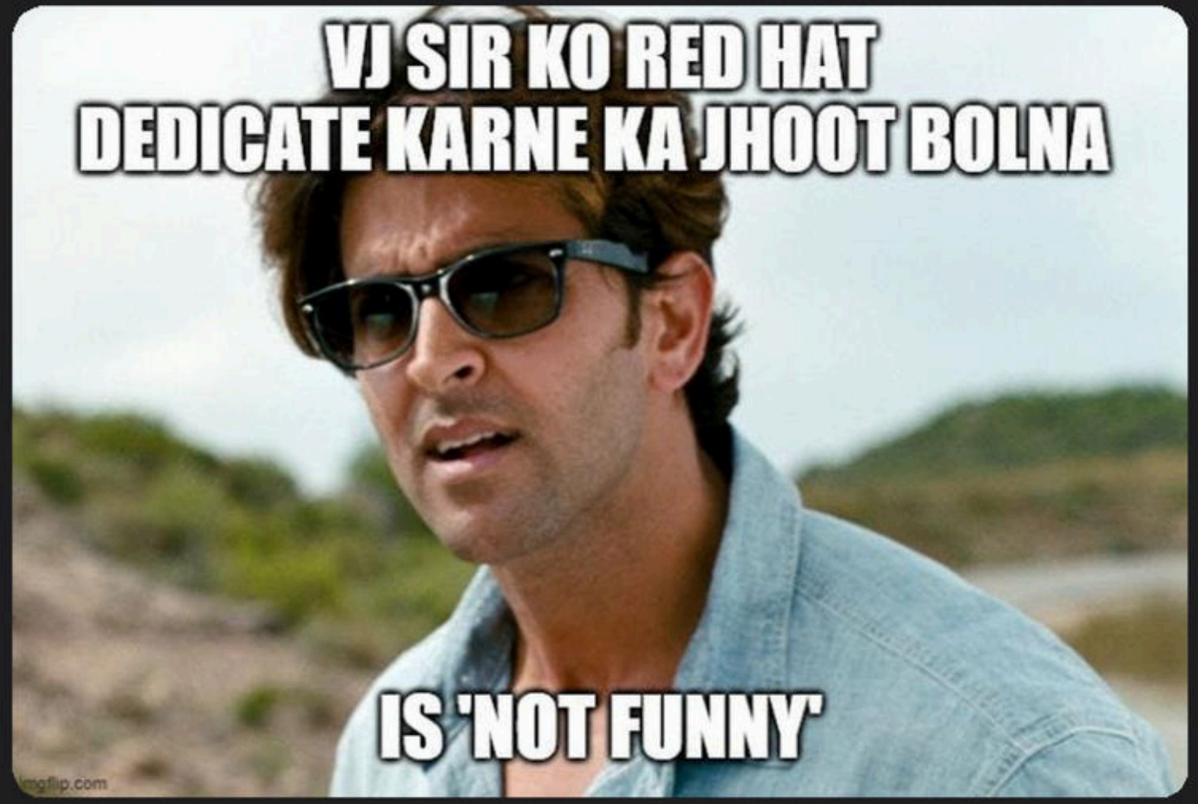
Hypovalent, Hypervalent and type of Lewis Acid and Doubt Clearing Session

