

VIDYAPEETH



BATCH CODE: 19-PJ301EA 2025

SUBJECT NAME: CHEMISTRY

CHAPTER NAME:

Chemical bonding and molecular structure

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Lecture No.

07

By – Swapnil Sir



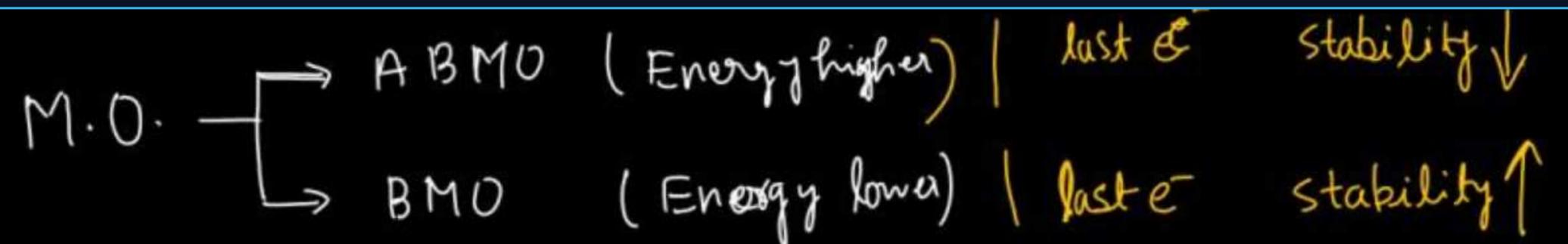
Today's Goal

Subtopic

- Molecular Orbital Theory
- Molecular Interactions
- Special Bonding
3c-2e Bonds

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homodiatomc molecule

$$Z \leq 7$$

$$Z \geq 8$$

as per carbon

heterodiatomc molecule

CO (Z ≤ 7)



$$(Z \geq 8)$$

intermixing almost over



NO^+ 3
 NO^- 2
 NO^{+2} 2.5
 NO^{-2} 1.5
 $O=8$

σ_{1s}^2 σ_{1s}^{*2} σ_{2s}^2 σ_{2s}^{*2} $\sigma_{2p_z}^2$ $\pi_{2p_x}^{1+1}$ $\pi_{2p_x}^{*2}$ $\pi_{2p_y}^{1+1}$ $\pi_{2p_y}^{*2}$ $\sigma_{2p_z}^*$

CO $6+8=14$

σ_{1s}^2 σ_{1s}^{*2} σ_{2s}^2 σ_{2s}^{*2} $\sigma_{2p_z}^2$ $\pi_{2p_x}^2$ $\pi_{2p_y}^2$

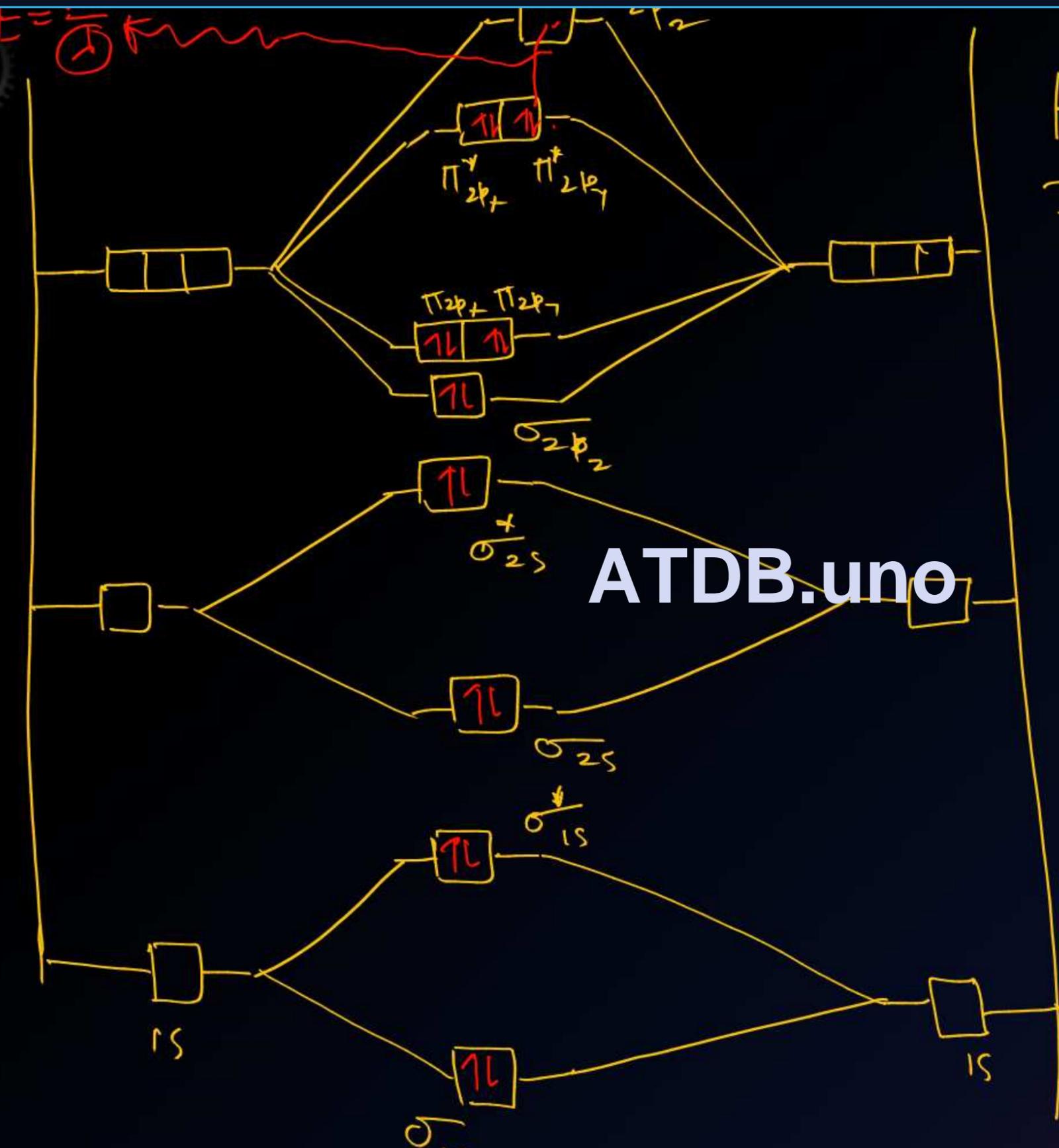
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$\pi_{2p_x}^*$ $\sigma_{2p_z}^*$ $\frac{10-4}{2} = 3$

