

Source of organic compound:- 35

i) Mineral & plants
ii) Natural gas & petroleum
iii) coal

iv) Fermentation
v) Synthesis

iv) Fermentation:-

→ Fermentation is defined as the reproduction of chemical & by the action of microorganism.

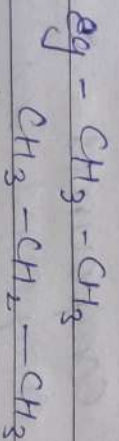
eg- Alcohol, vitamins, Antibiotics

* Classification of organic compound:-

→ It is a classified on 5 category

i) Aliphatic Compound

→ It is those compound which can consist of open chain of carbon atom are called aliphatic compound



ii) Saturated & unsaturated compounds:-

→ Compounds which contain only C, H, & are called hydrocarbon.

→ A hydrogen carbon is said to be saturated if it contain only C-C single bond.

→ A hydrocarbon is said to be unsaturated

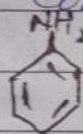
If it contain $C=C$ & $C\equiv C$ multiple bonds are called unsaturated. \rightarrow

iii) Aromatic Compounds:- \rightarrow

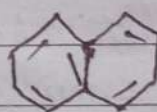
\rightarrow Benzene and all compound that have structural & chemical properties resembling benzene are called aromatic compound. \rightarrow



Benzene



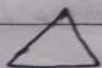
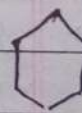
Anilin



Nepthaline

iv) Alicyclic Compound:- \rightarrow

\rightarrow which consist only of C-atoms are called alicyclic compound. \rightarrow

cyclo
Propanecyclo
butanecyclo
Peptanecyclo
hexane \rightarrow

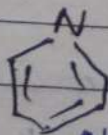
v) Hetrocyclic Compound:-

\rightarrow It is a compound in which the ring atom of carbon & some other element are called hetrocyclic compound. \rightarrow

Eg- Carbon, Oxygen, Nitrogen



Ethyl's oxide

Nitrobenzene
Cpripline \rightarrow

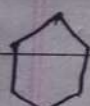
Structure of atom

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atoms are



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hexane

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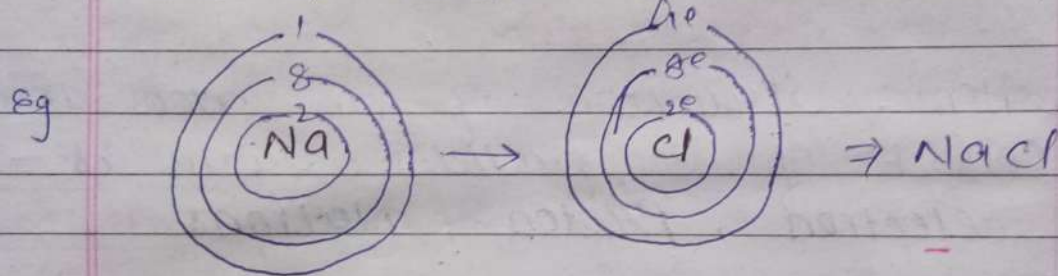
- The atomic structure was 1st described by "John Joseph Thomson" & "Ernest" 1900
- This model of atom is still used as basis of modern atomic theory.
- Atoms are nothing but building blocks of matter atomic theory: which has mass & takes up space
- Atoms are nothing but building
- All the matter is made up of atoms
- The word 'Atom' is obtained from Greek and each individual.
- Atomic structure of an atom mainly consists of 3 particles such as -
electron, Proton, Neutrons
- Atoms are particles of elements or substance. These cannot be broken further without changing the chemical nature of the substance
- Protons have +ve electric charge and it should be much larger and heavier than electron.
- Neutrons have no electric charge and it has much heavier and larger like protons
- Electrons are very small & lighter particles and it has -ve electric charge

Types of Bond:-

- i) Ionic or electrovalent bond
- ii) Co-valent bond
- iii) Co-ordinate bond

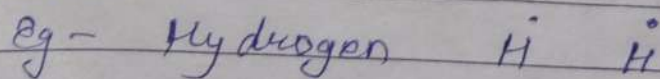
i) Ionic or, Electrovalent bond:-

- Ionic bond are formed by transfer of valance e^- from one atom to another. Excess electron than the
- This type of bond unites two atoms one of which has excess electron than the stable no (2 or 8) and the other is short of electrons.



ii) Co-valent Bond:-

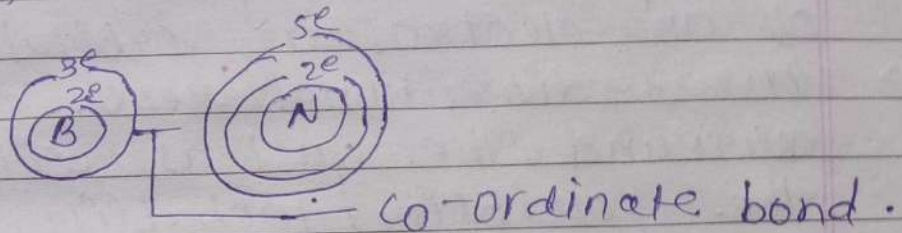
- Co-valent bond are formed by mutual sharing of electron this type of bond unites two atom both of which are short of e^- the two atoms contributed one electron each and then share the resulting pair of electron.



iii) Co-Ordinate Bond

- Co-ordinate bond is also formed by mutual sharing of electron but in this case the two electron ~~but~~ that

are shared come from the same atom



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* Atomic orbital :-

The three dimensional region or shape that is volume around the nucleus of an atom where probability of finding electron having a given energy is maximum (90-95%) is called atomic orbital.