Course on Chemical Bonding for Class XI 2023

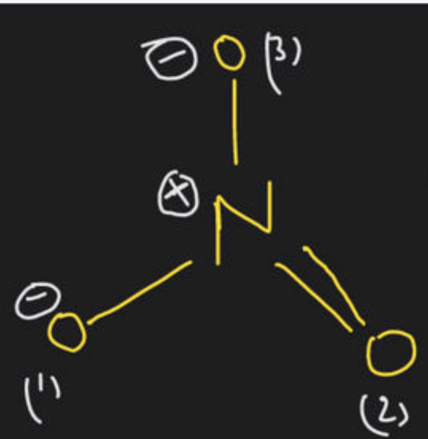
Vishal joshi • Lesson 4 • Aug 19, 2021

Question
from Mehul

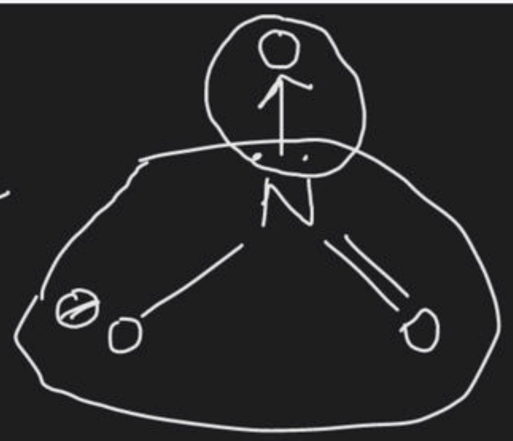
Love you 3000 sir



NO_3^-



or



$x_1 = 5 + 3 \times 6 + 1$

$= 24$

$x_2 = 8 \times 4 = 32$

$x_3 = 32 - 24 = 8$

$\frac{8}{2} = 4$ [number of bonds]

$x_4 = x_1 - x_3$

$24 - 8 = 16$

$\frac{16}{2} = 8$ [no of l.p]

f.c on $\overset{O}{(1)} = 6 - \frac{2}{2} - 6$

$= -1$

f.c on $\overset{O}{(2)} = 6 - \frac{4}{2} - 4 = 0$

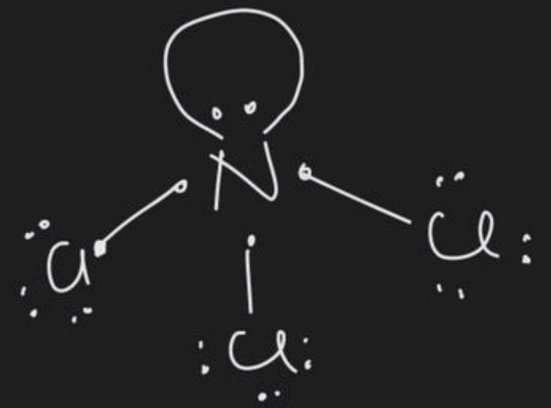
f.c on $\overset{O}{(3)} = 6 - \frac{2}{2} - 6 = -1$

f.c on $N = 5 - \frac{8}{2} - 0 = 1$

total val. e⁻

2	3	4	5	6	7	8
Be	B	C	N	O	F	Ne

NCl_3

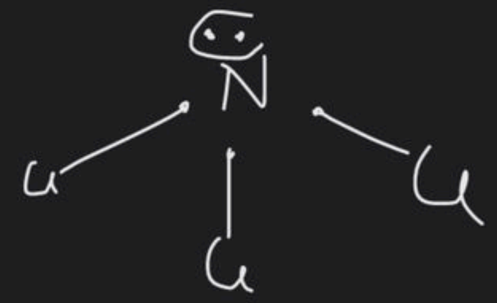


1 (one) l.p on N

3 bond pair

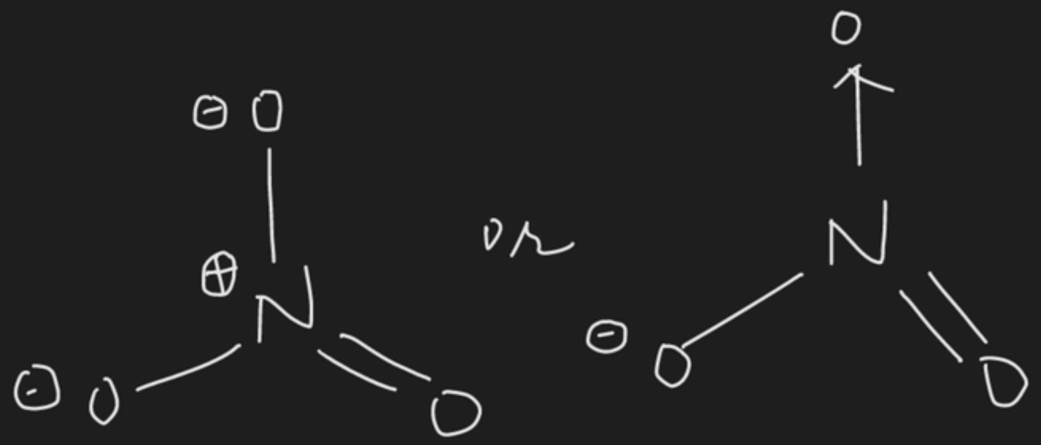
l.p : two e^- collectively called lone pair

