Ionisation Energy - III

Course on Periodic Table for Class IX 2023

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Ionisation energy :→

$$Na_{(g)} \xrightarrow{-e} Na^{+}_{(g)} + e^{-}$$

I.E = +'ive
(endothermic)

~~$K_{(g)} \xrightarrow{-e} K^{+} + e^{-}$~~

1 ev/atom = 96.4 KJ/mole

1 ev/atom = 23.1 K Cal/mole

Successive I.E

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

I.E$_1$: 5 / 10

I.E$_2$: 8 / 10

I.E$_3$: e / p : 10 / 10

always

I.E$_1$ < I.E$_2$ < I.E$_3$

$\star$ Zeff of A < Zeff of A^{+} < Zeff of A^{+2}

top

$+\delta$ $-\delta$

H – f

polar

H – H

(nonpolar

factors

① Z ↑ I.E ↑

② Z_{eff} ↑ I.E ↑

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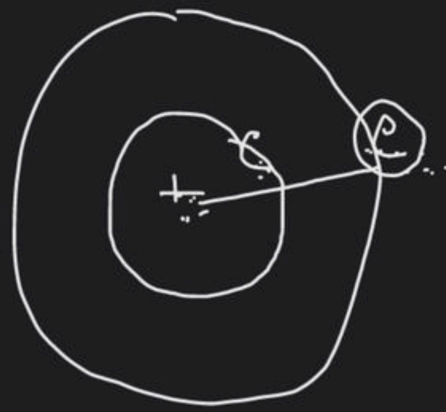
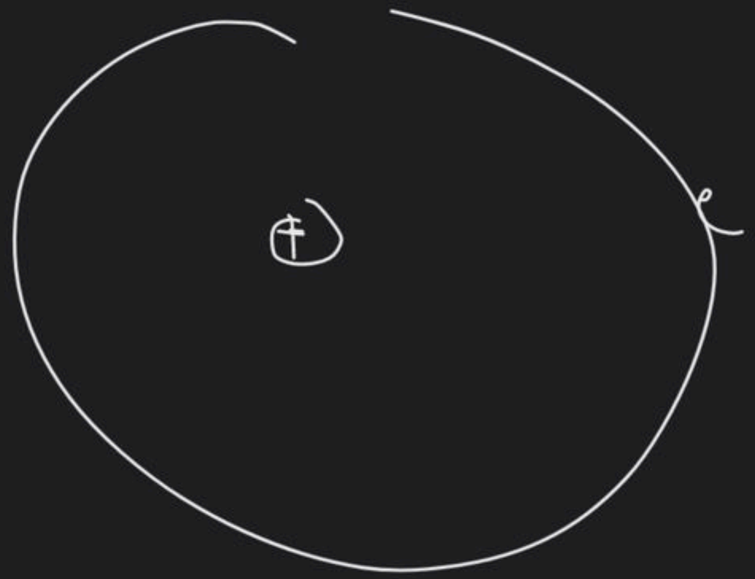
③ σ ↑ I.E ↓

④ n ↑ I.E ↓

S.E





(5) Half filled and fully filled

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

↑	↑	↑

$O = 2s^2\ 2p^4$

↑↓	↑	↑

$N > O$

$P > S$

$As > Se$

(6) Closness towards nucleus

$Be = 1s^2 2s^2$

$B = 1s^2 2s^2 2p^1$

Be > B

Mg > Al

Ca > Ga

Trends along the period

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

Z_{eff} ↑ I.E ↑

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

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

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

Ne → due fully filled conf. [extra stability]

along the group :→

Li > Na > K > Rb > Fr > Cs

Li
Na
K
Rb
Cs
Fr

lowest I.E

Li > Na > K > Rb > Cs < Fr

Be > Mg > Ca > Sr > Ba < Ra

Be > Mg > Ca > Sr > Ra > Ba

due to poor S.E of 4f

$_{87}Fr = [Xe]\ 4f^{14}\ 5d^{10}\ 6s^{2}\ 6p^{6}\ 7s^{1}$ Subshell

f

P - Block

B

{Al
Ga

{In
Tl

B > Tl > Ga > Al > In

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

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

Al < Ga

↑

due to poor S.E of 3d subshell.

