ARJUNA 2.0 JEE 2026

Chemical Bonding and Molecular Structure

Inorganic Chemistry | Lecture - 04

By - Amitabh Sharma (ATS sir)

Topics to be covered

1. Coordinate bond
2. Valency

https://t.me/Chemistry_by_AmitabhSir

Aap selection ke saath rank bhi Lana chhate to ye sequence follow karne...

Perfect lecture sequence of chemical bonding...

1. Introduction of bond
2. Octet rule
3. Ionic bond
4. Covalent bond
5. Overlapping
6. Coordinate bond
7. Valency
8. Lewis dot structure
9. Hybridization
10. Solid state hybridization
11. Hybridization in odd e molecule
12. VSEPR theory
13. Bents rule
14. Drago rule
15. Back bonding
16. Bridge bonding
17. Oxi acid
18. Molecule do not exist
19. Hydrolysis
20. Fajans rule
21. MOT
22. Hydrogen bonding
23. Dipole moment
24. Weak Force

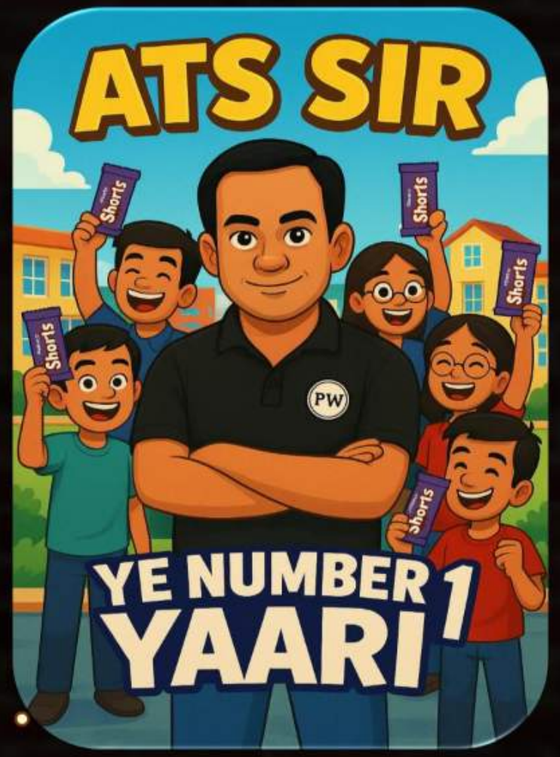
ATS-ANT TAK SAATH

Hello IITian
Lala Lali

IOC samjhne ka nahi,
Feel karne ka kaaa...!!

Love u Gucchu
Pucchu

Ready for
Shots pe shots
challenge



By the end
summary is
this

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Paneer Gang

ATS Army

Total Recall

① Axial overlapping → σ

② S.W → π

③ $\delta \rightarrow d_{z^2}$

④ Strength

Case I $n_1 + n_2 \rightarrow$ Sum same.