NCl$_3$ find the number of l.p on N atom



Ans = 1

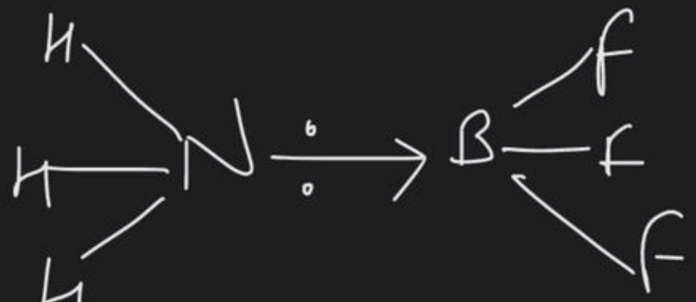
NO_3^-



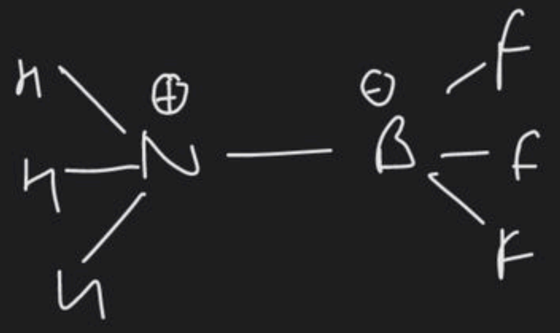
or

Co-ordinate bond

- σ – Co-ordinate
- π – Co-ordinate



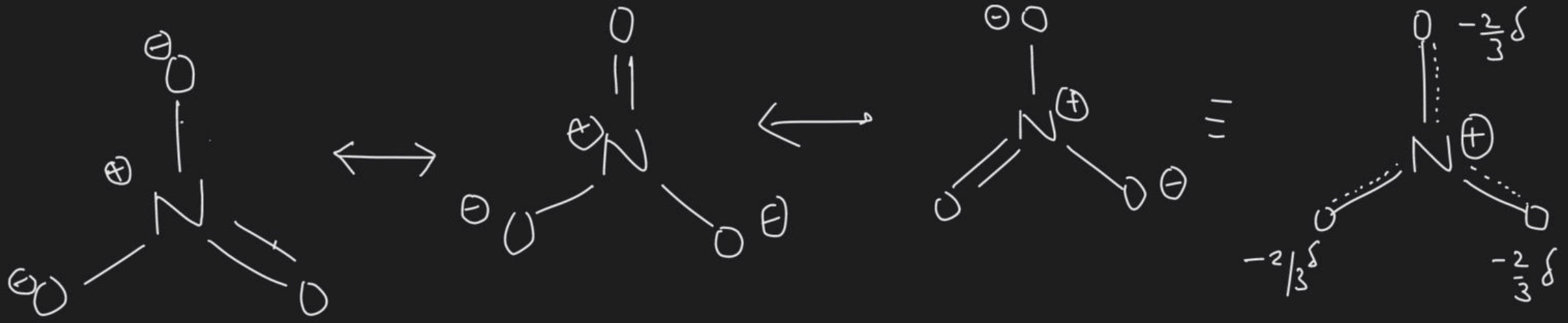
or



or

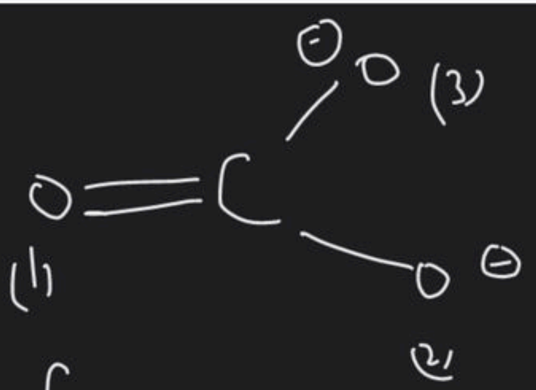
σ = 1

π = 2



$$B.O = \frac{4}{3} = 1.33$$

CO_3^{-2}



B.O = 1.33

$n_1 = 4 + 3\times 6 + 2$

$= 24$

$n_2 = 8 \times 4 = 32$

$n_3 = 32 - 24 = 8$

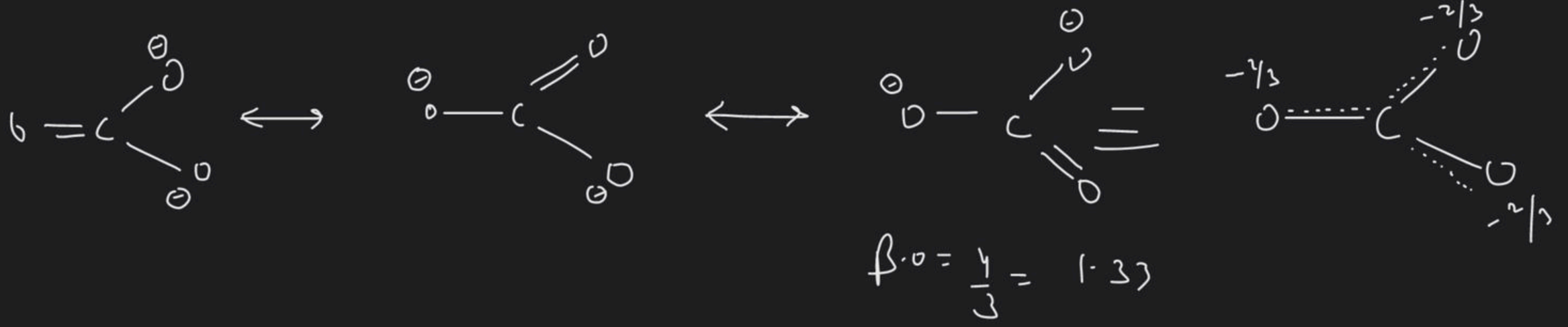
$\frac{8}{2} = 4$ [no π bonds]

$n_4 = 24 - 8 = 16$

$\frac{16}{2} = 8$ [l.p]