* Orbit :-

As postulated by Bohr's an orbit is a definite circular path at a definite distance from the nucleus in which the electron revolves around the nucleus. The orbits are numbered as 1, 2, 3, 4... from the nucleus and are designated by the Capital letter K, L, M, N... etc

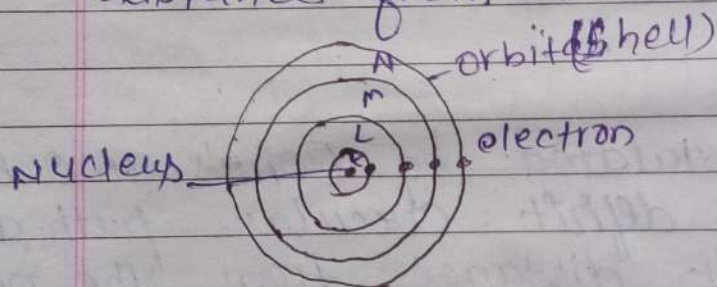
→ An orbit indicates an exact position / location of an electron in an atom

Eg - A/c to Bohr's theory an electron of hydrogen is found at the distance of 0.53 \AA from the nucleus.

Orbital:-

As postulated by wave nature of an electron an orbital is defined as 3-dimensional region or space around the nucleus within which the possibility/probability of finding an electron with a certain energy is maximum

→ An orbital does not specify the definite exact position of an electron in an atom since the electron due to its wave nature cannot be found at a fixed distance from the nucleus



St. of Bohr's atomic model

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Molecular Orbital

→ The goal of molecular orbital to describe molecules in a similar way to how we describe atoms that is in terms of orbital

→ Orbital diagram and electronic configuration

→ Molecules can share 1, 2 or 3 pairs of electrons from a single bond, (1) Atoms can share 1, 2 or 3 pairs

→ Sing bond - 1
Double bond - 2

Triple bond - 3

Other type of bonds are formed by charged atoms that is ionic and metal (metallic atom)

Orbital mixing:-

— when atoms share electrons to form a bond their atomic orbitals mixed to form molecular bond in order for these orbital to mix they must

- i) Have similar energy level
- ii overlap well
- iii well closed together

Molecular orbital Theory (MOT)

→ Atomic orbital mixed together and make

i) Bonding orbitals

— electrons in this orbitals help hold atom near each other.

ii) Antibonding orbitals

— electrons in this orbital push atom apart from each other.

Non bonding orbital (like lone pair)

— electron in this orbitals have no effect on bonding

— Molecular orbital can

- be σ (σ) or π (π)
- be spread over multiple atoms

Principle of molecular orbital theory

→ In molecules atomic orbital combine to form molecular orbitals which surround the molecules

- (a) Bonding $\text{O} \text{O} \rightarrow \text{O} \text{O}$ σ Bonding
- (b) Antibonding $\text{O} \text{O} \rightarrow \text{O} | \text{O}$

→ Molecular bonds have lower potential energy than in separate atomic orbitals.

→ Thus electrons prefer to stay in a molecular bonds

- Equal no of orbitals
- order of energy
- atomic orbitals, a like energy
- Following both the Pauli exclusion principle and Hund's rules

* σ Bond (Sigma)

→ They are symmetrical about the axis

* π Bond (Pi)

→ The $\pi(\pi)$ bonding bonds as a side to side overlap which then causes there is density above and below the axis

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The strength of equivalent bond stems from the exchange of electrons b/w two atoms.

— The magnitude of this exchange energy is proportional to the amount of the overlap of atomic orbital structure constituting the bond.

max overlap of \rightarrow Atomic orbital structure bond. result will result in the strongest bond consequently the bond is formed by a given orbital

will tend to lie in the direction in which the orbital as the maximum value called hybrid orbitals.

ii) Intermolecular force:-

We must remember that the particular method of mentally building molecules that we are learning to use in artificial. It is a purely intellectual process involving imaginary overlap of imaginary orbitals.

— There are other equally artificial way that use different mental or physical models. Our method is the one that so far has seemed to work out best. For the Chemist.

But However we arrive at be see the actual structure of a molecule to be the net result of a combination of repulsive & attractive force. We are related to charge & electron spin.

* Repulsive force:- Electrons tend to stay as far apart as

possible because they have the same charge and also if they are unpaired because they have the same spin.

