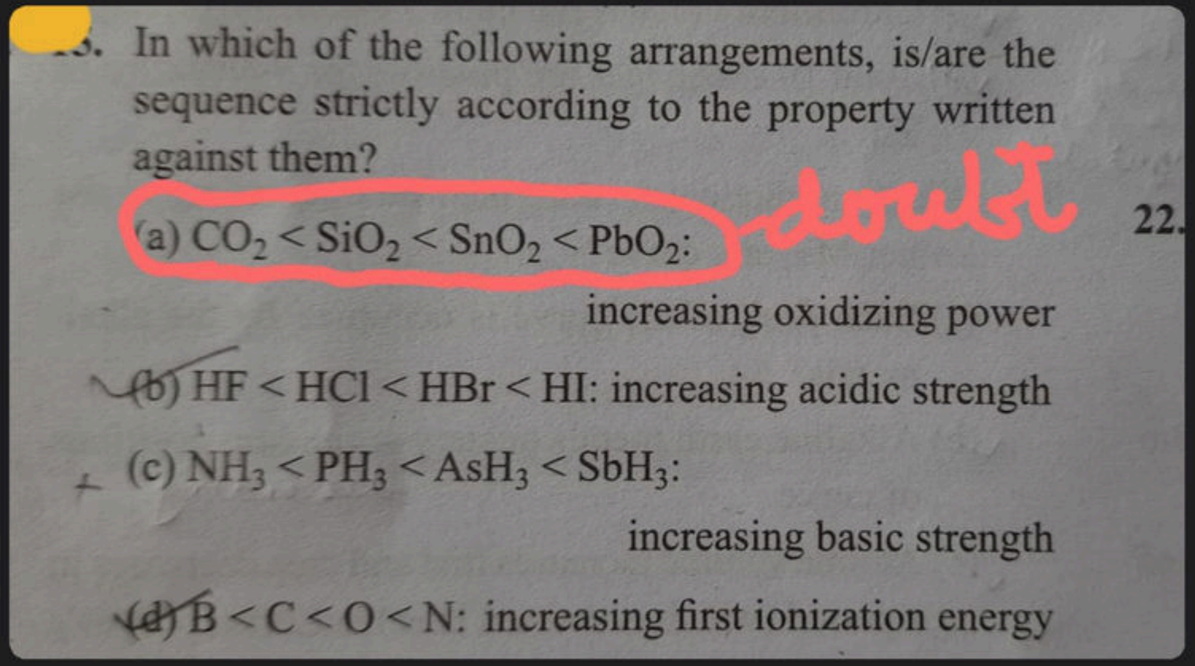
# Lewis Structures

Course on Chemical Bonding for Class XI 2023

**Vishal joshi** • Lesson 3 • Aug 17, 2021

**Question**
from tanishqa



13. In which of the following arrangements, is/are the sequence strictly according to the property written against them?

(a) $CO_2 < SiO_2 < SnO_2 < PbO_2$: increasing oxidizing power

(b) $HF < HCl < HBr < HI$: increasing acidic strength

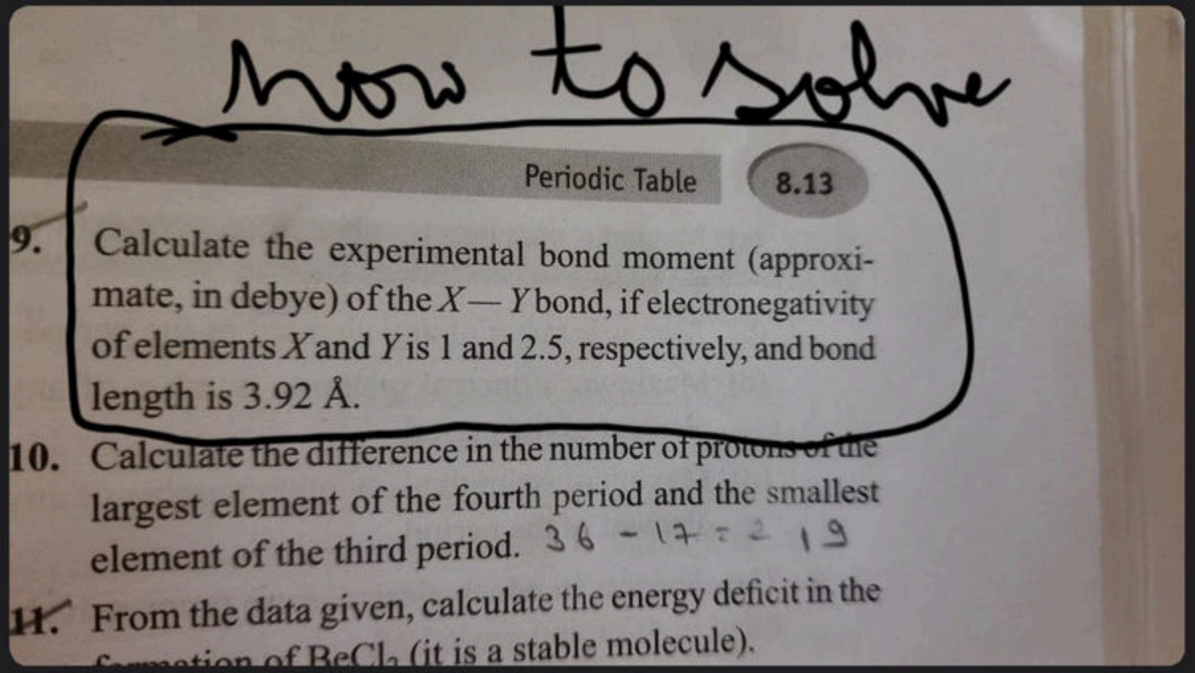
(c) $NH_3 < PH_3 < AsH_3 < SbH_3$: increasing basic strength

(d) $B < C < O < N$: increasing first ionization energy

doubt

22.

