Chemstry –chemichal bonding

Octet rule

Atoms can combine either by transfer of valence electrons or by sharing valence electron inorder to have an octet in their shell

octet rule limitation

. It faced to explain electron defficient compounds eg:- BF_3

. it faced to explain the formation of odd electron species

Fajans rule   (anion=negative)

(cation=positive)

Fajans rule areeneyn munne ionic compoundm coavelent compound arynm

Ionic

Ithentha vechal rand atom ionic bondingloode setaavne oxidationm reductionm ndavm exmple hcl

NA nte valency 1 elle

Pinne cl ath 7 alle valence electron ee valence electron ntha vechl shell configuration eythmbo last shell lleth subshell ella shell ttoh appo

 na +1 mm cl-1 mm ayond owl ang setaay ithahn ionic bonding

Covalent

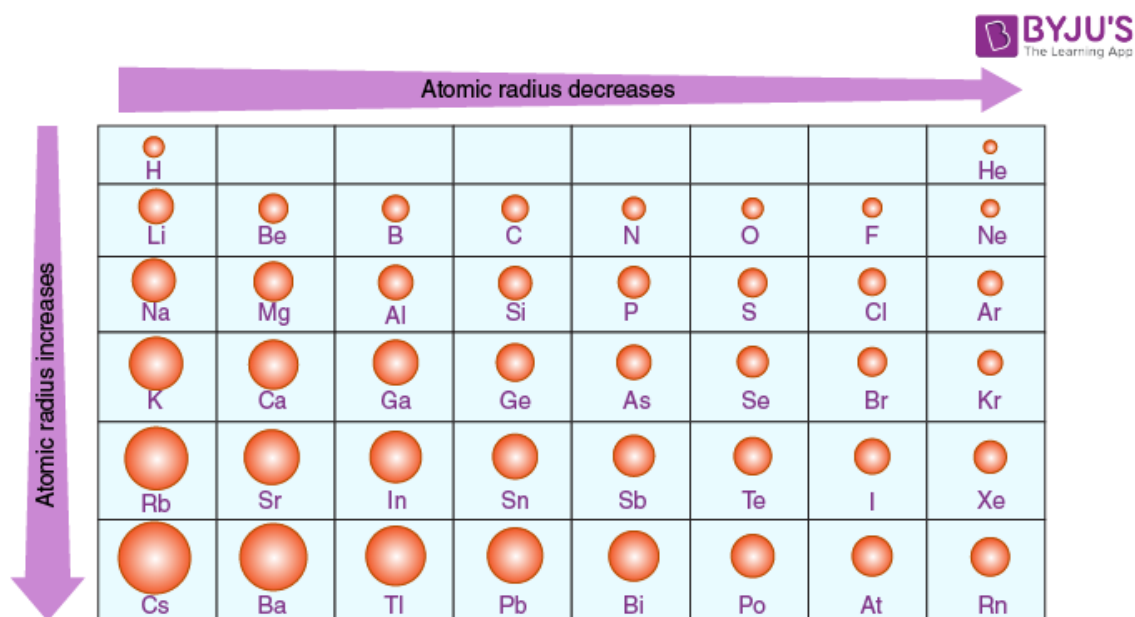Ithentha vechal share chyya elecrons CH4 example aahn
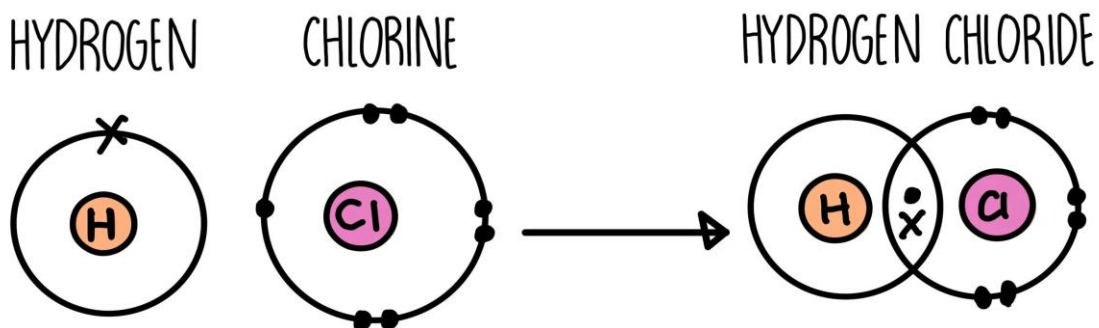
Manslaaayo ngna share chym ival electronsne aarm kodknulya vaaaangnulya ithrellu covalent bond

appo eee fajans rule ntha vechl ee ionic compounds covalent charcterm cherngna kaaanikmn

rule one

. **Smaller the size of cation and larger the size of anion the greater the covalent bond charcter**