Note
 CO \oplus
 $3 \cdot 5$

exceptional

σ_{1s}^2 σ_{1s}^{*2} σ_{2s}^2 σ_{2s}^{*2} $\sigma_{2p_z}^2$ $\pi_{2p_x}^2$ $\pi_{2p_y}^2$ $\sigma_{2p_z}^*$

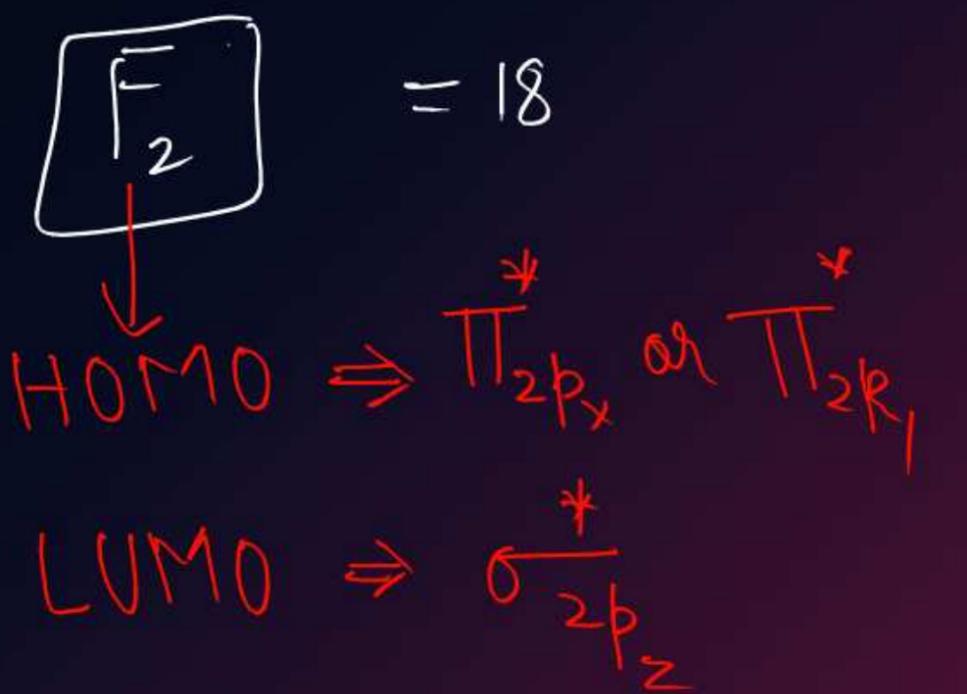


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HOMO-LUMO

Highest Occupied molecular orbital

Lowest Unoccupied molecular orbital



Special Bonding \Rightarrow

H-Bonding

Hydrogen bonding



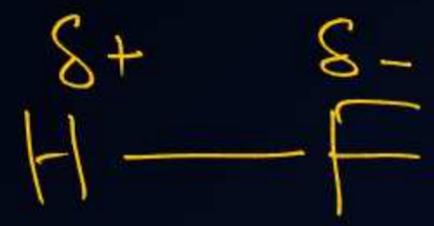
