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I.E

Li | Be B | C N O | F Ne

Li < B < Be < C < O < N < F <<< Ne

Na < Al < Mg < Si < S < P < Cl <<< Ar

K < Ga < Ca < Ge < Se < As < Br <<< Kr

Down the group

Li	Be
Na	Mg
K	Ca
Rb	Sr
Cs	Ba
Fr	Ra

down the group size ↑ I.E ↓

Li > Na > K > Rb > Cs < Fr

Be > Mg > Ca > Sr > Ba < Ra

due to poor shielding effect of 4f subshell

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P-Block

B
[Al
Ga]

[In
Tl]

B > Tl > Ga > Al > In

due to poor S.E of 6p subshell

due to poor S.E of 4f subshell

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C
Si
Ge
Sn
Pb

TL
$6s^2$

C > Si > Ge > Pb > Sn

↓

due to poor
S.E of 4f Subshell

d-Block

Cu
Ag
Au

$Cu > Ag < Au$

$Au > Cu > Ag$

L → R

I.E ↑

down the group

	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
	Y	Zr	Nb	-	-	-	-	-	-	Cd
57	La	^{72}Hf	Ta	-	-	-	-	-	-	Hg
89	Ac	$^{104}Ku/Rf$	Ha							

3d Series > 4d series < 5d series

element element element

(due to Lanthanide Contraction)

$^{58}Ce \longrightarrow {}^{71}Lu$

$^{90}Th \longrightarrow {}^{103}Lr$

Sol

Order of I.E

① N > O

② N < O^+

$2p^3$ $2p^3$

$1s^2 2s^2 2p^6 3s^1$ $1s^2 2s^2 2p^6$ $2p^5$

③ Na $\xrightarrow{a}$ Na^+ $\xrightarrow{b}$ Na^{+2} $\xrightarrow{e}$ Na^{+3}

Successive I.E

a < b < c

Order of I.E

a b e f

c d b e

a b d f

c d

$a < c$

$b > d$

$e < f$

$c < d < f$

Mg $\xrightarrow{c}$ Mg^+ $\xrightarrow{d}$ Mg^{+2} $\xrightarrow{f}$ Mg^{+3}

$1s^2 2s^2 2p^6 3s^2$ $1s^2 2s^2 2p^6 3s^1$ $2p^6$

He = highest I.E

Cs = lowest I.E

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order of II I.E

$C = 1s^2 2s^2 2p^2 \xrightarrow{-e} 1s^2 2s^2 2p^1 \xrightarrow{-e}$

$N = 1s^2 2s^2 2p^3 \xrightarrow{-e} 1s^2 2s^2 2p^2 \xrightarrow{-e}$

$O = 1s^2 2s^2 2p^4 \xrightarrow{-e} 1s^2 2s^2 2p^3 \xrightarrow{-e}$

$F = 1s^2 2s^2 2p^5 \xrightarrow{-e} 1s^2 2s^2 2p^4 \xrightarrow{-e}$

C N O F

C < N < F < O

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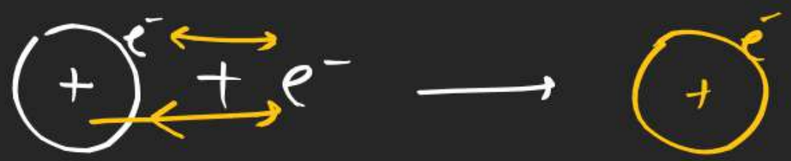
ΔH_{eg}

$$X_{(g)} + e^- \longrightarrow X^{\ominus}_{(g)} \qquad \Delta H_{eg} = -ive$$



two type of force

(i) e^- e^- rep.

(ii) e^- nucleus att.

in most of the case — Nucleus and e^- att is dominant

Second e^- → energy req. $\Delta H_{eg} = +ive$

We can not compare ΔH_{eg_1} and ΔH_{eg_2}

but However

$$|\Delta H_{eg_1}| < |\Delta H_{eg_2}|$$

$$\Delta H_{eg_1} + \Delta H_{eg_2} > 0$$

factor

1. $Z \uparrow \Delta H_{eg} \uparrow$
2. $Z_{eff} \uparrow \Delta H_{eg} \uparrow$
3. $n \uparrow \Delta H_{eg} \downarrow$
4. $\sigma \uparrow \Delta H_{eg} \downarrow$
5. N
   Noble gas
   IIA
   → ΔH_{eg} = +ive

Order of ΔH_{eg}

IV = ΔH_{eg} = +ive

P
As
Sb
Bi

ΔH_{eg} = -ive due to vacant orbital

B C N O

Al Si P S

$3p^2$ $3p^3$ $3p^4$

Al < P < Si < S

N < B < C < O

ΔH_{eg} = +ive

highest ΔH_{eg} = Cl

Highest ΔH_{eg} in Noble gas = Ne

order of I.E

F Cl F^- Cl^-

$F > Cl > Cl^- > F^-$

$F \xrightarrow{+e} F^{\ominus}$ ΔH_{eg} of F

$F^{\ominus} \xrightarrow{-e} F$ I.E of F^-

$|\Delta H_{eg} \text{ of } F| = |\text{I.E of } F^-|$

$Cl \xrightarrow{+e^-} Cl^-$ ΔH_{eg} of Cl

$Cl^- \xrightarrow{-e^-} Cl$ I.E of Cl^-

$|\Delta H_{eg} \text{ of } Cl| = |\text{I.E of } Cl^-|$

$A + B \longrightarrow C + D$, ΔH -ive

$C + D \longrightarrow A + B$ ΔH = +ive

Which of the following reaction is endothermic

(a) $Na \longrightarrow Na^{+} + e^{-}$

(b) $N + e^{-} \longrightarrow N^{\ominus}$

(3) $O + 2e^{-} \longrightarrow O^{-2}$

(4) all

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order II IE

Li Be B C

$1s^2 2s^1$ $2s^2$ $2p^1$ $2p^2$

Li^+ Be^+ B^+ C

$1s^2$ $2s^1$ $2s^2$ $2p^1$

Be < C < B < Li (the conf.)

Which of the following reaction is exothermic

Ne + e⁻ ⟶

N + e⁻ ⟶ N⊖

① Ne + e⁻ ⟶ Ne⁻

② N⊖ ⟶ N + e⁻

③ Li ⟶ Li⁺ + e⁻

④ all

⑤ none

Noble gas

N

IIA

Diffg

Δ Reg group

2nd period B C N O F

3rd period Cl Si P S Cl

2nd period < 3rd period

F Cl Br I

Cl > F > Br > I