## Question
from tanishqa



## Question
from Prasad

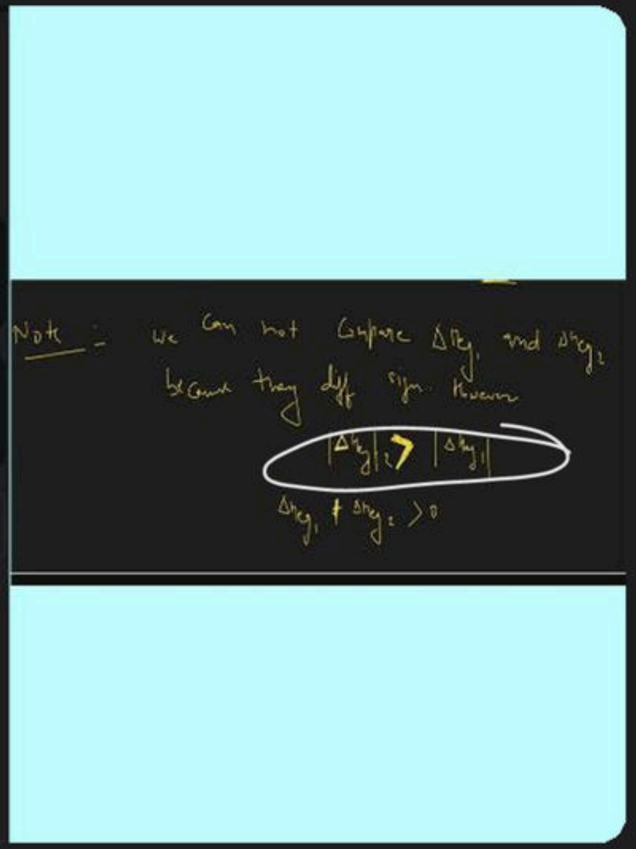
Find the number of elements having lower $EA_2$ than $EA_1$ of Cl.

O, S, P, I, As, Si, Al, Li, K

6
YOUR ANSWER

9
CORRECT ANSWER

Save | Hide Solution

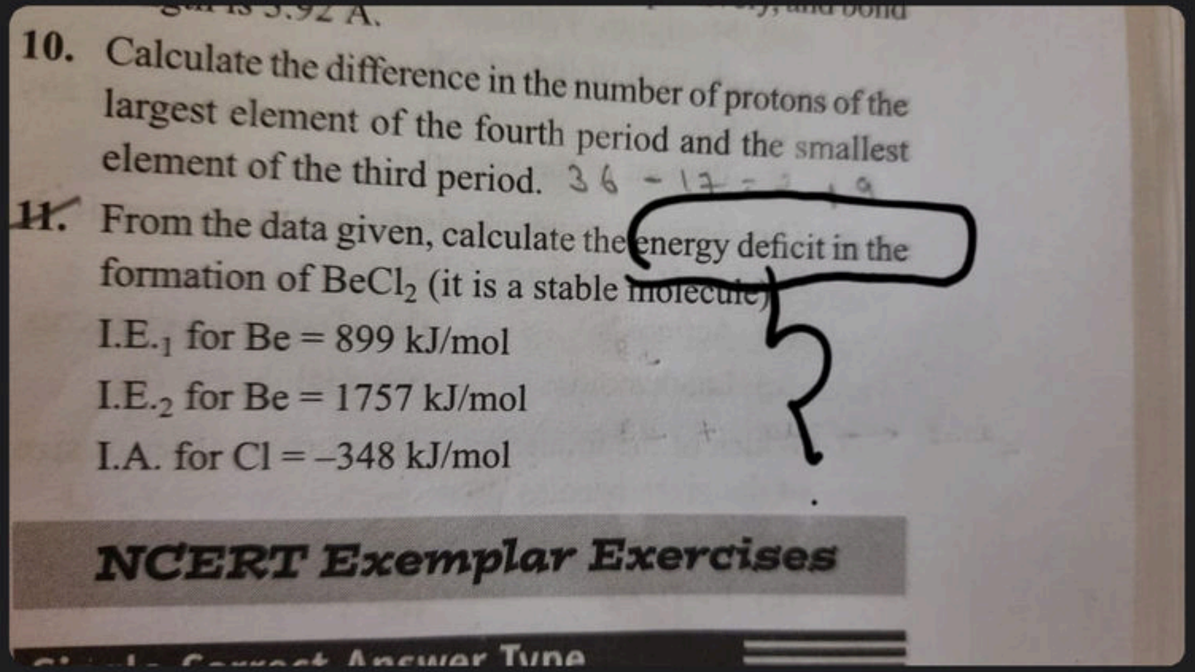



### Solution

$EA_1$ is higher as compared to $EA_2$ for all the elements in periodic table.

PERIODIC TABLE AND ITS PROPERTIES

## Question
from tanishqa



10. Calculate the difference in the number of protons of the largest element of the fourth period and the smallest element of the third period.