$$S-S < S-P < P-P$$

Case II Sum of $n_1 + n_2 \downarrow$, $E \downarrow$, Strength $\uparrow$

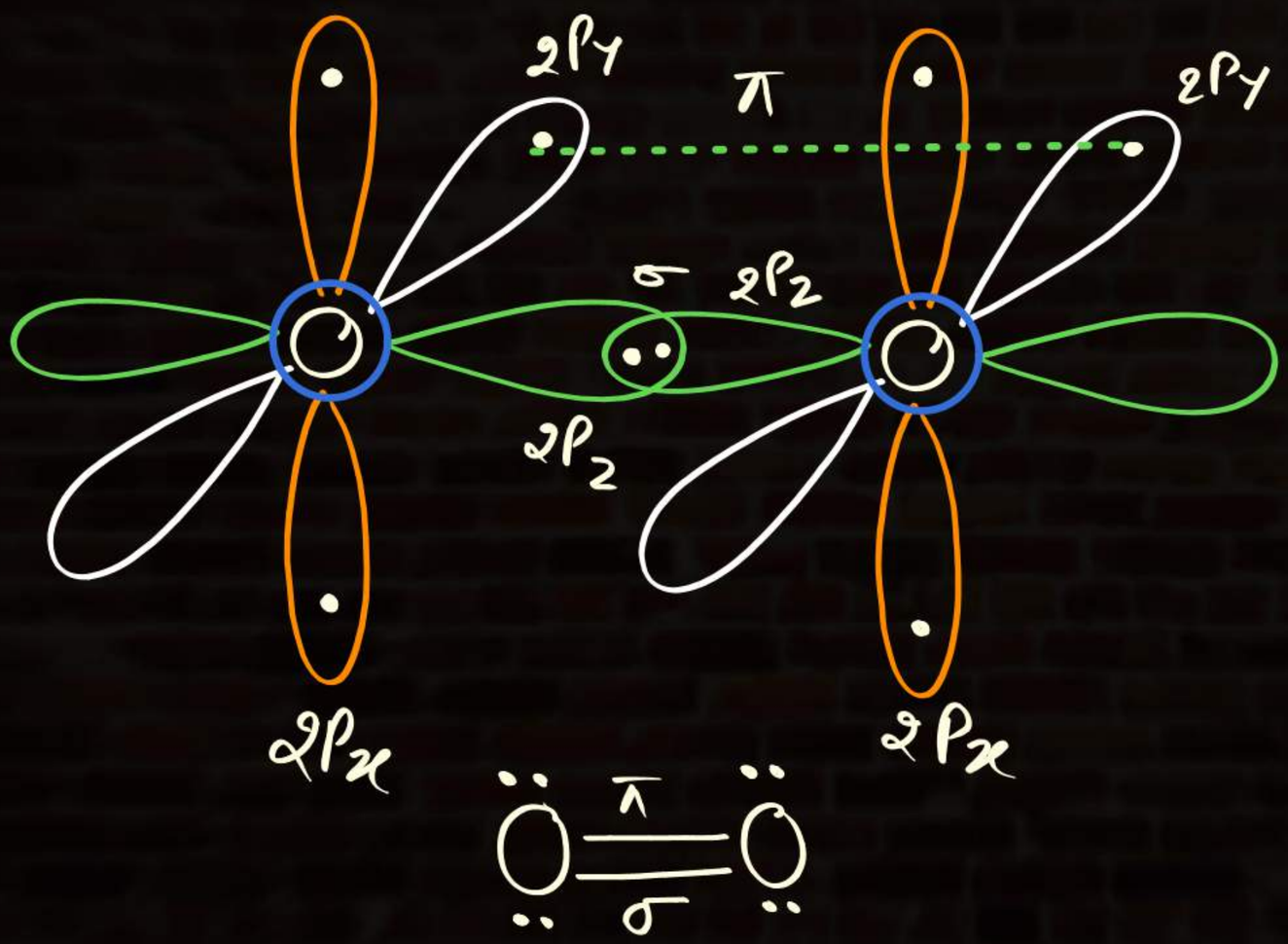
⑤ Max no C.V.B in B/w atom

$A \equiv B$ 1σ 2π

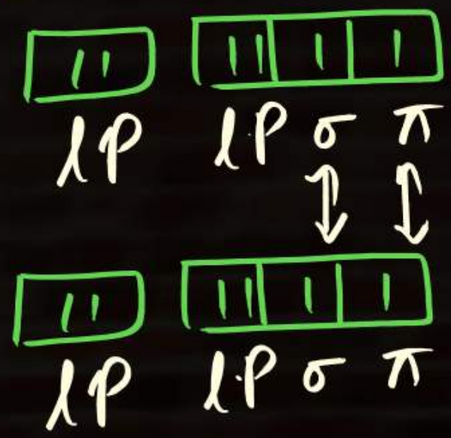
⑥ 1 axis = 1 Bond

Define the sigma and pi bond in given molecule :