f.c on $O_{(1)} = 6 - \frac{4}{2} - 4 = 0$

f.c on $O_{(3)} = 6 - \frac{2}{2} - 6 = -1$



$$B.O = \frac{4}{3} = 1.33$$

Correct order of C–O B.L in

$O = C = O$

(1) $CO_2 > CO > CO_3^{-2}$

(2) $CO_3^{-2} > CO > CO_2$

(3) $CO_3^{-2} > CO_2 > CO$

(4) $CO > CO_2 > CO_3^{-2}$

B.O ↑ att ↑ B.L ↓

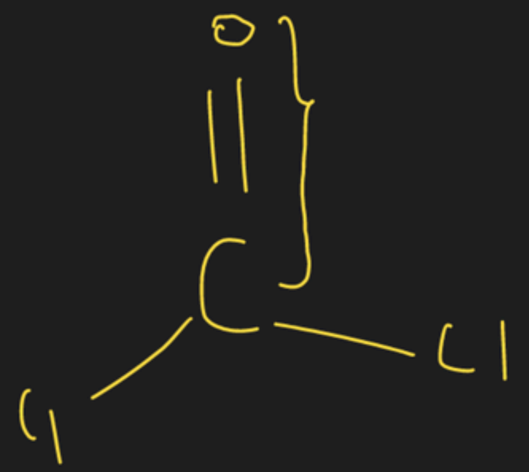
CO_3^{-2} B.O = 1.33

CO_2 B.O = 2

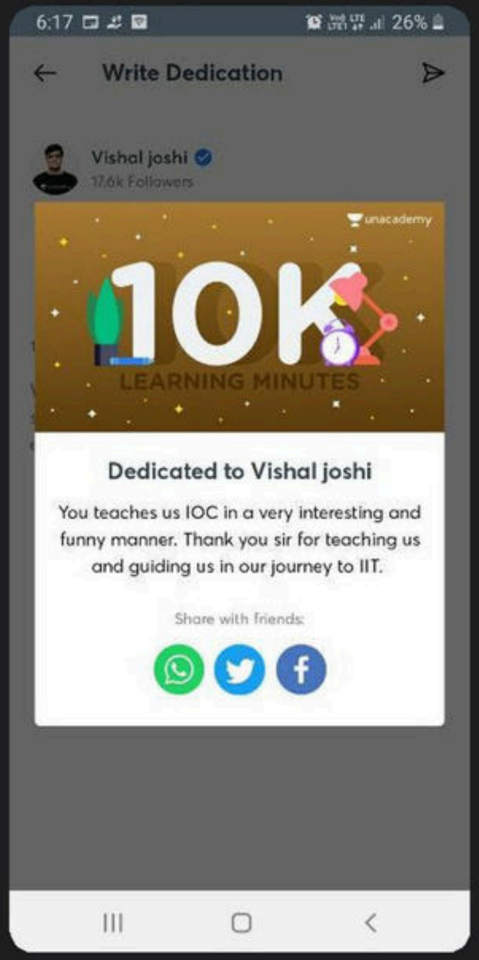
CO B.O = 3

CO_2

O=C=O

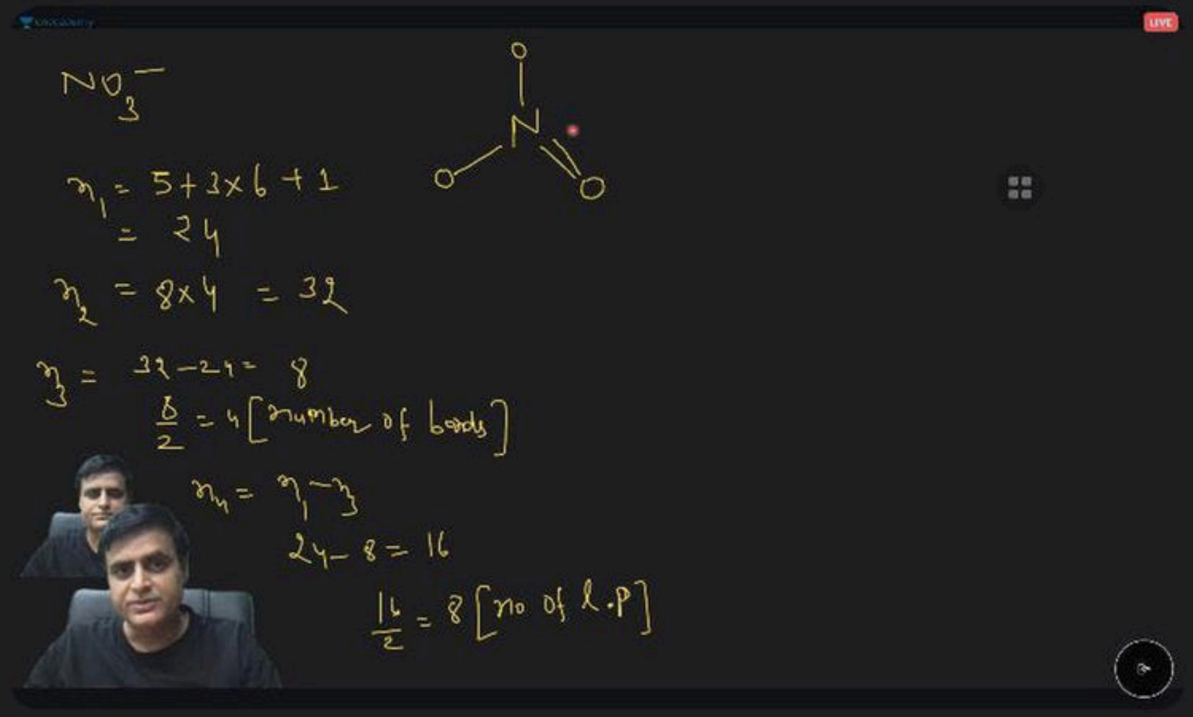


Question
from Yash



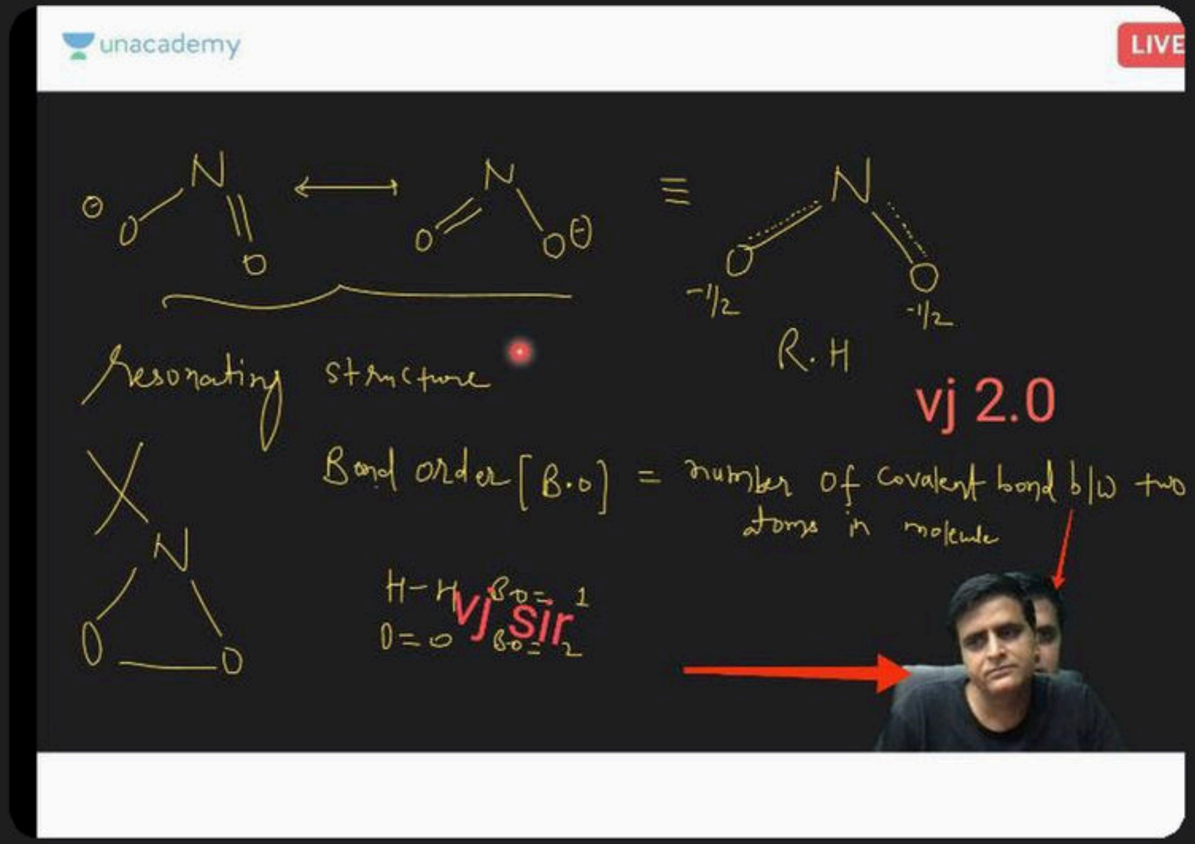
Question

from Rachittiwa...