11. From the data given, calculate the energy deficit in the formation of $BeCl_2$ (it is a stable molecule)

I.E.$_1$ for Be = 899 kJ/mol

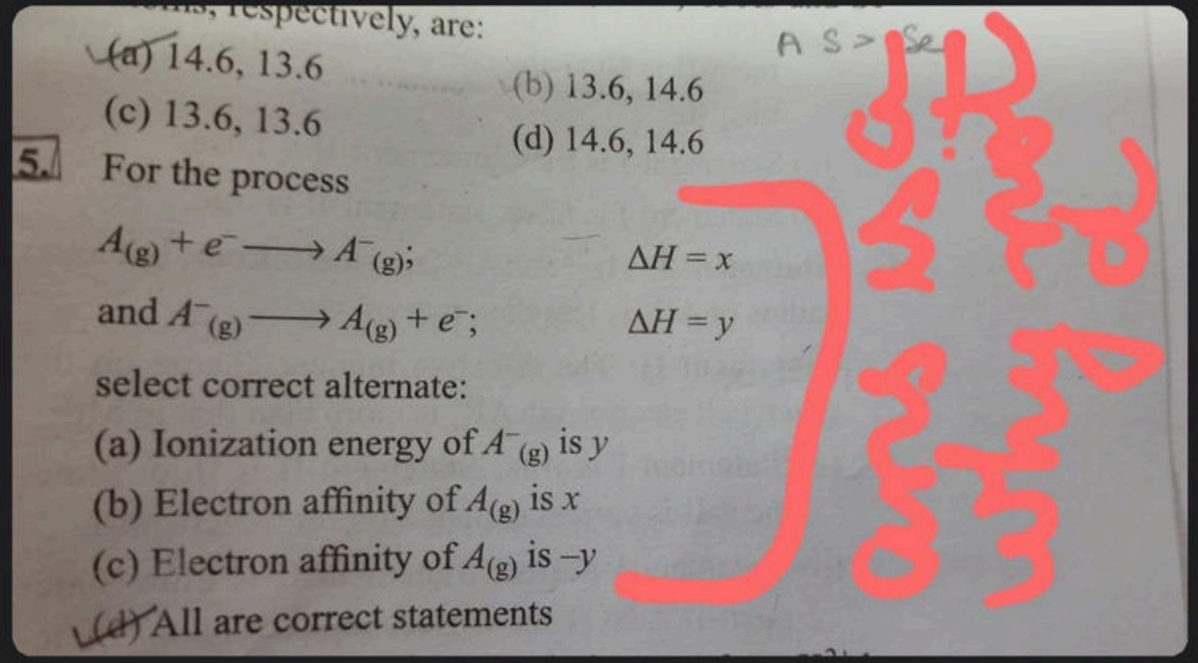
I.E.$_2$ for Be = 1757 kJ/mol

I.A. for Cl = –348 kJ/mol

**NCERT Exemplar Exercises**

## Question

from tanishqa



...respectively, are:

(a) 14.6, 13.6 (b) 13.6, 14.6

(c) 13.6, 13.6 (d) 14.6, 14.6

5. For the process

$A_{(g)} + e^- \longrightarrow A^-_{(g)}$; $\Delta H = x$

and $A^-_{(g)} \longrightarrow A_{(g)} + e^-$; $\Delta H = y$

select correct alternate:

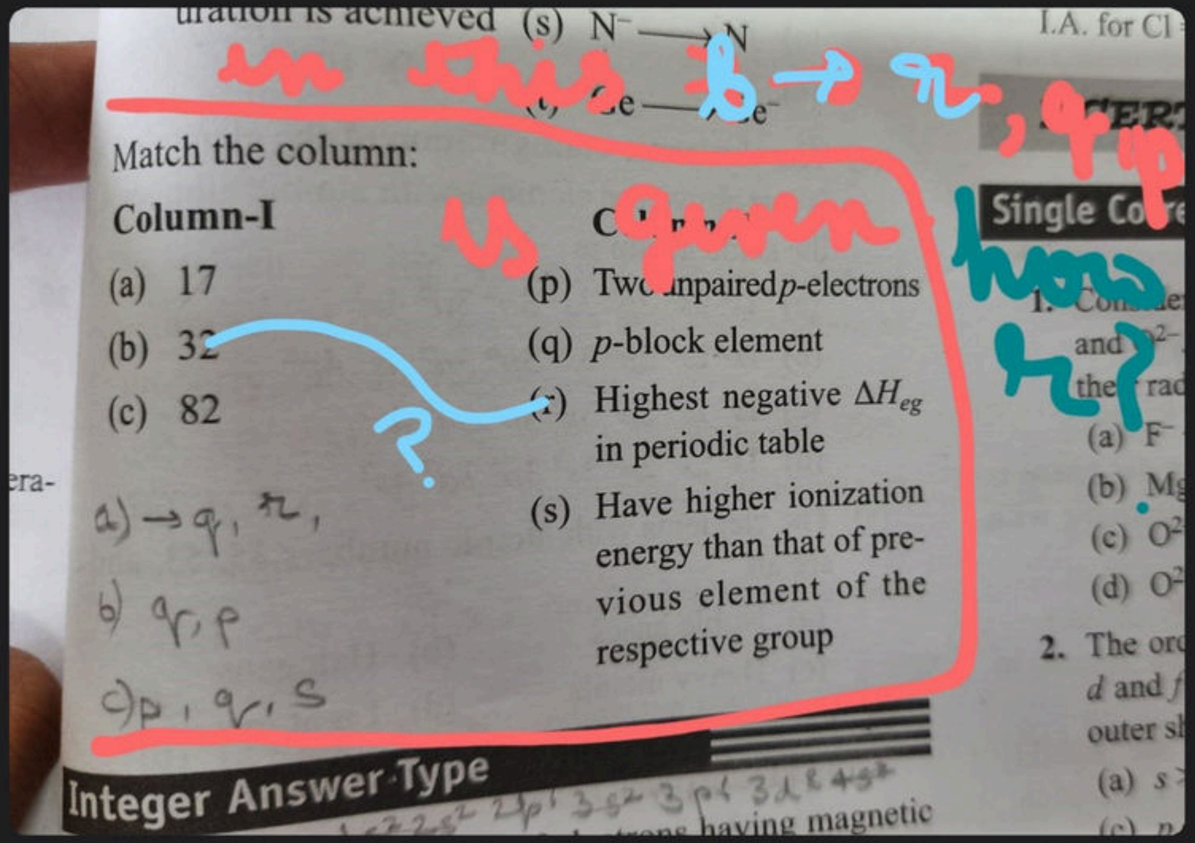
(a) Ionization energy of $A^-_{(g)}$ is $y$

(b) Electron affinity of $A_{(g)}$ is $x$

(c) Electron affinity of $A_{(g)}$ is $-y$

(d) All are correct statements

## Question
from tanishqa


uration is achieved (s) $N^- \longrightarrow N$ I.A. for Cl

Match the column:

| Column-I | Column-II |
|---|---|
| (a) 17 | (p) Two unpaired $p$-electrons |
| (b) 32 | (q) $p$-block element |
| (c) 82 | (r) Highest negative $\Delta H_{eg}$ in periodic table |
| | (s) Have higher ionization energy than that of previous element of the respective group |

Integer Answer Type

having magnetic

Single Co

1. Co... and ...2– ... the ... rad
(a) $F^-$
(b) Mg
(c) $O^{2-}$
(d) $O^{2-}$

2. The orc... d and f ... outer sh...
(a) s ...

**Question**
from Aaradhay

Sir just for fun , pls don't be offended

**Question**
from Pratyush

Net pe mila

## Question
from Aaradhay

Please don't take it as wrong sir :)

