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I.E trends down the group

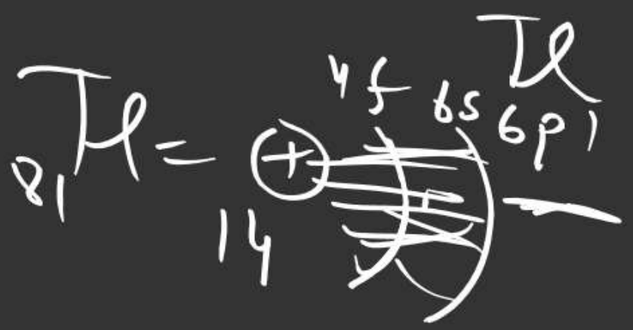
B
Al
Ga
In
Tl

B > Al < Ga > In < Tl

→ due to poor S.E of 3d subshell.

B > Tl > Ga > Al > In

$Ga = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1$



C
Si
Ge
Sn
Pb

C > Si > Ge > Pb > Sn

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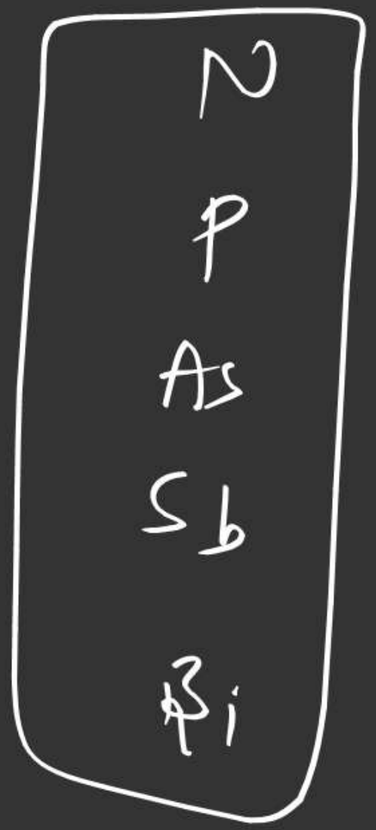

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trends down the in d-BLOCK

3d series / I T.S
4d series / II T.S
5d series / III T.S

$_{21}Sc$ $_{22}Ti$ ------ Cu Zn
Y $_{40}Zr$ ---- Ag Cd
$_{57}La$ $_{72}Hf$ ---- Au Hg
$_{89}Ac$ Ku/Rf
$_{104}$

4f 6s6 1

$_{58}Ce \rightarrow {}_{71}Lu$ (Lanthanide) 4f series

I T.S element > II T.S element < III T.S element

due to poor S.E of 4f Sub shell [lanthanide Contraction]

Order of I.E

Cu Ag Au

Cu > Ag < Au

Au > Cu > Ag

Que — Zn Cd Hg

Zn > Cd < Hg

Hg > Zn > Cd

Ans

Correct ordering I.E

	N	O^+
e	7	7
p	7	8

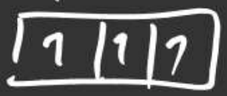
(1) $N > O^+$

(2) $N < O^+$

(3) $N = O^+$

(4) none

$N = 1s^2 2s^2 2p^3$



$O^+ = 1s^2 2s^2 2p^3$

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order of I.E

$a < b$

$b < c$

$q < c$

$q < d$

$b > e$

$c < f$

$d < e$

$e < f$

$d < f$

Compare I.E

$1s^2 2s^2 2p^6 3s^1$ Na $\xrightarrow{a}$ $1s^2 2s^2 2p^6$ Na^+ $\xrightarrow{b}$ $1s^2 2s^2 2p^5$ Na^{+2} $\xrightarrow{c}$ Na^{+3}

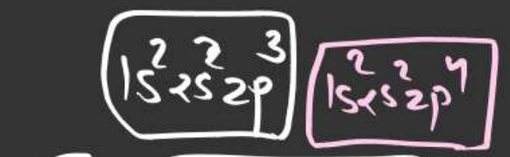
$1s^2 2s^2 2p^6 3s^2$ Mg $\xrightarrow{d}$ $1s^2 2s^2 2p^6 3s^1$ Mg^+ $\xrightarrow{e}$ $1s^2 2s^2 2p^6$ Mg^{+2} $\xrightarrow{f}$ Mg^{+3}