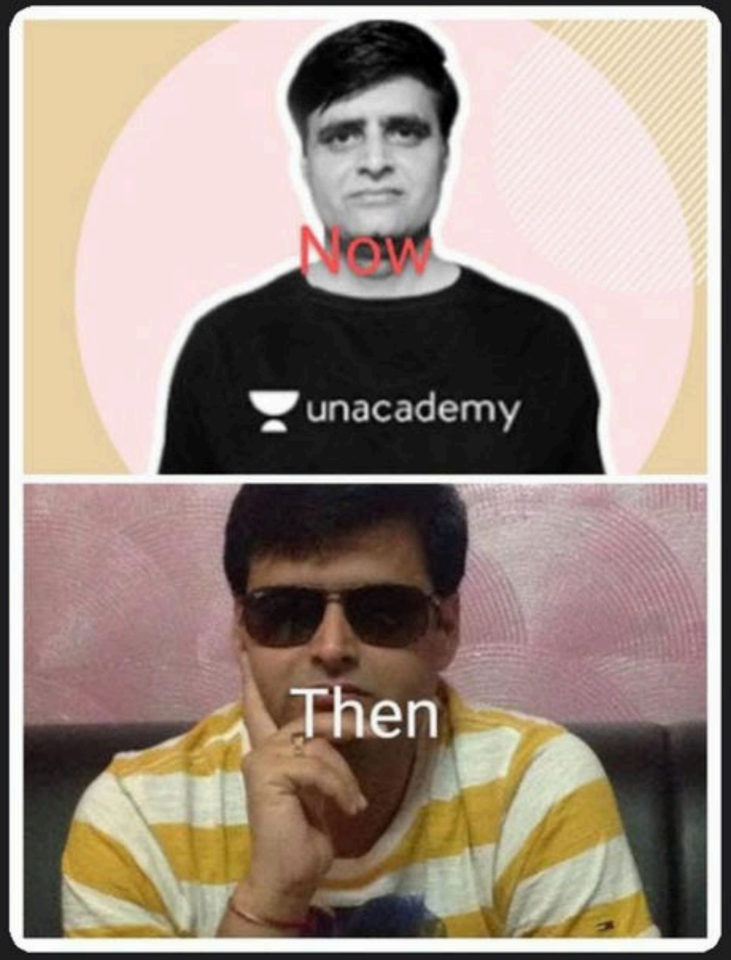


Question
from Alokyadav

Vj 2.0 sir



Question
from Ankit



CO

$n_1 = 4 + 6 = 10$

$n_2 = 8 \times 2 = 16$

$n_3 = 16 - 10 = 6$

$\frac{6}{2} = 3$ [number of bonds]

$n_4 = n_1 - n_3 \quad 10 - 6 = 4$

$\frac{4}{2} = 2$ [l.p]

f.c on C $= 4 - \frac{6}{2} - 2 = -1$

f.c on O $= 6 - \frac{6}{2} - 2 = +1$

Unshared e^- (v) $= 8 -$ (Shared e^-)