$H_4SiO_4$

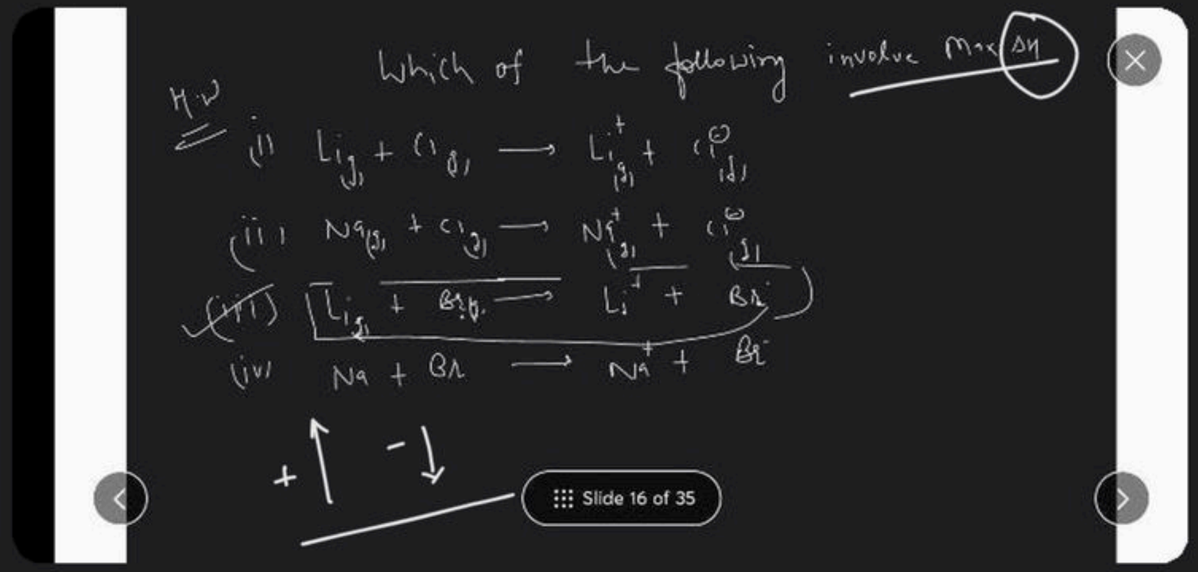
$4 + x + 4(-2) = 0$

$x = +4$

## Question

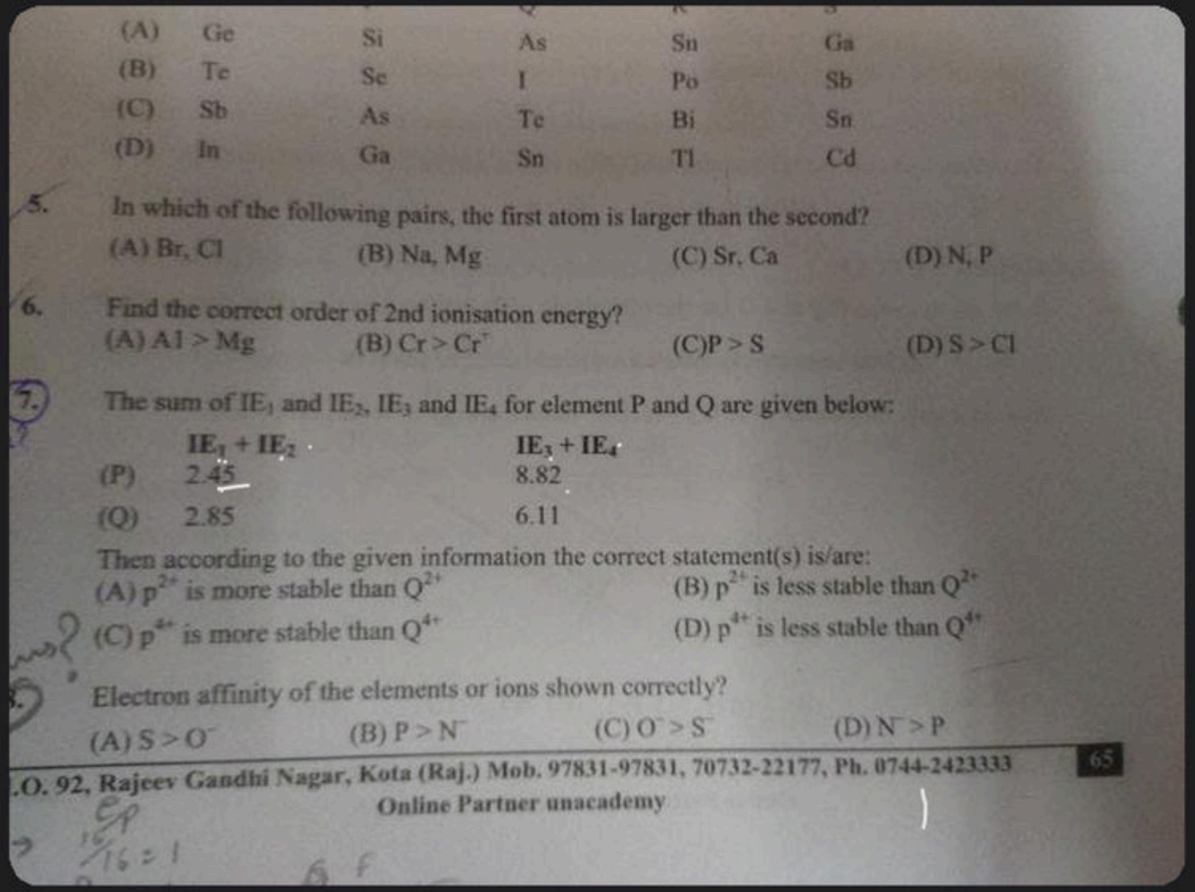
from Biprajit

SIR YEE QUESTION KA SOLUTION HW THA LAST COURSE KE LAST CLASS ME



## Question
from DHRUV

Dbt



| | | | | | |
|---|---|---|---|---|---|
| (A) | Ge | Si | As | Sn | Ga |
| (B) | Te | Se | I | Po | Sb |
| (C) | Sb | As | Te | Bi | Sn |
| (D) | In | Ga | Sn | Tl | Cd |

5. In which of the following pairs, the first atom is larger than the second?
(A) Br, Cl (B) Na, Mg (C) Sr, Ca (D) N, P

6. Find the correct order of 2nd ionisation energy?
(A) Al > Mg (B) Cr > $Cr^+$ (C) P > S (D) S > Cl

7. The sum of $IE_1$ and $IE_2$, $IE_3$ and $IE_4$ for element P and Q are given below:

| | $IE_1 + IE_2$ | $IE_3 + IE_4$ |
|---|---|---|
| (P) | 2.45 | 8.82 |
| (Q) | 2.85 | 6.11 |

Then according to the given information the correct statement(s) is/are:
(A) $P^{2+}$ is more stable than $Q^{2+}$ (B) $P^{2+}$ is less stable than $Q^{2+}$
(C) $P^{4+}$ is more stable than $Q^{4+}$ (D) $P^{4+}$ is less stable than $Q^{4+}$

