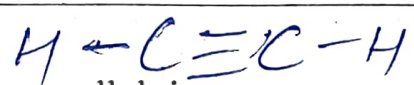
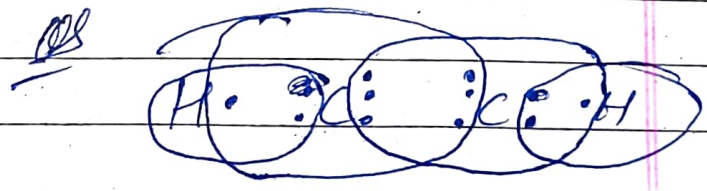
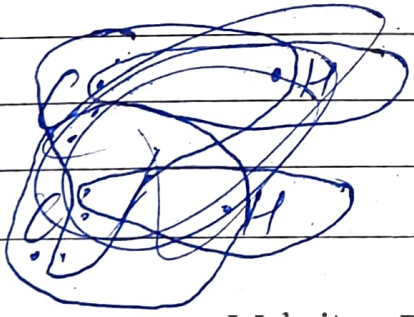


Explain the formation of C_2H_2 molecules?
 C_2H_2 molecule contains two atoms of C and ~~2~~ ^{two} atoms of H. The type of bond formed between these atoms is covalent bond. Hydrogen ($Z=1$) atom has electronic configuration $1s^1$ & it has only one electron in its valence shell. It requires one ^{more} electron to attain the stable electronic configuration of its nearest noble gas He. Carbon ($Z=6$) atom has electronic configuration $1s^2, 2s^2, 2p^2$ it has ~~one~~ 4 electrons in its valence shell. It requires 4 more electrons to attain the stable configuration of its nearest noble gas Neon (Ne).

Thus, in the formation of C_2H_2 molecule, each C-atom complete its octet by sharing three electrons with other C-atoms and by sharing one electron with H-atom. A triple covalent bond formed between two carbon atoms and single covalent bond formed between C and H-atoms. Thus, there are two single covalent bond ~~around~~ ^{formed} and ~~one~~ ^{two} triple covalent bond ^{formed} in C_2H_2 molecules.



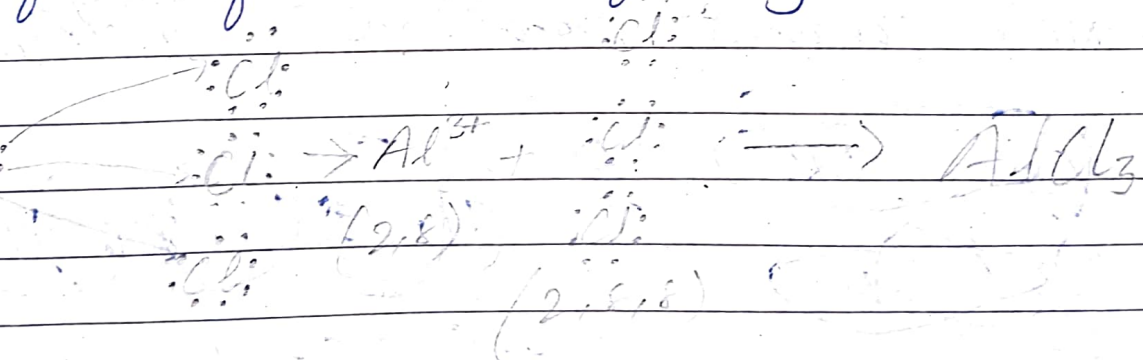
Describe the formation of $AlCl_3$ molecule with diagram?

A molecule of $AlCl_3$ is formed by development of ionic bonds between Al^{3+} ions and chloride Cl^- ions.

The electronic configuration of Al is 2, 8, 3. It has three electrons in their valence shell. It acquires stable electronic configuration of the nearest noble gas neon (Ne) by losing three valence electrons and forming Al^{3+} ion.

The electronic configuration of Cl is (2, 8, 7). It has 7 electrons in their valence shell. It acquires stable electronic configuration of the nearest noble gas Argon (Ar) by gaining one electron by every ^{three} chlorine atoms and forming Cl^- ions.

Thus, in the formation of $AlCl_3$, aluminium atom loses three electrons which are gained by three chlorine atoms. Al^{3+} ion and Cl^- ions are held together by electrostatic forces of attraction forming a molecule of $AlCl_3$.



