NEET Chemistry

Short Notes

Revise Chemical Bonding in 5 Simple Steps

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In NEET and other entrance examinations, most of the questions come from Chemical Bonding. Here are some amazing steps to understand all the important facts based on the topic:

Step 1: UNDERSTANDING OF CHEMICAL BOND AND ITS TYPE:

We all know that except noble gas elements no other elements exist independently. The group of atoms known as molecules have the independent existence. If the molecules are of the same atom they are HOMOATOMIC and if molecules are of different atoms they are HETEROATOMIC. The force that holds different atoms in molecule together is called chemical bond.

TYPES OF CHEMICAL BONDS:

1. **Ionic or Electrovalent Bond:** These bonds are formed as a result of complete transference of one or more electrons from one atom to another. Thus it may define as electrostatic force of attraction which holds the oppositely charged ions together
2. **Covalent bond:** for explaining this bond many theories come:
3. ***Lewis Langmuir Theory:*** the bonds form between two atoms (same or different) by mutual contribution and sharing of electron e.g.: Cl_2 molecule, O_2
4. ***Polar and Non-Polar covalent bond:***

Non – Polar Covalent bond: If share pair of electron lies in centre and bonding atoms have same electronegativities the bond form of non polar.eg: H_2 , Cl_2 etc.

Polar Covalent bond: If share pair of the electron does not lie in the centre and bonding atoms have different electronegativities are known as Polar covalent bond.eg. HCl, HBr, HF.

c) Valence shell electron pair repulsion theory: In covalent molecule, central atom is surrounded by share pair and lone pair of electron. These electrons tend to repel and molecule become unstable so to minimize it electron pairs are directed such that they are apart as possible.

The main **feature** of this theory is that *shape of a molecule depends upon the electron pair around the central atom.*

The order of repulsive interaction is:

Lone pair – Lone pair > Lone pair – Bond pair > Bond pair Bond pair

- If central atom surrounded by all bond pairs then it is having *regular geometry*
- If central atom is surrounded by bond pair of different atoms or both bond pair and lone pair then it is *irregular geometry*

STEP 2: LEARN THE SHAPE OF MOLECULES

Trick to learn the shapes of molecule:

- Write 21,22,31,32,41,42,51 and draw line between 2 and 1 (21) similarly for other cases
- Remember the word BeaTS
- **B** stands for bent shape
- **T** has two shapes now by alphabetic order p comes before s so remember this point
- **S** has 3 geometry keep in mind see-saw and again (from square planar and square pyramid) just check alphabetic order)

Bond pair	Lone Pair	Structure
2	1	Bent
2	2	Bent
3	1	T – pyramid
3	2	T – shape
4	1	Seesaw
4	2	Square planar
5	1	Square pyramid

NOTE: *UNEQUAL SHARING OF ELECTRON BETWEEN THE BONDING ATOMS RESULT IN POLAR COVALENT BOND WHILE COMPLETE TRANSFERENCE OF ELECTRON PAIR TO ONE OF THE ATOM MAKES THE BOND IONIC.*

ORBITAL CONCEPT OF COVALENT BOND

The bond formed as a result of the overlap of orbital belonging to two atoms and having opposite spins of the electron. Generally, there are 3 types of overlap: s-s overlap, s-p overlap, p-p overlap.

STEP 3: CONCEPT OF HYBRIDISATION

APPROACH:

1. Identify central atom
2. Valence electron in central atom
3. Form bonds with surrounding atoms(pi and sigma bond; in double bond one bond is sigma and other is pie)
4. Add $1e^-$ = -ve

Subtract $1e^-$ = +Ve

5. Sigma + lone pair =?
6. Lone pair = shape

Sigma + lone pair	Hybridization
2	sp
3	sp^2
4	sp^3
5	sp^3d

Let us take an example what is hybridization and molecular shape of ClF_4^+

Step 1: central atom is Cl

Step 2: valence electron of Cl is 7 because 4 Fl atoms are attached to its surrounding and one positive charge so we left with one lone pair

Step 3: there is no double bond and hence we have 4 sigma bonds and one lone pair

Step 4: sigma + lone pair =5

Step 5: hybridization sp^3d

STEP 4: SHAPES

	Lone pair	Shape
sp	0	linear
sp^2	0	Triangular planar
	1	bent
sp^3	0	Tetrahedral
	1	Pyramidal
	2	Bent
	3	Linear
sp^3d	0	Trigonal bipyramidal
	1	See saw
	2	T shape
	3	linear
sp^3d^2	0	Octahedral
	1	Square pyramidal
	2	Square planar

STEP5: LEARN ABOUT RULES FOR FILLING MOLECULAR ORBITAL:

1. The molecular orbitals are filled in order of increasing energy. This is accordance with **Aufbau Principal** applicable in case of atoms.
2. A molecular orbital whether bonding or antibonding can have maximum of two electrons and two electrons have opposite spins. This is tune with **Pauli's Exclusion Principle.**
3. **Hund's Rule** (electron pairing can occur only in case there are all first singly filled) also applicable to molecular orbital.

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Quiz on Chemical Bonding

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