8. Electron affinity of the elements or ions shown correctly?
(A) S > $O^-$ (B) P > $N^-$ (C) $O^-$ > $S^-$ (D) $N^-$ > P

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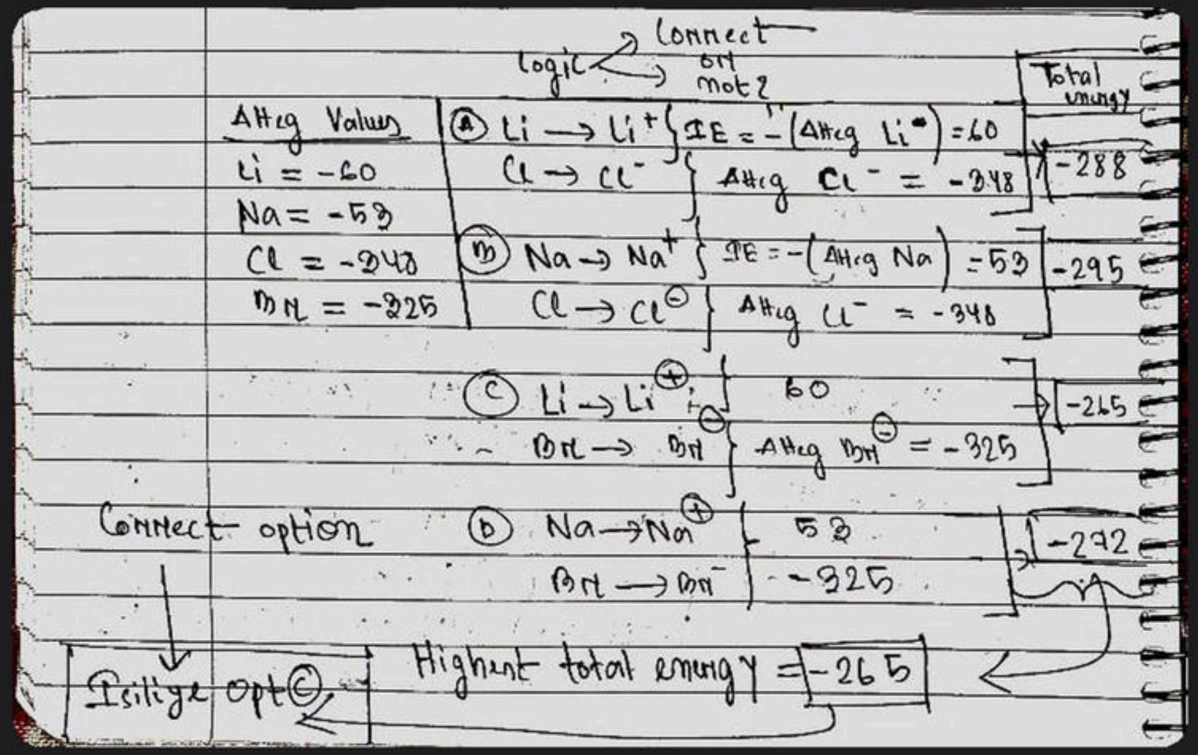
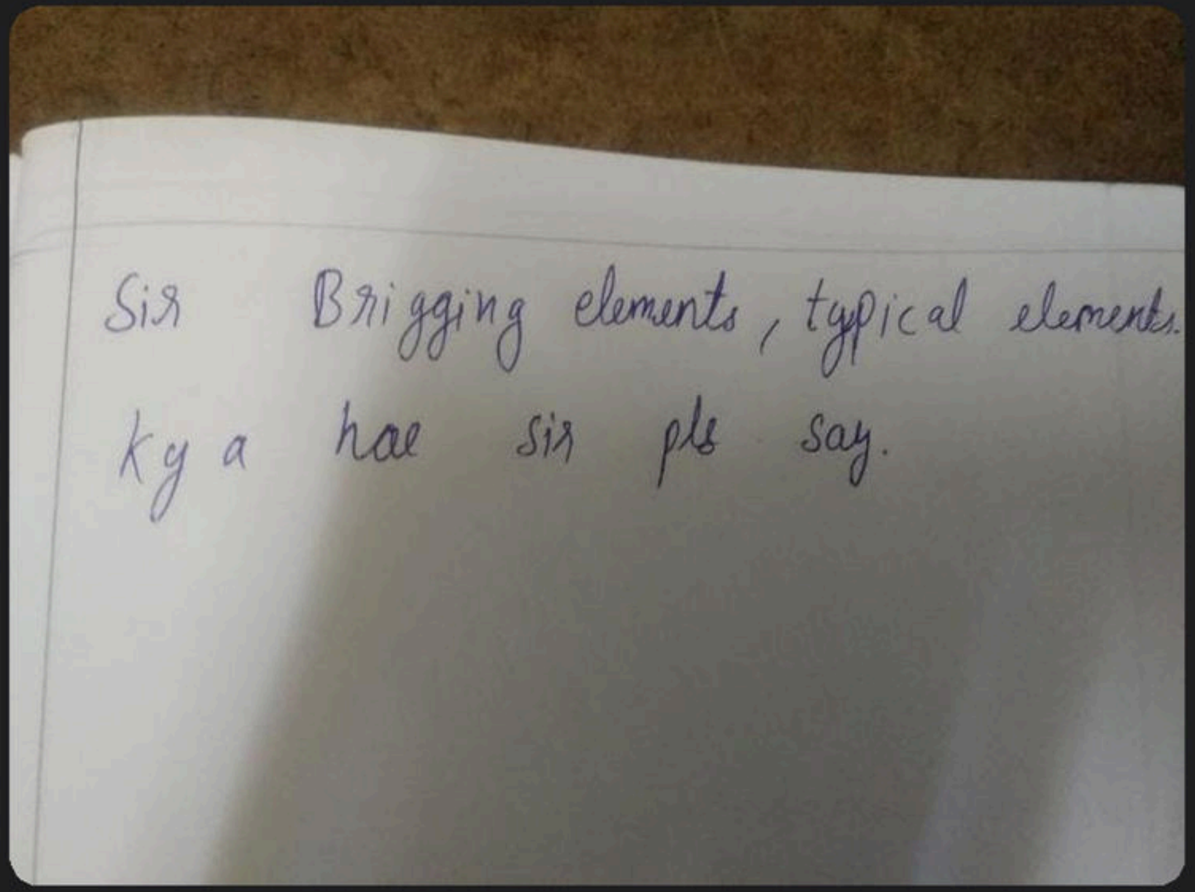
**Question**
from Biprajit

KYA YEE LOGIC SAHI HAI?