Hydrogen Bonding

Intermolecular H-Bonding

Intramolecular H-Bonding

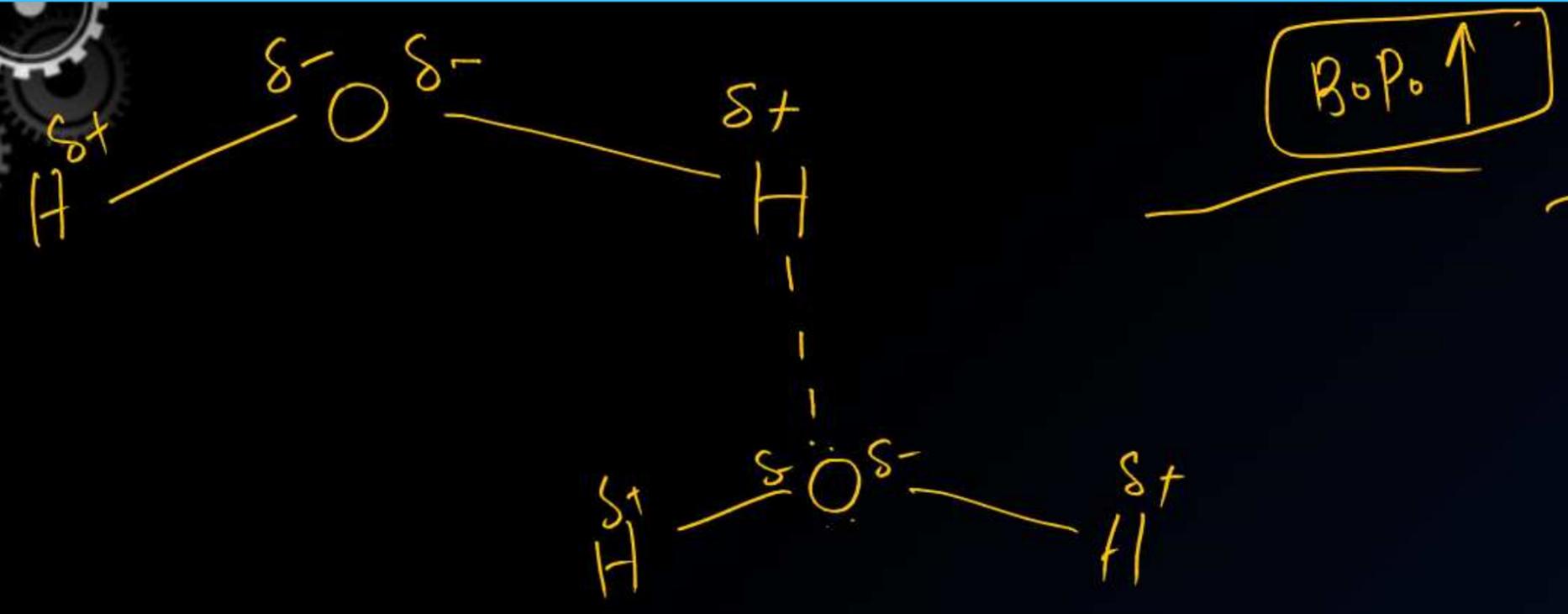
dipole moment
 $= q \times l$

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formation of a dipole



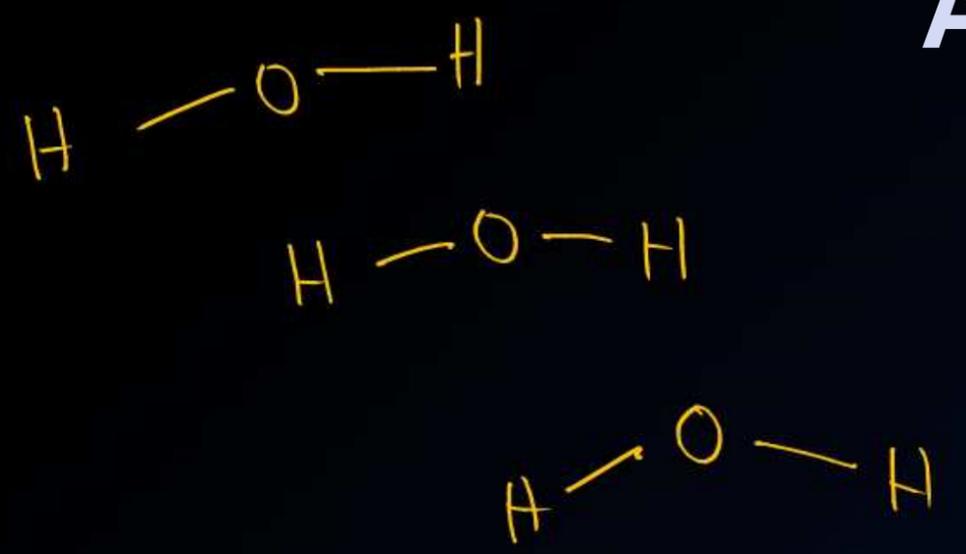


$B_o P_o \uparrow$

H_2O	liq.
H_2S	(g)
H_2Se	
H_2Te	

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factors affecting strength of H-bond