Ithokk thayek povmbo size koodm atom thine

LICL > KCL

Ithokk ee underline ittedh aahn cation athinte size koreembo aah compondn covalent charcter koodm appo k nekaalm cherth LI elle appo LICL aahn koodthl covalent charcter ndava

LI i >LIf

Ithokk cation same aah anion vere vere aahn appo anion i n size koodyond avde covalent chrcter koodi ithrellu

<u>Rule 2</u>

The greater the charge of cation the greater in the covalent character

Eg :-ALCL3 > MGCL2 > NACL

NGNA AAHNEL njml ithinte charge noknm

Cl=-1   3 cl llond CL=-3 aaavm appo AL=+3 aavm usual thing

Mgcl2 ll cl=-2 appo mg=+2

Na=+1 and cl=-1 aavm cation positive aahn athin velye charge vermbo athin covalent charcter koodm athrellu

note:- two type bonds lone pair (lp)   bond pair(bp)
<u>VSEPER THEORY</u>

<u>postulates</u>

. Shape of the molecule is determined by valance shell electron pair around the central atom

. Valence shell electron pair stay as far part as possible

.order of repulsion is lp-lp > lp-bp > bp-bp

. If the molecule contaion only bond pair we get a regular geometry

. If the molecule contaion both lone pair and bond pair we get irregular geometry

<u>Valence electrons</u>

Be	B	C	N	O	
Mg	Al	Si	P	S	
2	3	4	5	6	= valence electrons

Total number of electron pair = ½ [no of valence electron+no of single bonded atom]

Shapes if total is these

2= linear

3=triogonal planar

4=tetrahedral

5=triogonal bipyramidal
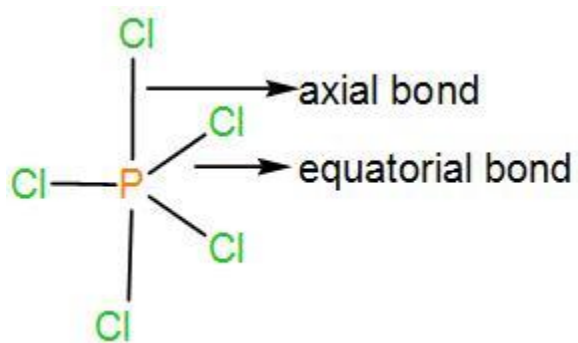
6= octahedral

Eg:-BeF2

Total=½[2+2]

=2
shape = linear

F-------BE-------F

- Why pcl5 is highly reactive?

Ans aadhym shape varka

Total=½[5+5]=5

Trioganl bi pyramidal

Ithil kandeele mele thaye lleth axial bonda appo owle angle 90 degree aahn appo angle koreembo owle elctron-electron repulsion koodm bond weak aavm appo reactivity koodm

. pcl5 molecule contain 3 equotorial bond and 2 axial bond,axial bond are weaker than equotorial bond
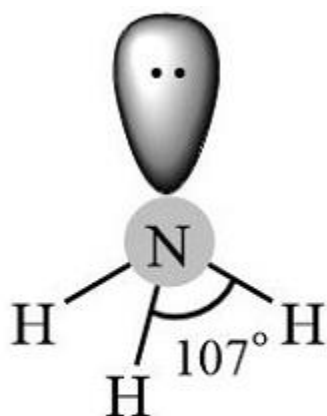
NH₃

N=5

H=1

TOTAL=½ [5+3]=4

Expected tetra hedral

Pyramidal shape

Kandeeeele 3 h llu appo adeeel adth adth kodtht mele lone pair aaki
lone pair vechal verthe nikne electron pair aahn

Q. find the shape of molecule h2o

Difference btw   sigma bond and pi bond

<u>Sigma</u>
.formed by axial overlaping of orbitals
.overlaping taking place along internuclear axis

<u>Pi-bond</u>
.formed by sidewise overlaping
.overlaping takes place perpendicular to internuclear axis

Hybridization

.process of intermixing of atomic orbitals

$X = \frac{1}{2}[V.E + M.A - C = A]$

WHERE
V.E=VALANCE ELECTRON
M.A =SINGLE BONDED ATOM
C=CHARGE OF CATION
A=CHARGE OF ANION
X CAN BE...