(Pauli exclusion principle)

— The live charge atomic nuclei to repel each other

* Attractive force :- Electrons are attracted by atomic nuclei as are the nuclei by the electrons because of their opposite charge and hence tend to occupy the region b/w two nuclei opposite. Spine permits to electrons to occupy the same regions

*) Bond dissociation energy

Bond energy

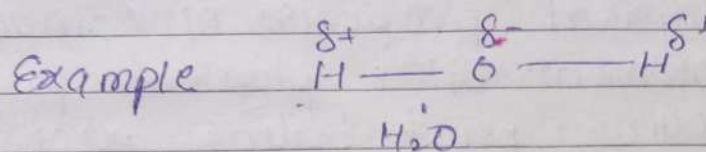
→ The bond energy is defined as the strength of the bond as it exists in a molecule or the contribution of the bond between a particular pair of atom A-B in a molecule to the total bond energy present in that molecule

4 Polarity of bonds :-

→ Besides the properties already describe certain co-valent bonds have another properties polarity two atoms joint by a co-valent bond share electrons their nuclei are held by the same electrons - but in most cases the two nuclei do not share the electrons equally.

— The electron is denser about one atom than the other. one end of the bond is relatively negative and other end is relatively positive that is there is a negative pole & a

positive pole. Such a bond is said to be a polar bond.



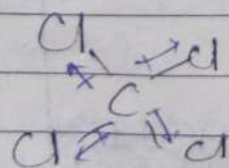
* Polarity of molecules:-

A molecule is polar if the centre of negative charge does not coincide with the centre of positive charge. Such a molecule constitutes a dipole to equal and opposite charges separated in a space.

— A dipole is represented symbolized by " \rightarrow " where the arrow points from positive to negative. $\delta^+ \rightarrow \delta^-$

→ The molecule possesses a dipole moment which is equal to the magnitude of charge electron multiplied by distance "d" between the centre of charge.

→ Methane and Carbon tetrachloride (CCl_4) and zero (0) dipole moment we often would expect the individual bonds of Carbon tetrachloride to be polar because of the very symmetrical tetrahedral arrangement.



$\mu = 0 D$

where, Dipole moment = $q \times d$
Distance = d
Magnitude of charge = q

$1 D = 3.33 \times 10^{-30} \text{ C m}$
→ unit D

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* Structure and physical properties
we have just discussed on
physical properties of compound dipole
movement. Other physical properties like
melting point boiling point or solubility
in a particular solvent. are also of
consequence to us

→ The physical properties of a new
compound give valuable structure.
In attempting to synthesize a new
compound

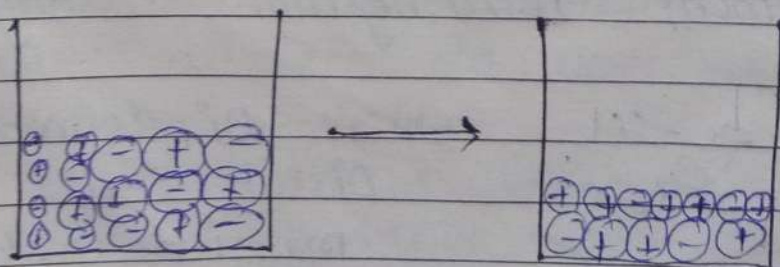
Example - A new

we must plan a series of
reaction to convert a compound that
we have into the compound that we
want

Q. melting point

In a crystalline the particles acting
has structural unit ion or molecule
are arranged in some very regular
symmetrical way. There is a geometrical
pattern repeated over and over within
a crystal.

→ melting is the change from highly ordered
arrangement of particles in the crystalline



melting of an ionic crystal - The units are ion

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Boiling point:-

- The particles in a liquid are arranged less regularly are free to move about than in a crystal each particle is attract by a number of other particles. Boiling involves the breaking away from the liquid of individual molecules or pairs of oppositely charged ions this occurs when a temperature is ~~sig~~ reached at which the thermal energy of the particles is great ~~enough~~ enough to over the the co-hesive force that ~~old~~ hold them in the liquid.

Solubility:-

- when solid or, liquid dissolved the structural unit ions or molecules become seprate from each other. And the specie of liquid in b/w become seprate occupied by solvent molecules in dissolution as in melting & boiling energy must ~~be~~ be supplied to over come the inter-ionic or inter-molecular force.

- The energy required to break the bonds b/w solute particles is supplied by the formation of bond. b/w the ^{solvent} solid particles & the solvents molecules the attractive force are replaced by new molecules.

* Inter molecular force :-

what kinds of forces nature's molecule to each other like interionic force these forces seems to be electrostatic in nature involving attraction of the

Charge & negative charge. There are two kinds of intermolecular force

- i) Dipole - dipole interaction
- (ii) ~~No~~ Van-der Waals forces -

i) Dipole - Dipole Interaction -

The attraction of the positive end of one polar molecule for the negative end of another polar molecule in hydrogen chloride.

Example - The relatively positive hydrogen of one molecule is ^{attracted} attached to the relatively negative chlorine of another.

- As a result of dipole - dipole interaction polar molecules are generally held to each other more strongly than are non polar molecules of comparable molecular weight. This difference in strength of intermolecular force is reflected in the physical properties in the compound.

(ii) Van-der Waals forces -

There ~~must~~ be forces b/w the molecules of a non polar compound. Since even such compounds can solidify. Such attraction are called Vander-waal forces.