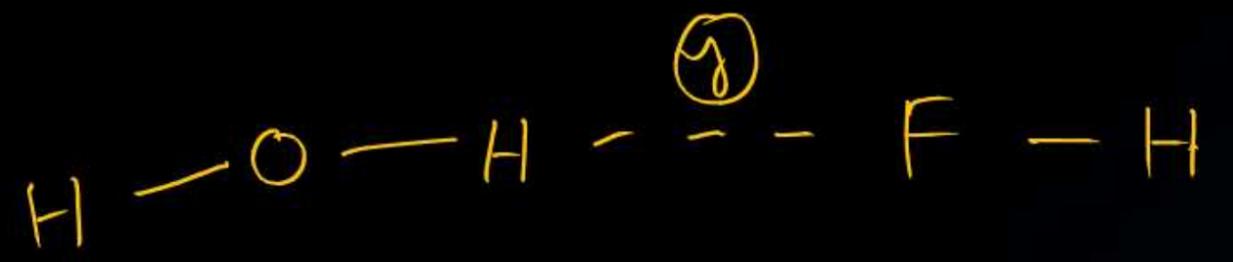


→ (1) Partial +ve charge on H-atom

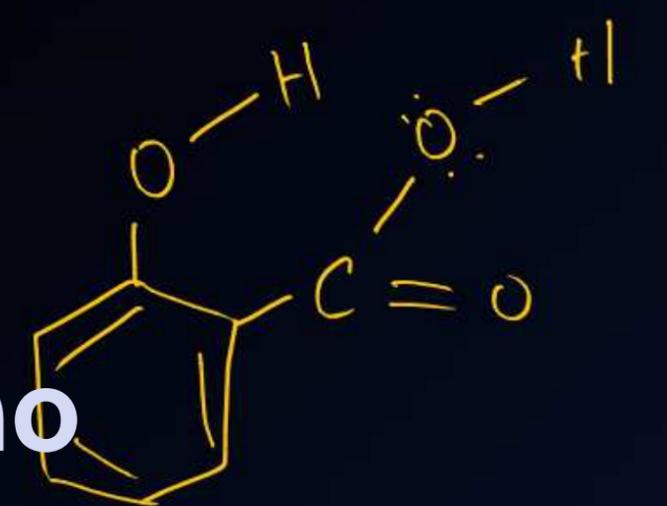
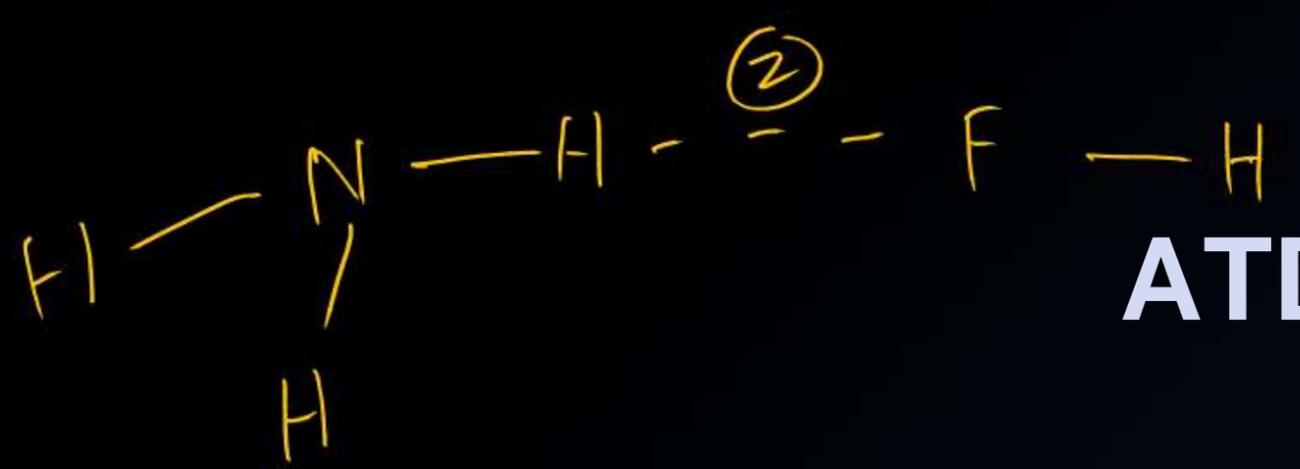
→ (2) Polarisability of EN atom