**Question**
from punith

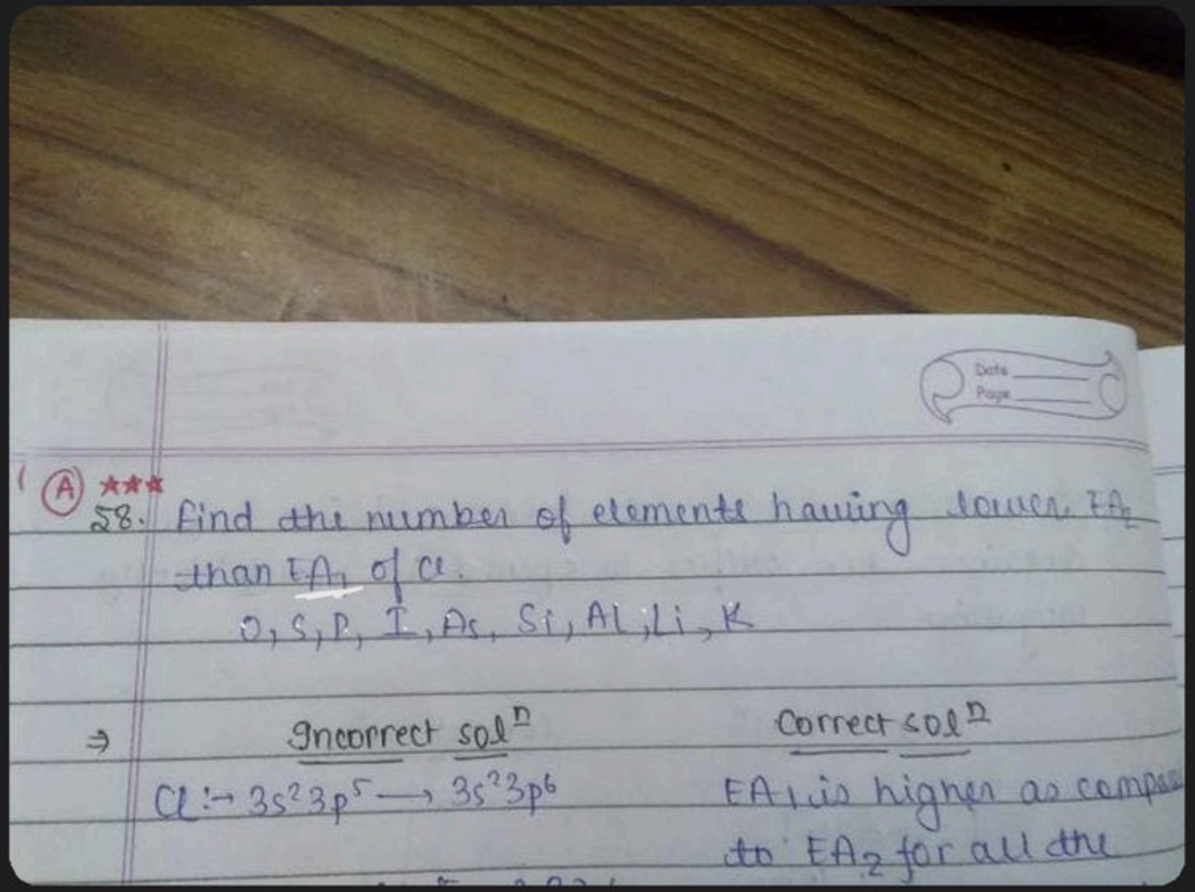


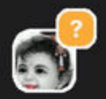
Bridge element ⇒

Na Mg Al

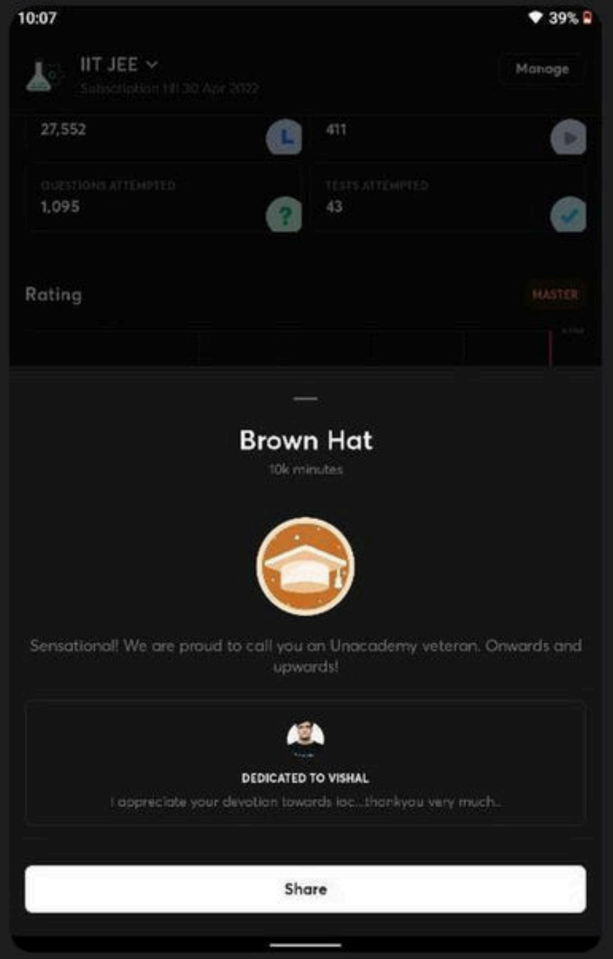
## Question
from Shaswat

TEST QUESTION SIR BHEJA H PLS CHECK



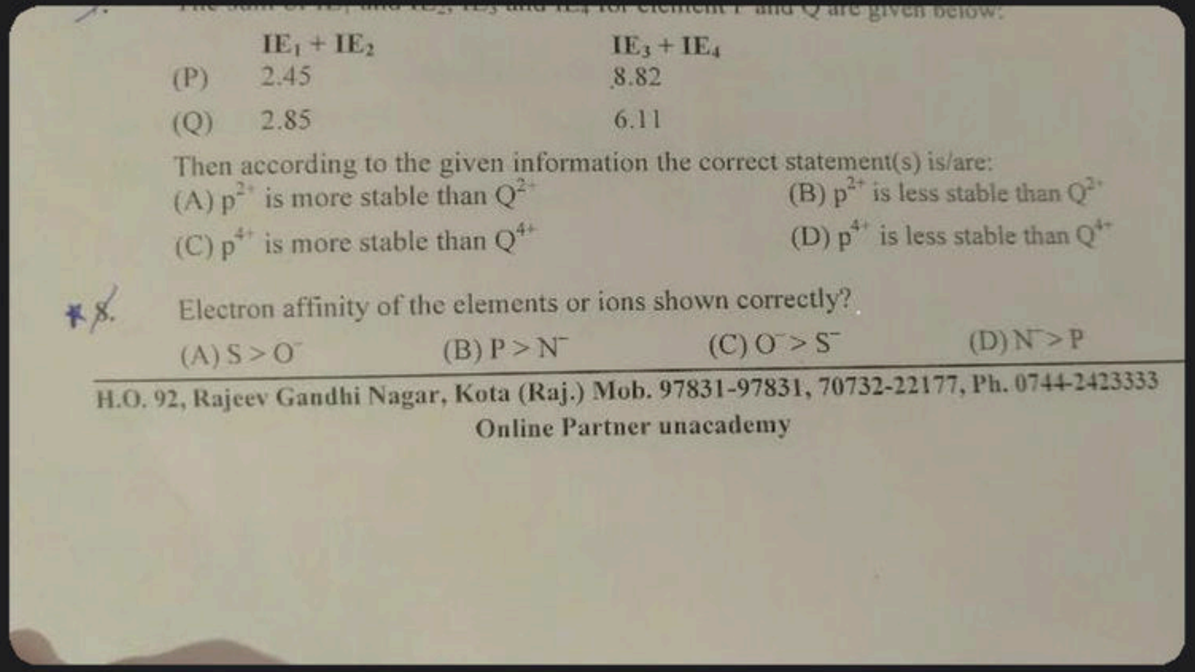


# Question
from Pratik



## Question
from Aditya

Iske C option  ko kaise check kare



| | $IE_1 + IE_2$ | $IE_3 + IE_4$ |
|---|---|---|
| (P) | 2.45 | 8.82 |
| (Q) | 2.85 | 6.11 |

Then according to the given information the correct statement(s) is/are:

(A) $p^{2+}$ is more stable than $Q^{2+}$ (B) $p^{2+}$ is less stable than $Q^{2+}$

(C) $p^{4+}$ is more stable than $Q^{4+}$ (D) $p^{4+}$ is less stable than $Q^{4+}$

8. Electron affinity of the elements or ions shown correctly?

(A) $S > O^-$ (B) $P > N^-$ (C) $O^- > S^-$ (D) $N^- > P$

# Lewis dot structure

$n_1$ = total number of Val.$e^-$ of all atoms + no of -ive charge − no of +ive charge

$n_2$ = 8 × all other atoms + 2 × no of H atom

$n_3$ = $n_2 - n_1$ = number of shared $e^-$ $\left(\frac{n_3}{2} = \text{no. of bonds}\right)$