Resonance

=	=
=	l.p
=	-ive
=	≡

Que N–O B.L, Correct order

(i) NO_2^- > NO_3^- (ii) NO_3^- > NO_2^- (iii) NO_3^- = NO_2^- (iv) none

NO_2^- B.O = 1.5

NO_3^- B.O = 1.33

B.O ↑ B.L ↓

Hypo val. :⟶ molecule in which central atom (C.A) has less than 8 e^-

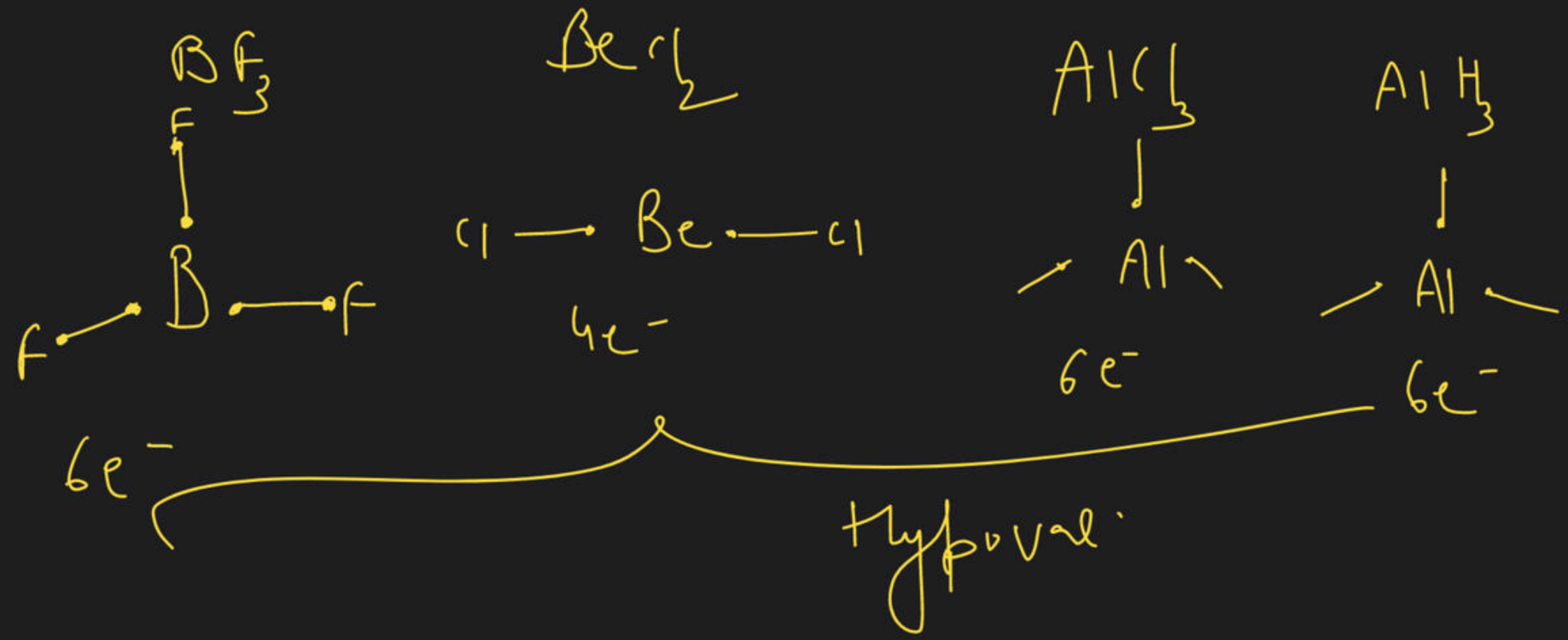
(Super octet)
Hyper val. :⟶ molecule in which Central atom ((.A) has more than 8 e^-

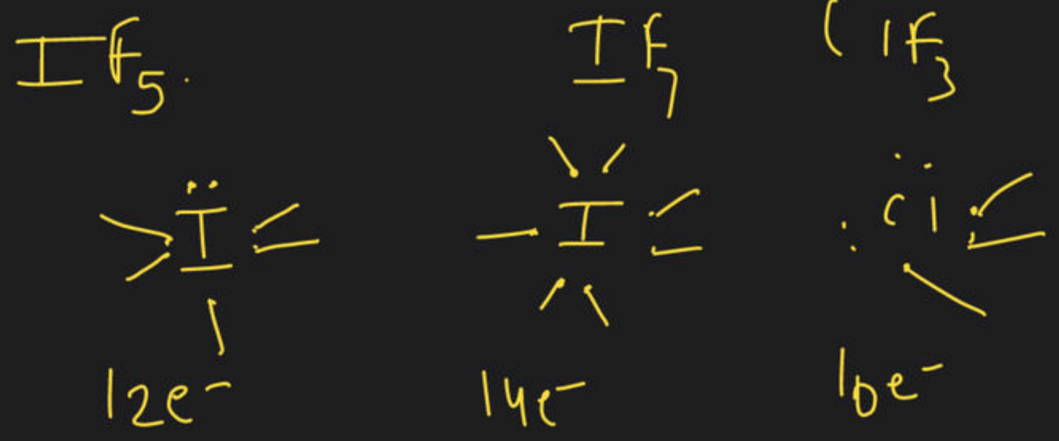
Total val. e^-	2	3	4	5	6	7	8
	Be	B	C	N	O	F	Ne

AlF_3 ⟶ Ionic

Al^{+13} $1s^2 2(s^2 2p^6)$ — 8e⁻

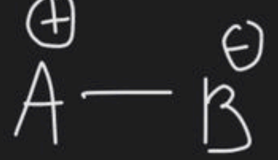
$+ 3F^{-\theta}$ $1s^2 2(s^2 2p^6)$ — 8e⁻


BF3
F
B
F
F
BeCl2
Cl
Be
Cl
4e⁻
AlCl3
Al
6e⁻
AlH3
Al
6e⁻
6e⁻
Hypoval.


IF5
I
12e⁻
IF7
I
14e⁻
ClF3
Cl
10e⁻

Co-ordinate bond = it is formed by unequal sharing

or



Simple Covalent bond

Co-ordinate [unequal sharing]

or