In < Tl

order

C

Si

Ge

Sn

Pb

C > Si > Ge > Pb > Sn

due to

poor s.E of 4f

subshell.

$$_{81}Tl = [Xe]\ 4f^{14}\ 5d^{10}\ 6s^2\ 6p^1$$

due to poor s.f of 4f subshell

d-Block

3d series | I T.S

4d series | II T.S

5d series | III T.S

Sc	Ti	V	-	-	-	-	Cu	Zn	
Y	Zr	Nb	-	-	-	-	Ag	Cd	
La	Hf	Ta	-	-	-	-	Au	Hg	
Ac	Ku	Ha							

$_{80}Hg = 4f^{14}\,5d^{10}\,6s^{2}$

3d > 4d < 5d

5d > 3d > 4d

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

$Na_{(g)} \xrightarrow[I \cdot E_1]{-e^-} Na^{+} \xrightarrow[I \cdot E_2]{-e^-} Na^{+2} \xrightarrow[I \cdot E_3]{-e^-} Na^{+3}$

$1s^2 2s^2 2p^1$ $\qquad$ $1s^2 2s^2 2p^5$

Which of the following $I \cdot E$ is highest

(1) $I \cdot E_2$ $\qquad$ (2) $I \cdot E_1$ $\qquad$ (3) $I \cdot E_3$ $\qquad$ (4) same

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

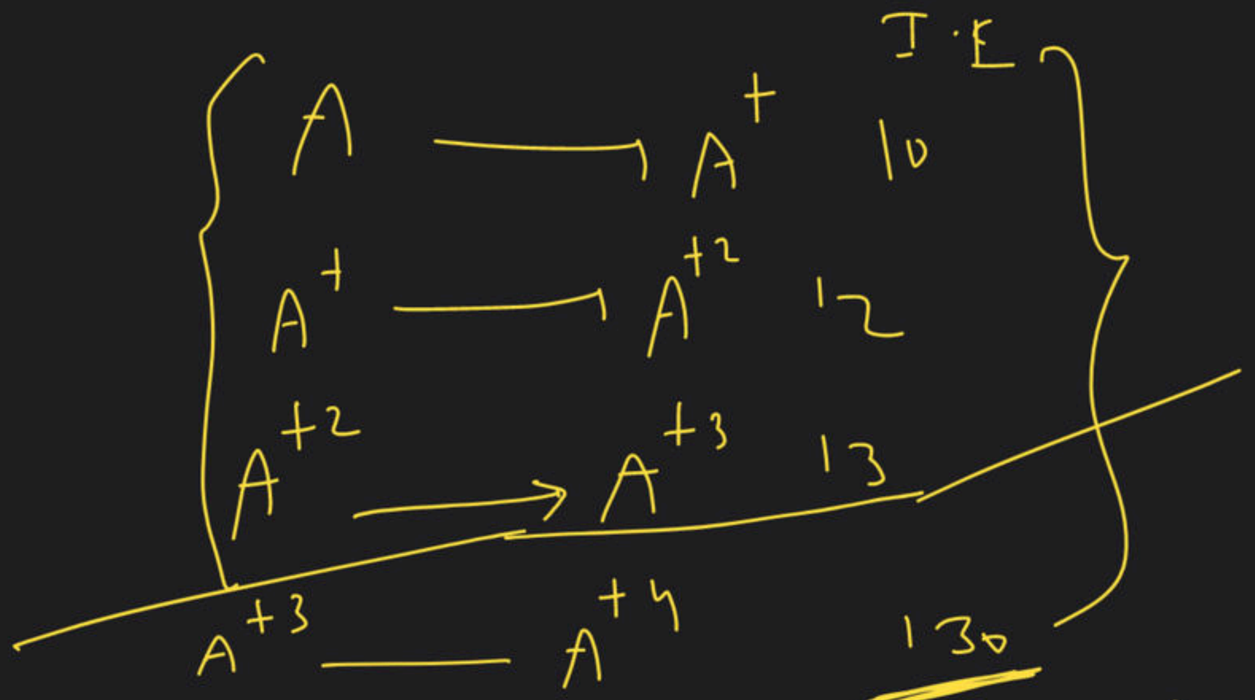
$$Mg \xrightarrow{c} Mg^{+} \xrightarrow{d} Mg^{+2}$$

find the correct option

(a) $a > c$ (b) $a < c$ (c) $b < d$ (d) all are correct.

(a) $a < b$ (b) $c > d$ (c) both (d) none

(a) $b < d$ (b) $b > d$ (c) both (d) none



find the number of Val. e^- in A

(a) 4 (b) 3 (c) 2 (d) 5

I.E ↓ metallic ch. ↑ Electropositive ch. ↑

most Electropositive element = Cs

I.E ↓ R.A ↑

(but Reducing also dep. on mother factory

$A \longrightarrow A^{+}$ (oxidation)

(R.A)

diff of two successive I.F is > 11 ew then lower O.S is stable

if diff between two successive I.F ≤ 11 ew then higher O.S is stable

11 to 16 → both stable

Que Which of the following has highest $\pm\cdot F$ among them?

(1) C_4 (2) A_g (3) A_M (4) all have equal

C_4

A_g

A_M