THEORY

1. If an electron continuously revolves around the nucleus itshould emit energy continuously and finally it should fall in the nucleus.

2. If the electrons emit energy continuously, they should formcontinuous spectrum. But actually line spectrum is obtained.