Difference between Atomic Number and Atomic Mass Number.

Atomic no.	Atomic Mass No.
The number of protons present in the nucleus is equal to the no. of electrons in orbits is known as <u>atomic no.</u>	i). The total no. of protons and neutrons present in the nucleus of an atom is called <u>atomic mass no.</u>
Atomic no. have fixed position in the periodic table.	ii). Atomic mass no. doesn't ^{have} fixed position of an element in periodic table.
It is denoted by Z .	iii). It is denoted by A .
Different elements have different atomic no.	iv). Atoms of same or different elements may ^{may} not have same atomic mass no.
Atomic no. doesn't indicate the mass of the nucleus of atom of element.	v). Atomic mass no. indicates the mass of the nucleus of atom of the element.
ii). <u>E.g.</u> :- Na - 11 Mg - 12	ii). <u>E.g.</u> Na - 23 Mg - 24

Q.1 Different between isotopes and isobars?

Isotopes

Isobars

i). It has the same atomic no. but different mass numbers.

i). It is defined as the same mass no. but different atomic no. of an element.

~~ii). They~~

ii). They occupy same place in the periodic table.

ii). They occupy different places in periodic table.

iii). They have the same no. of protons and electrons.

iii). They have the unequal no. protons and electrons

iv). It also have ~~diff~~ unequal no. of neutrons.

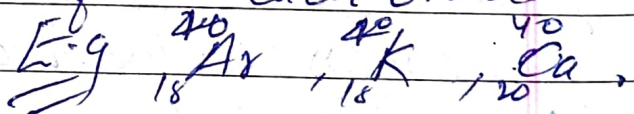
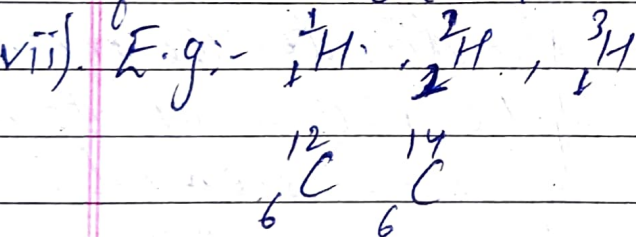
iv). It also have diff no. of neutrons.

v). Their chemical properties are identical.

v). Their chemical properties are different.

vi). It have different physical properties from each other.

vi). It has similar physical property from each other.



What are the key postulates of Dalton's atomic theory, and how do they explain the nature of matter?

The following are the postulates of Dalton's Atomic theory are as:-

All matter is made up of very tiny particles called atoms, which participate in chemical rxns.

Atoms are indivisible particles which cannot be created nor be destroyed in a chemical rxn.

Atoms of different elements have different masses and chemical properties.

Atoms combine in the ratio of small whole numbers to form compounds.

2. Describe the experimental setup and key observation of Rutherford's gold foil experiment? what conclusions about atomic structure were drawn from this experiment?

Ans. The experimental setup of the Rutherford's gold foil experiment are as follows:-

i). He selected a gold foil because he wanted as thin layer as possible.

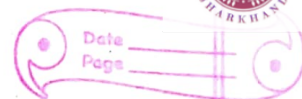
The α -particles are doubly-charged helium ions. Since the mass of (He) ions, the fast moving α -particles have a considerable amount of energy. It was expected that α -particles would be deflected by the sub-atomic particles in the gold atoms because the α -particles were more heavier than proton, he did not expect to see large deflections.

Observation

Most of the fast moving α -particles passed straight through the gold foil. Some of α -particles deflected by making small angles. Every ~~or~~ 12000 particles one particles get ~~bounced back~~ rebound.

Conclusions

Most of the space inside the atom is empty. Very few particles were deflected from their path. A very small fraction of α -particles were deflected by 180° .



- The radius of nucleus is 10^5 times less than the radius of the atom.

3. Difference between orbits and orbitals?

- | | |
|---|---|
| <p>i). It is a well defined circular path around the nucleus in which an electron revolves.</p> | <p>i). It is the region around the nucleus where the probability of finding an electron is maximum.</p> |
| <p>ii). It is circular in shape.</p> | <p>ii). Different orbitals have different shapes.</p> |
| <p>iii). It shows that an electron moves around the nucleus in one plane.</p> | <p>iii). It shows that an electron can revolve around the nucleus in 3D space.</p> |
| <p>iv). It does not follow Heisenberg's uncertainty principle.</p> | <p>iv). It follows Heisenberg's principle.</p> |
| <p>v). The maximum number of electron in an orbit is $2n^2$ ($n = \text{no. of orbit}$)</p> | <p>v). The max. no. of electron in an orbital is two.</p> |
| <p>vi). It doesn't describe the shape about an atom because it is non-directional.</p> | <p>vii). It describes the shape about an atom because it is directional.</p> |



Date _____
Page _____

Difference between electrovalent and covalent compounds?