$x > y > z$



Intramolecular H-bonding



intra

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Molecular Interactions

Ion - ion

Ion - dipole

dipole - dipole

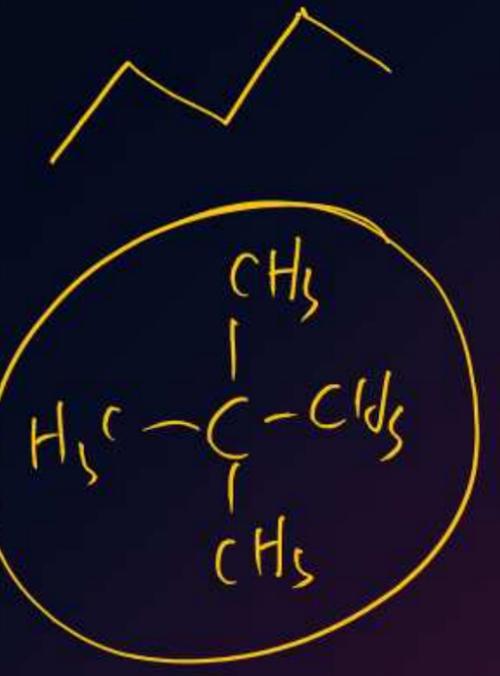
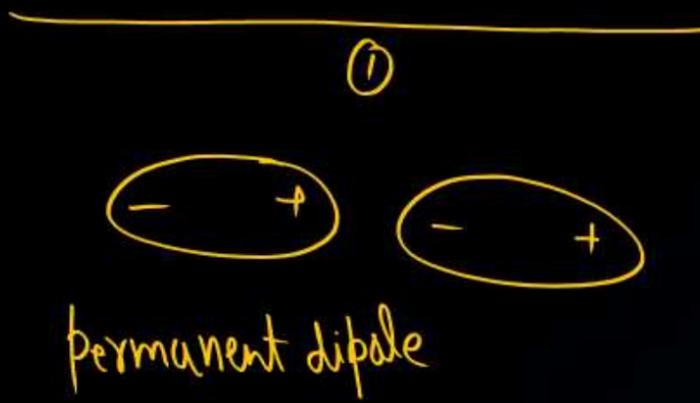
Hydrogen bonding

Van-der-Wall interaction

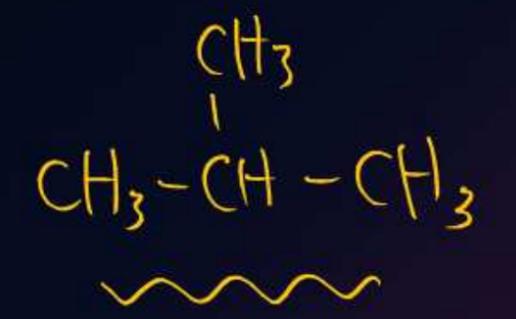
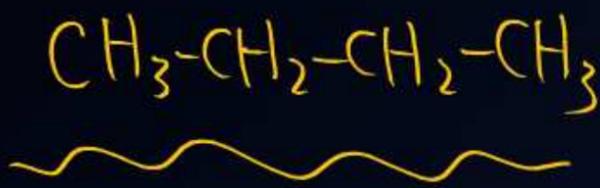
dipole - dipole

dipole - induced dipole

Dispersion force
{ London forces }



Factors →
①



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Energy - distance Relationship