$n_4$ = $n_1 - n_3$ = number of unshared $e^-$ $\left(\frac{n_4}{2} = \text{L.P}\right)$

formal charge = $V - \frac{S}{2} - U$

V = Val.$e^-$, S = Shared $e^-$, U = Unshared $e^-$

## Rules for drawing lewis structure :→

(1) Select the central atom (C.A) → least E.N atom acts as central atom ~~except~~ except H

(2) If E.N of atoms are same then atom which has higher covalency in ground state acts as central atom.

✓ N = 4

$N = 2s^2 2p^3$

| ↑ | ↑ | ↑ |
|---|---|---|

G.S Covalency = 3

$4 = 3s^2 3p^5$

| ↑↓ | ↑↓ | ↑ |
|---|---|---|

G.S Covalency = 1

$COCl_2$

$n_1 = 4 + 6 + (7 \times 2) = 24$

$n_2 = 8 \times$ all other atoms

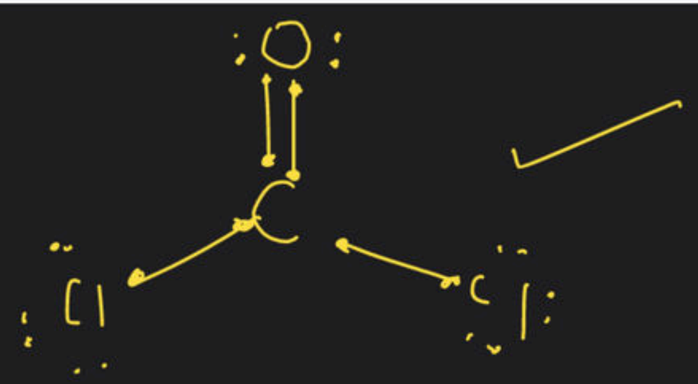
$= 8 \times 4 = 32$

$n_3 = n_2 - n_1 = 32 - 24 = 8$

$\frac{n_3}{2} = \frac{8}{2} = 4$ (number of bonds)

$n_4 = n_1 - n_3 \quad 24 - 8 = 16$

$\frac{n_4}{2} = \frac{16}{2} = 8$ l.p

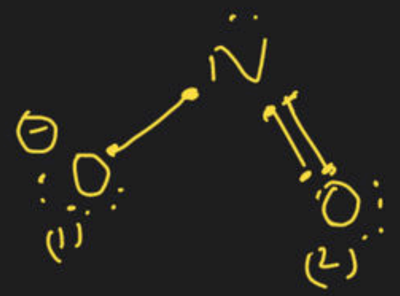


f.c of C $= 4 - \frac{8}{2} - 0 = 0$

f.c of Cl $= 7 - \frac{2}{2} - 6 = 0$

f.c of O $= 6 - \frac{4}{2} - 4 = 0$

$NO_2^-$




$n_1 = 5 + 2 \times 6 + 1$

$= 18$

$n_2 = 8 \times 3 = 24$

$n_3 = 24 - 18 = 6$

$\frac{n_3}{2} = \frac{6}{2} = 3$ [number of bonds]