O_2

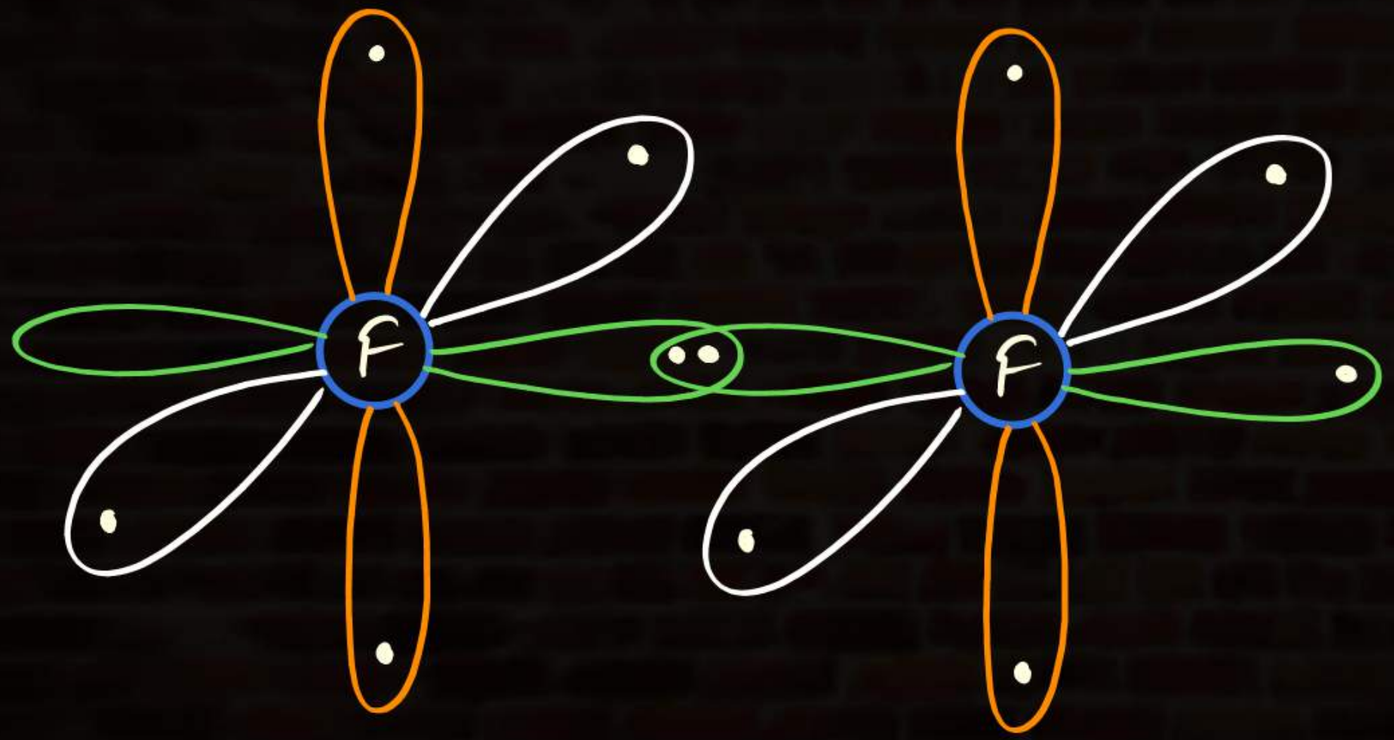


$O \rightarrow 1s^2, 2s^2 2p^4$

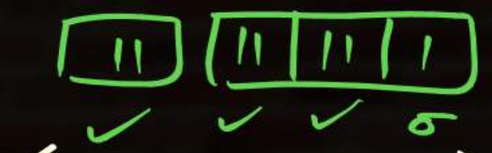


Define the sigma and pi bond in given molecule :