① Ionic Bond

$$\frac{1}{r}$$

② Ion-dipole

$$\frac{1}{r^2}$$

③ dipole-dipole

$$\frac{1}{r^3}$$

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④ ion-induced dipole

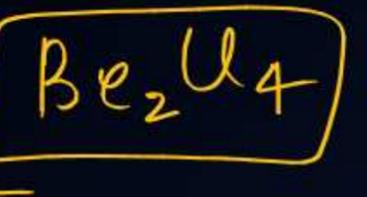
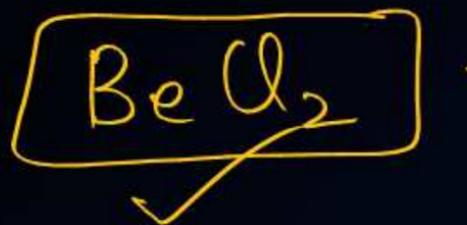
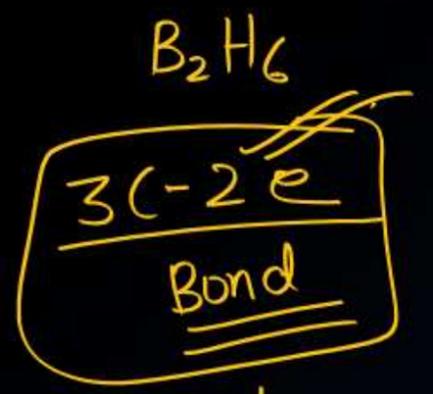
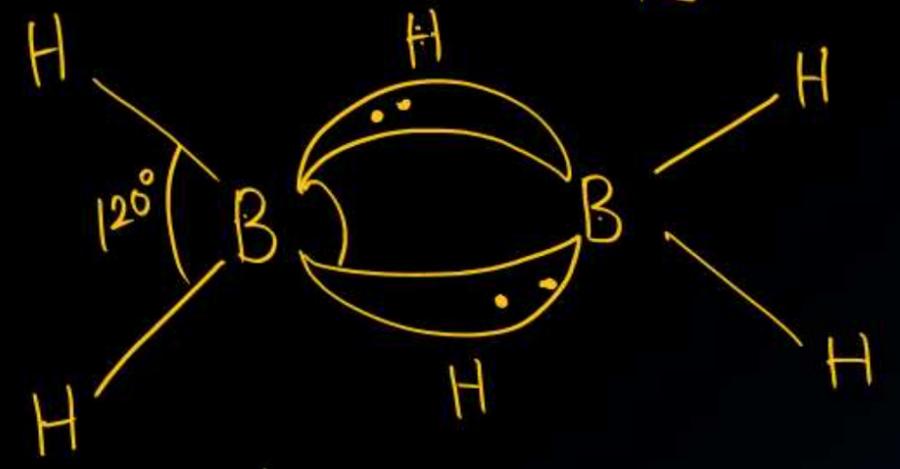
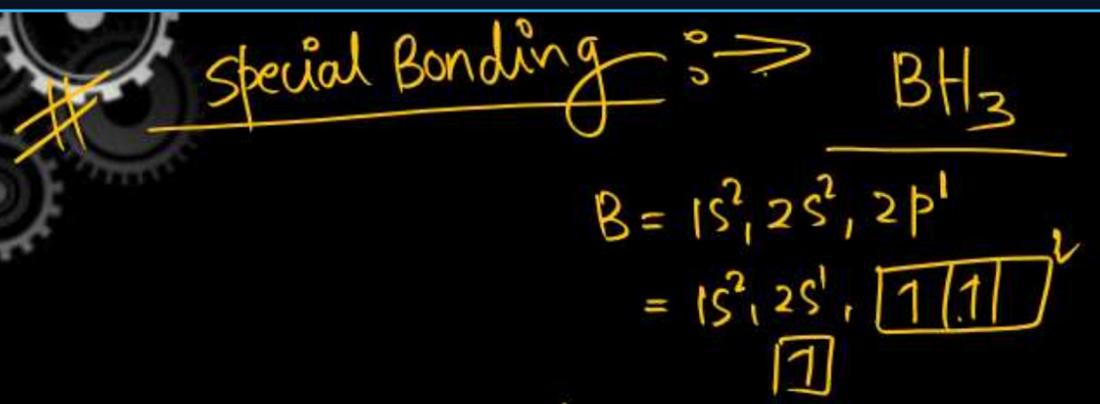
$$\frac{1}{r^4}$$