<u>Electrovalent</u>	<u>Covalent</u>
The compounds which are formed by complete transfer of electrons between atoms.	i). The compounds which are formed by mutual sharing of electrons between similar and dissimilar atoms.
It can conduct electricity in molten or aqueous state.	ii). It doesn't ^{can} conduct electricity in any state.
They are soluble in polar solvents like water but insoluble in non polar solvents like benzene, alcohol.	iii). They are soluble in non polar solvents like benzene, alcohol or CCl_4 but insoluble in polar solvents like water.
They have high melting and boiling points.	iv). They have low melting and boiling points.
They have strong electrostatic force between cations and anions.	v). They have weak electrostatic force between their molecules.
The reactions takes place at very high speed.	vi). The reaction takes place at very slow speed.

What is valency and its types?
 The combining capacity of an atom. The number of electrons that can lose, gain, share by an atom of an element to attain nearest noble gas configuration is known as their valency.

There are two types of valency are as:-

Electrovalency :- The valency obtained by the complete transfer of electrons by an atom of an element during the formation of electrovalent bond is known as electrovalency.

E.g:- NaCl, Na₂S, FeSO₄ etc.

Types of electrovalency:-

- Positive electrovalency
- Negative electrovalency

Covalency :- The valency obtained by mutual sharing of electrons between similar or dissimilar atoms to form an covalent bond is known as covalency.

E.g:- NH₃, HCl, Cl₂, CO₂ etc.

What is Octet and Duplet rule Explain?

Duplet Rule

- The tendency of an atom to ~~attains~~ acquire an outermost (valence shell) of two electrons is known as duplet rule.
- Atoms with low atomic number that have ^{only} $1s$ orbitals ~~are~~ around the nucleus followed duplet rule.
- All the duplets having valence shell electronic configuration ending as ns^2 , where
 $n = \text{no. of shell}$
 $s = \text{no. of electrons in } s\text{-subshell.}$

2) Octet Rule

- The tendency of an atom to acquire ~~to~~ an outermost (valence shell) of eight electrons is known as octet rule.
- Atoms with 7 or less than 7 electrons in their valence shell around the nucleus followed the octet rule.
- All octets ~~rules~~ having valence shell electronic configuration ending as $ns^2 np^6$
 where, $n = \text{no. of shell}$
 $s, p = \text{no. of electrons in } s \text{ and } p \text{ sub-shell.}$

Q. Explain the Bohr's atomic theory?

- Ans. The following are the postulates of Bohr's atomic model of an atom are as:-
- Atom is a spherical shape in which +ve charge is present inside the nucleus while the -ve charge revolved around the nucleus.
 - Electrons revolved in fixed orbits around the nucleus called 'stationary orbits' or 'shells'.
 - The electrons closer to the nucleus have lower energy levels while the electrons far away from the nucleus have higher energy levels.
 - Electrons do not emit or absorb energy while revolving in a same nucleus energy levels.
 - Electrons absorb or releases energy when it moves from one shell to another.

The following are the limitation of Bohr's atomic model of an atom:-

- i). The formulation and calculation given by Bohr is only valid for single orbital electrons like

(He, He⁺, Li²⁺) like atoms.

ii) He couldn't explain the Zeeman and Stark effect.

Zeeman - breaking of e^{\ominus} in magnetic field
Stark effect - breaking of e^{\ominus} in electric field.

iii) He couldn't explain Heisenberg uncertainty principles and photoelectric effect.

iv) He also couldn't explain the multiple spectrum and the behaviour of radiating of energy.

Q8. What is Aufbau principle and Hund's rule? Explain?

Aufbau Principle :- It states that 'The electrons always enter the various orbitals in the order of increasing energy'. Lower energy orbitals are therefore, better seats for electrons and better seats are occupied first.

The order of filling of the orbitals is

~~1s
2s 2p
3s 3p 3d
4s 4p 4d 4f~~