IE: Na < Mg

Order of 2nd I.E

I, I.E

C < O < N < F



Z_{eff} ↑ I.E ↑

II. I.E

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

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

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

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

C < N < F < O

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Highest I.E in periodic table = He

lowest I.E = Cs

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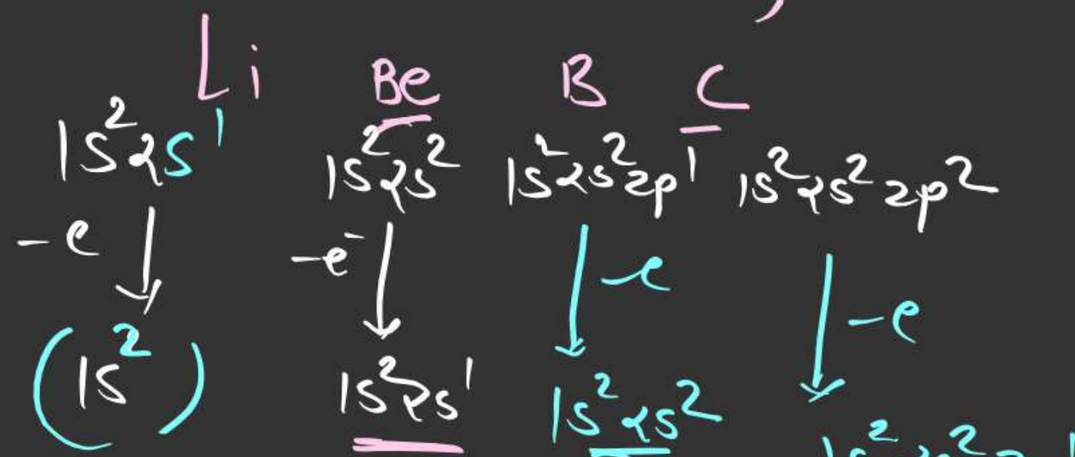
Order of II I.E



Order of II I.E

$Be < C < B < Li$

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

13
III A

one

$A \xrightarrow{-e} A^{+}$ 10

$A^{+} \xrightarrow{-e} A^{+2}$ 12

$A^{+2} \xrightarrow{-e} A^{+3}$ 14

$A^{+3} \xrightarrow{-e} A^{+4}$ 120

ans find the valence e^- of A

Ans = 3

ans find the stable O.S of A

(+3)

ans find the group number of element A

III A | 13

$X \xrightarrow{-e} X^{+}$ 6

$X \xrightarrow{-e} X^{+2}$ 8

$X^{+2} \xrightarrow{-e} X^{+3}$ 10

$X^{+3} \xrightarrow{-e} X^{+4}$ 12

$X^{+4} \xrightarrow{-e} X^{+5}$ 112

(1) find the val. e⁻ of X

4

(2) Stable oxidation state of X

+4

(3) group number of X

14 / IVA

Application of I.E

(1) Metallic ch.

I.E ↓ Metallic ch. ↑

L ⟶ R

I.E ↑ metallic ch. ↓

down the group, I.E ↓ Metallic ch. ↑

Note

If diff of two successive I.E is > 16 ev/atom then lower Oxidation state becomes more stable

=

if diff two successive I.E is < 11 ev/atom then higher Oxidation state becomes more stable.

in between 11 to 16 then both Stable

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$N < O^+$

$1s^2 2s^2 2p^3$ $\quad$ $1s^2 2s^2 2p^4$

$N > O$

$\frac{e}{p} = \frac{7}{7}$ $\quad$ $\frac{8}{8}$

$\frac{e}{p} = 1$ $\quad$ 1

Qul

Order of I.E

By successive I.E

$Na \xrightarrow[I.E_1]{-e} Na^{+} \xrightarrow[I.E_2]{-e} Na^{+2} \xrightarrow[I.E_3]{-e} Na^{+3}$

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

Order of I.E

$I.E_1 < I.E_2 < I.E_3 \ldots\ldots$