⑤ dipole-induced dipole

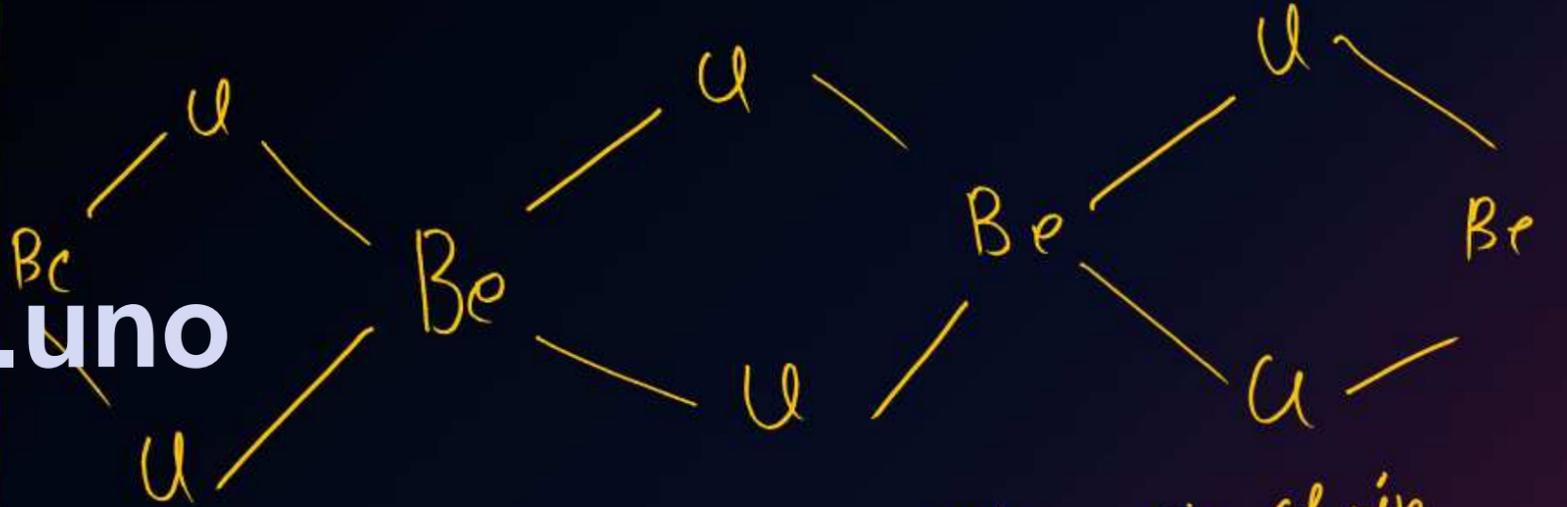
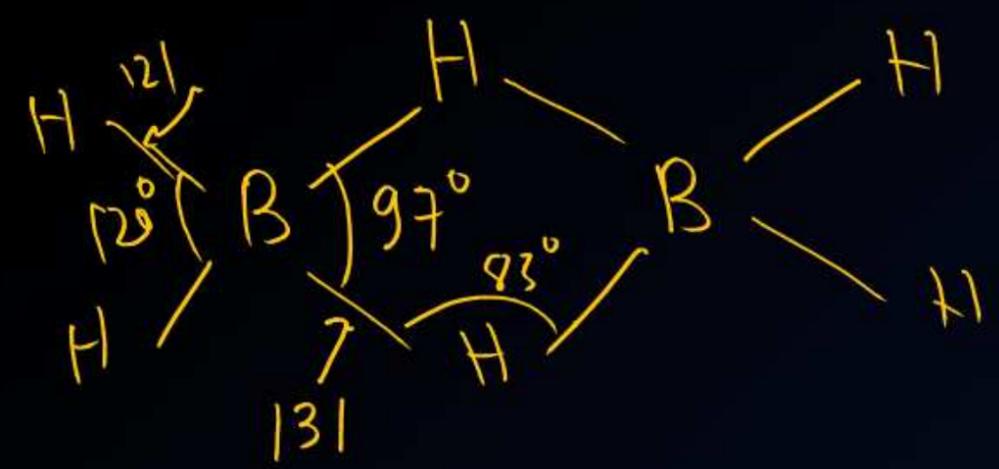
$$\frac{1}{r^6}$$

⑥ London dispersion

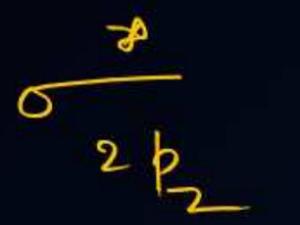
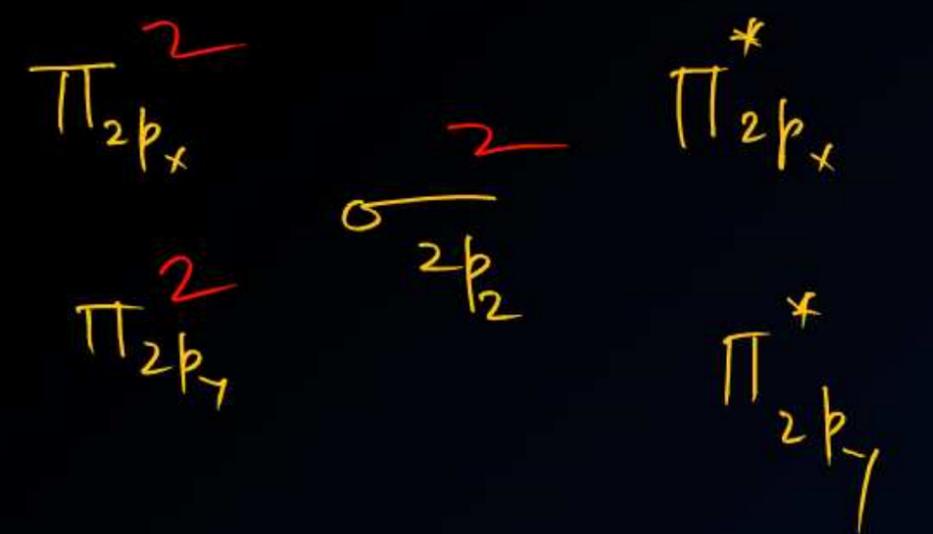
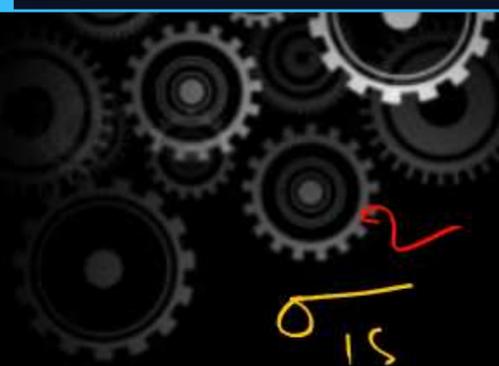
$$\frac{1}{r^6}$$