X	2	3	4	5	6
HYBRID ORBITALS	SP	SP2	SP3	SP3D	SP3D2
SHAPE	LINEAR	TRIOGONAL PLANAR	TETRAHEDRAL	TRIGONALBIPYRAMIDAL	OCTAHEDRAL

Eg bf2

$x = \frac{1}{2}[2+2-0+0] = 2$

Shape linear   orbital sp
Eg=2 nh4+

$X=\frac{1}{2}[5+4-1+0]=4$

Shape= tetrahedral
Orbital sp3

Molecular orbital electronic configuration
H2 TO N2
 O2

MO Energy Order (FROM H_2 TO N_2)

$$\sigma(1s) < \sigma^*(1s) < \sigma(2s) < \sigma^*(2s) < \pi(2p_x) = \pi(2p_y) < \sigma(2p_z) < \pi^*(2p_x) = \pi^*(2p_y) < \sigma^*(2p_z)$$

FROM 02 TO NE

MO Energy Order (FROM O_2 TO Ne_2)

$$\sigma(1s) < \sigma^*(1s) < \sigma(2s) < \sigma^*(2s) < \sigma(2p_z) < \pi(2p_x) = \pi(2p_y) < \pi^*(2p_x) = \pi^*(2p_y) < \sigma^*(2p_z)$$

ITH BYHART AAKIKO
Randilm vethysm vechal aadhytheyl pi 2py kaynjta sigma 2pz

o2 muthal 2pz kaynjta pi verne ithengna chyndye aruo que tehra

writw thw molecular configuration of n2

n=7   n2=14

ellathil 2ennm vech fill chya

Molecular Orbital Configuration of N$_2$

Total electrons = 14

MO energy order used (H$_2$ → N$_2$):

$$\pi(2p_x) = \pi(2p_y) \; < \; \sigma(2p_z)$$

Electronic configuration:

$$(\sigma 1s)^2(\sigma^*1s)^2(\sigma 2s)^2(\sigma^*2s)^2(\pi 2p_x)^2(\pi 2p_y)^2(\sigma 2p_z)^2$$

Kandeeele fill chythe star ittedh antibonding aahn star lyaathe bondingm simple aaahn etha element nokka adhym nnt athil etrha electrons nd nokka nnt 2 ennm vech kodka srdhikndye pi 2px=pi2py lye ithil x ll 1 yll 1 aadhym kodka nnt pinne baaaki fill aakya mati

Bond order=½[nb-na]
Nb=no of electrons in bond
na=no of electrons in antibonding

Ella electrons paired ahnel diamagnetic behaviour
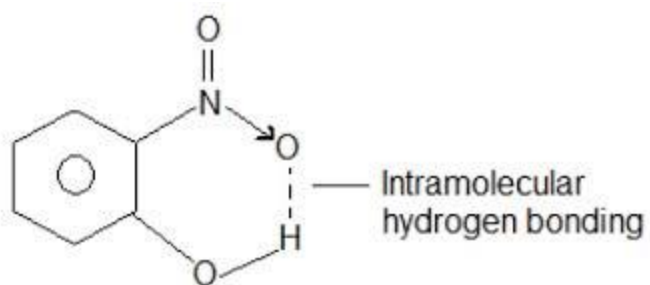singly aahnel paramagnetic behaviour

Hydrogen bonding

Intermolcular and intra molecular

intermolecular = btw two molecules eg:- H-F---H-F

f mm hmm thamil kandeeeele aynte edkdotted line must ahn hydrogen bondingl matteyl scnlya ith randm rand molecula

intramolecular = within a molcule

Intramolecular hydrogen bonding

Kandeeeele h mm o mm thammil bond verm same molceula ithrellu intra

Ee chapter kaynjjjj...