F_2



$F \rightarrow 1s^2 2s^2 2p^5$



V.S Orbital

Question

Order of strength σ, π and δ bond

A $\sigma > \pi > \delta$

B $\sigma < \pi < \delta$

C $\sigma < \pi > \delta$

D $\sigma > \delta > \pi$

Stability $\sigma > \pi$

Case I axial

⊕ $e^- e^-$ ⊕

$rep^n_1 \downarrow$

Stability ↑

$R_1 < R_2$

S.W

π

no of lobes → 2 from each orbital

e^-

⊕ ⊕

$rep^n_2 \uparrow$

e^-

Stability ↓

A — A
σ only ✓

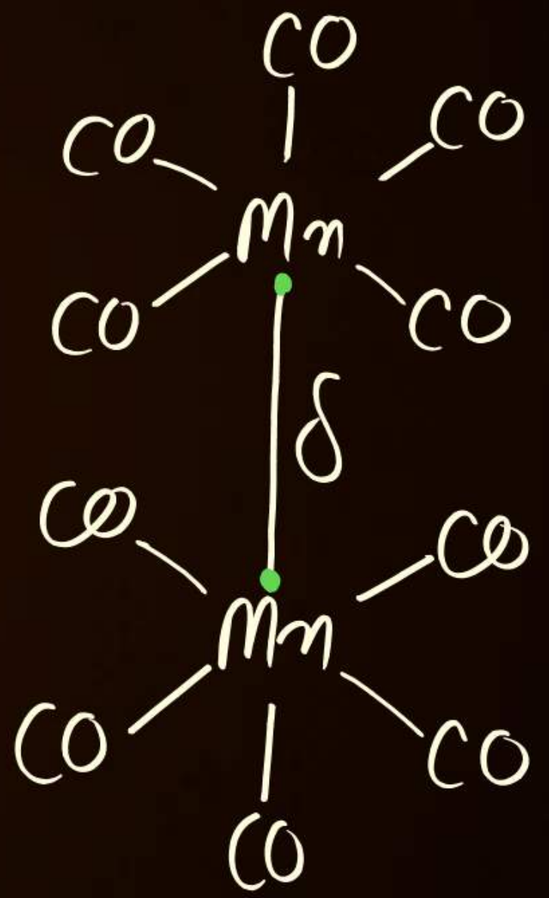
A — A
δ only ✓

A — A
π only ✗

σ > δ > π

In δ Bond
no of lobes → (4)
from each
orbital

$Mn_2(CO)_{10}$



Order of strength of overlapping :

(1) $2p\pi\text{-}2p\pi > 2p\pi\text{-}3d\pi$

4 5

Same rule for σ/π

(2) $2p\pi\text{-}3p\pi < 2p\pi\text{-}3d\pi$

5 5

Question

Choose the incorrect order of bond strength:

A $3p_\pi - 3p_\pi < 2p_\pi - 3d_\pi$

B $3p_\pi - 3p_\pi < 3d_\pi - 3d_\pi$

C $3p_\pi - 3d_\pi < 2p_\pi - 3d_\pi$

D $3p_\pi - 3d_\pi < 3p_\pi - 3p_\pi$

Question

Correct order of bond strength is:

A $1s - 1s > 1s - 2s > 2s - 2p$

2 3 4

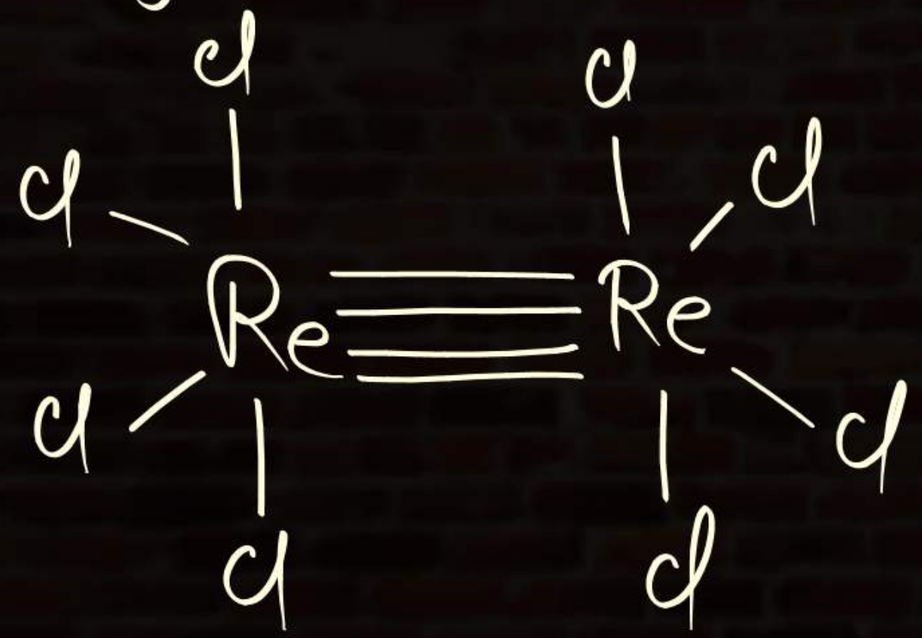
B $1s - 1s < 1s - 2s < 2s - 2p$

C $1s - 2s > 2s - 2p > 1s - 1s$

D None of the above

Molecule in which four covalent bonds are possible between two atoms is

$[Re_2Cl_8]^{2-}$



$1\sigma / 2\pi / 1\delta$

not in IIT

Question

$[Re_2Cl_8]^{-2}$ molecule has

A Only σ bond

B Only π bond

C Quadruple bond

D None of these

Question

The number and type of bonds between two carbon atoms in CaC_2 are

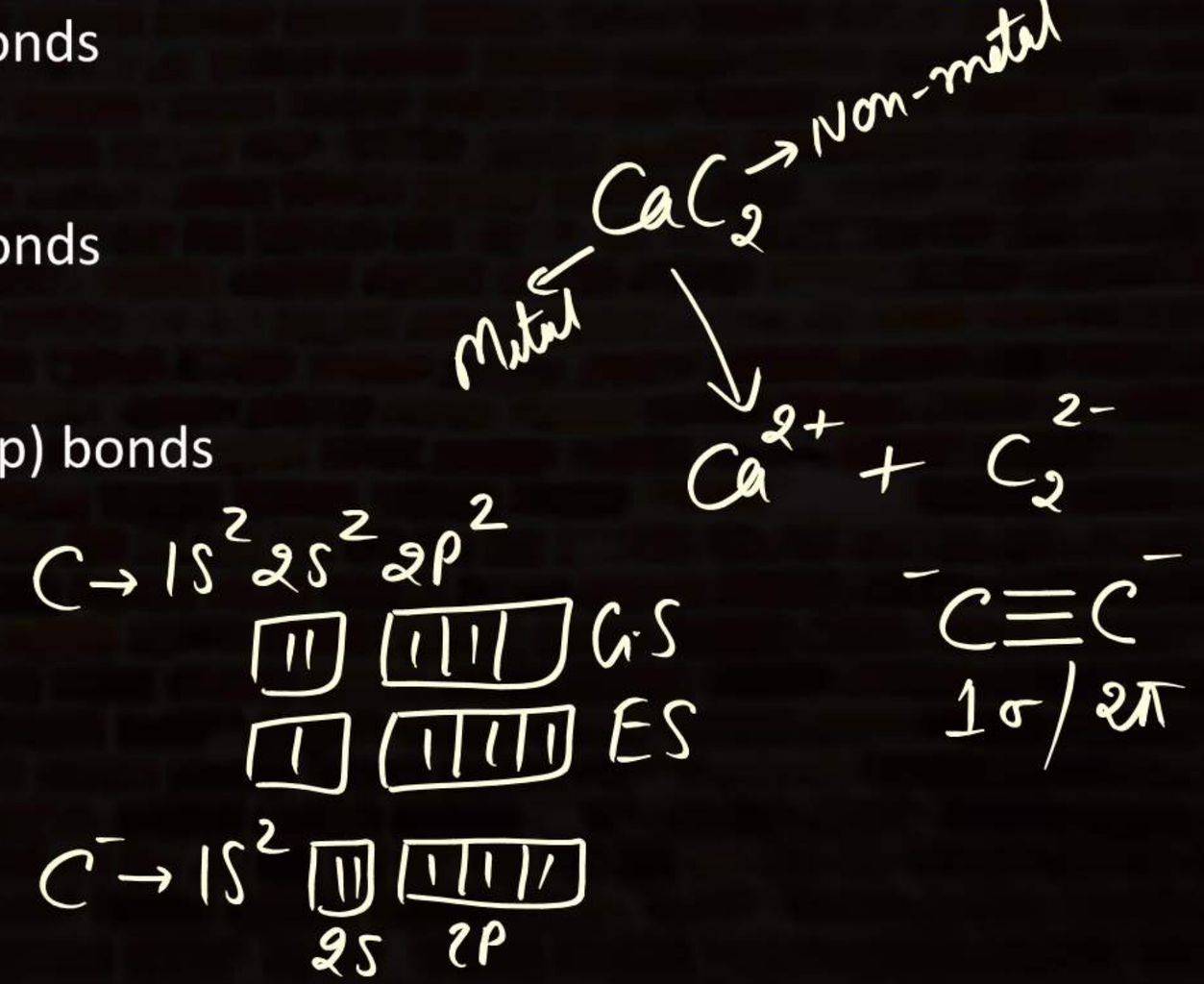
[IIT JEE 1996]

A one sigma (s) and one pi (p) bonds

B one sigma (s) and two pi (p) bonds

C one sigma (s) and one-half pi (p) bonds

D one sigma(s) bond



Question

Which of the following molecule(s) do/does not exists.

A N_2

B O_2

C P_2

D S_2

$N \equiv N$

$2p_\pi - 2p_\pi$

Strong Bond

$O = O$

$2p_\pi - 2p_\pi$

$P \equiv P$ $\quad P \rightarrow 3s^2 3p^3$

$3p_\pi - 3p_\pi$

Weak Bond

$S \equiv S$ $\quad S \rightarrow 3s^2 3p^4$

$3p_\pi - 3p_\pi$

Energy level $\quad 2p_\pi - 2p_\pi < 3p_\pi - 3p_\pi$

Stability $\quad >$

Predict the nature of bond :

	x	y	z
1. s-s			
$S + S$	σ	σ	σ
2. s-p			
$S + P_x$	σ	$\times$	$\times$
$S + P_y$	$\times$	σ	$\times$
$S + P_z$	$\times$	$\times$	σ

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