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$3C - 4e$
bond
 Polymeric chain \Rightarrow



O₂

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HOMO = σ_{2p_z}

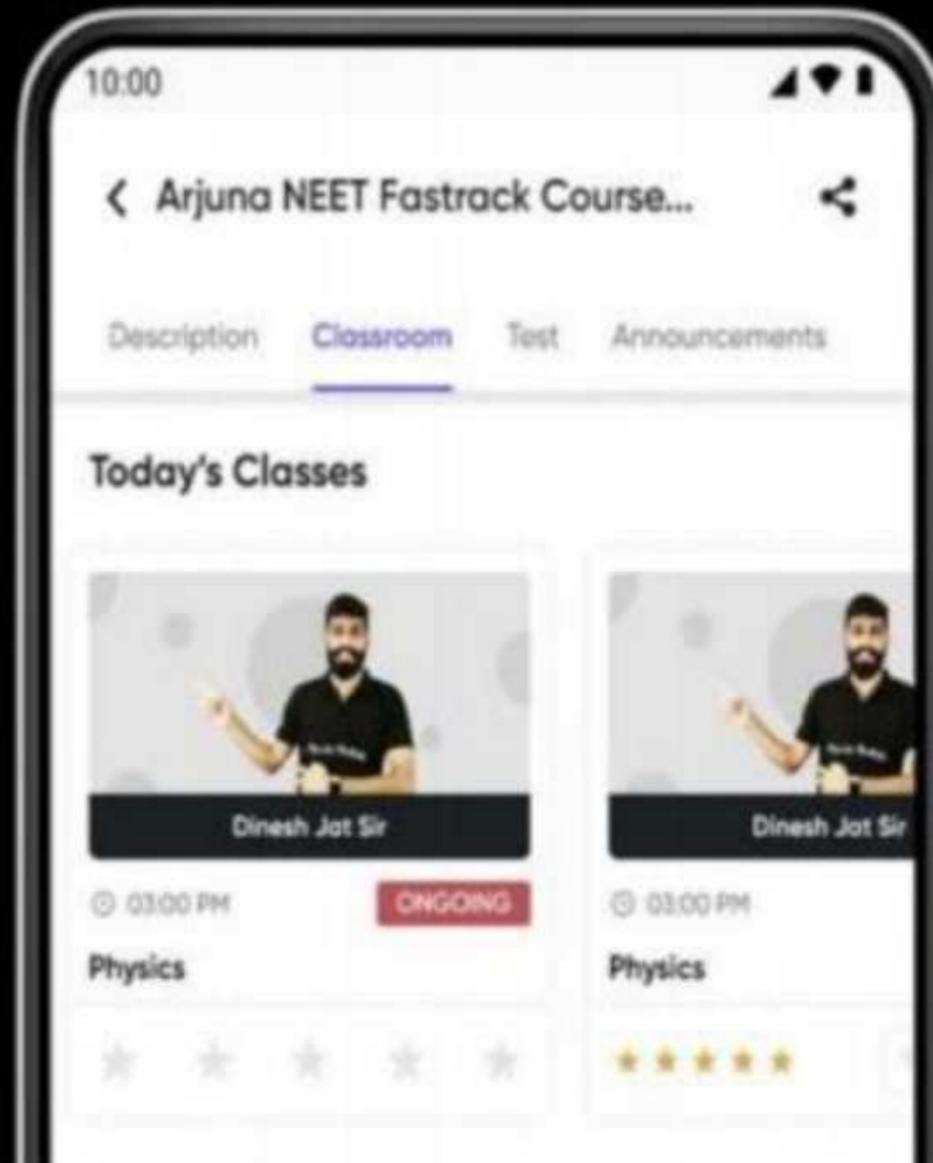
LUMO = $\pi_{2p_x}^*$
 or $\pi_{2p_y}^*$



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Solve the DPP and check Solution



"SCAN" to join our "TELEGRAM" channel

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WORK, POWER AND ENERGY

DPP-1 (JAP/046)

[Introduction, Definition of work, work done by constant force, Area under force-displacement curve]

<p>1. A particle moves from position $\vec{x} = 3\hat{i} + 2\hat{j} - 6\hat{k}$ to position $\vec{x} = 14\hat{i} + 13\hat{j} + 9\hat{k}$ under the action of force $-4\hat{i} + \hat{j} + 3\hat{k}$ N. The work done by this force will be</p> <p>(A) 100 J (B) 50 J</p>	<p>(A) 8×10^{-2} joules (B) 16×10^{-2} joules (C) 4×10^{-2} joules</p>
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Thank You!!!!

Check your performance through Student Dashboard



#	<u>VBT</u> Hydr <u>VSEPR</u>	MOT	Interaction	Special Bond
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