$n_4 = n_1 - n_3$

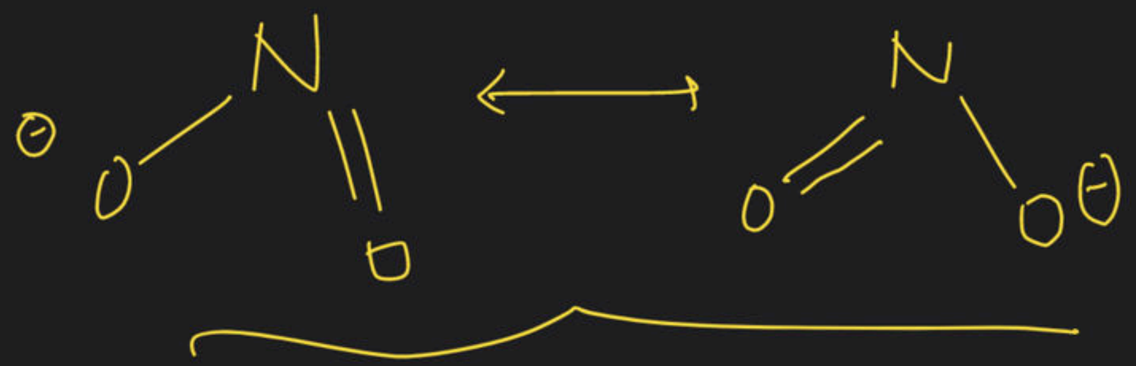
$18 - 6 = 12$

$\frac{n_4}{2} = \frac{12}{2}$ [l.p]

f.c on $N = 5 - \frac{6}{2} - 2 = 0$

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

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




R. H

Resonating structure

Bond order [B.O] = number of covalent bond b/w two atoms in molecule

H–H B.O = 1

O=O B.O = 2

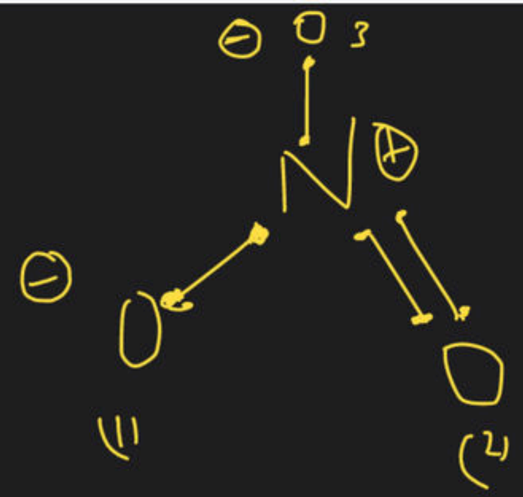
N–O B.L identical in $NO_2^-$ due to Resonance

$$B.O = \frac{\text{total number of bonds b/w two atoms in R.S}}{\text{total R.S}}$$

$$= \frac{3}{2} = 1.5$$

$\Leftrightarrow$ B.O $\uparrow$ att $\uparrow$ B.L $\downarrow$

$NO_3^-$




$\eta_1 = 5 + 3 \times 6 + 1 = 24$

$\eta_2 = 8 \times 4 = 32$

$\eta_3 = \eta_2 - \eta_1 \quad 32 - 24 = 8$

$\frac{\eta_3}{2} = \frac{8}{2} = 4$

$\eta_4 = \eta_1 - \eta_3 \quad 24 - 8 = 16$

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

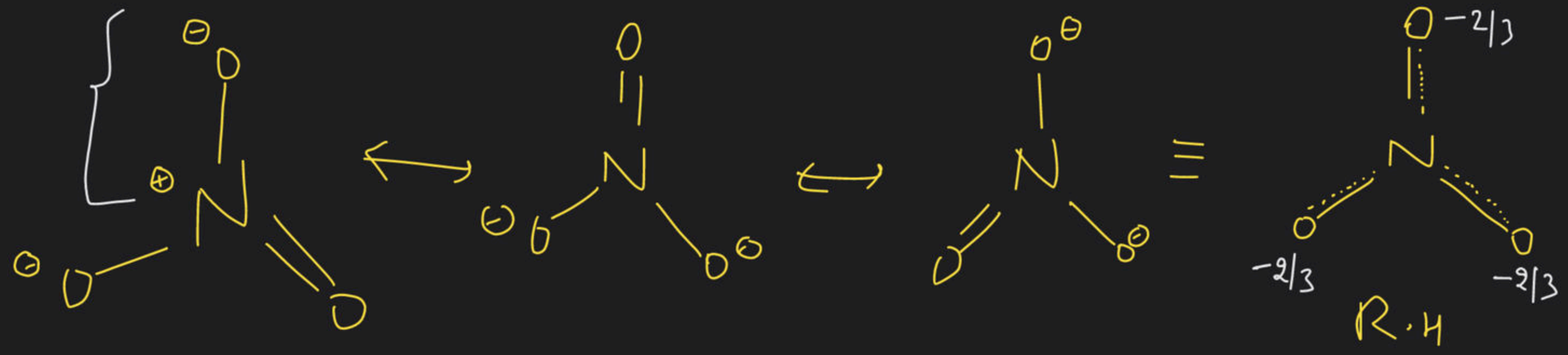
f.c on $\overset{O}{(1)} = 6 - \frac{2}{4} - 6 = -1$

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

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

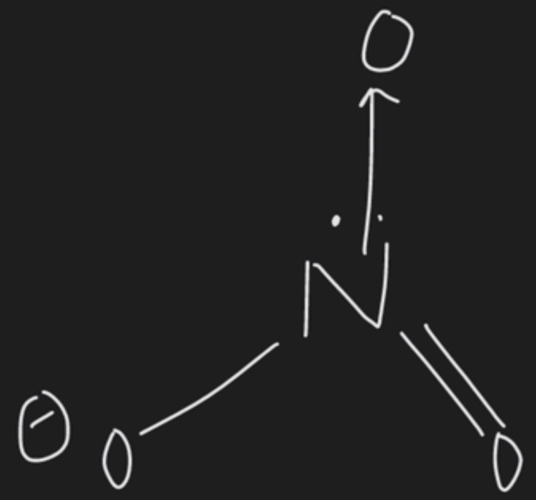
f.c on $N = 5 - \frac{8}{2} - 0$

$= +1$




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

all N–O B.L identical due to resonance



## Question
from Umashankar