

CHEMICAL BONDING

Strongly bonded with
nucleus of cation

Na⁺ Ionic bond [Fajan's Rule]



acc. to fajan's, cation and anion come close together
in isolated condition then, e⁻ cloud of anion
is attracted by charge on cation simultaneously
e⁻ cloud on cation is attracted by nucleus of
anion as the result of this distortion
exists in both ions but distortion in e⁻ cloud of
cation is negligible because of its small size. e⁻ cloud of cation

distortion in e^- cloud of anion
is called polarisation of anion

Note \Rightarrow the tendency of cation to distorted
to anion is called polarising power
of cation, charge density, degree of covalency
and ionic potential.

$$\text{(Ionic Potential)} \quad \phi = \frac{\text{Charge}}{\text{Size}}$$

$\phi \uparrow$ Polarisation \uparrow Covalent ch. \uparrow I.C.

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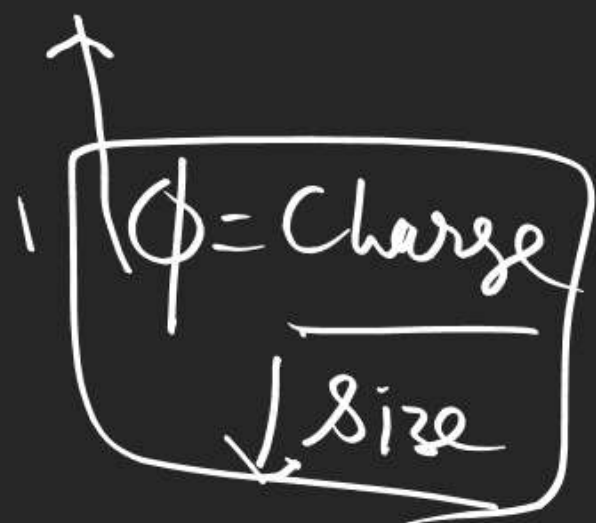
factor affecting fajan's Rule

① Charge on cation $\uparrow \phi \uparrow$ pol. \uparrow cov. \uparrow \pm -c \downarrow

order of Covalent ch.



② Size of cation $\downarrow \phi \uparrow$ pol. \uparrow cov. \uparrow \pm -c \downarrow



③ Size of anion \uparrow pol. \uparrow cov. \uparrow i-c \downarrow



④ Charge on anion \uparrow pol. \uparrow cov. \uparrow i-c \downarrow





$$\chi_{\text{Cu}^+} \approx \chi_{\text{Na}^+}$$

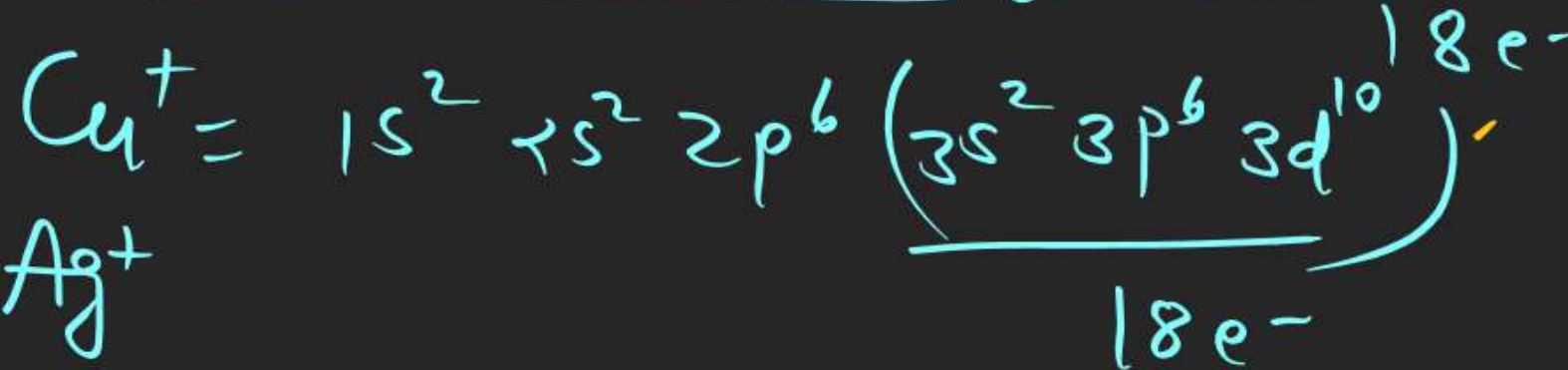
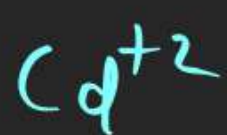
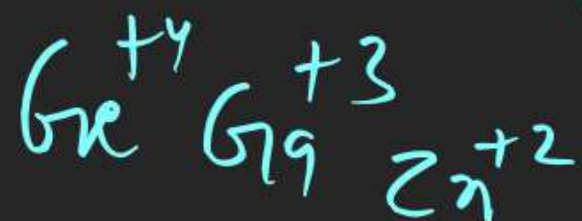
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(5) type of cation

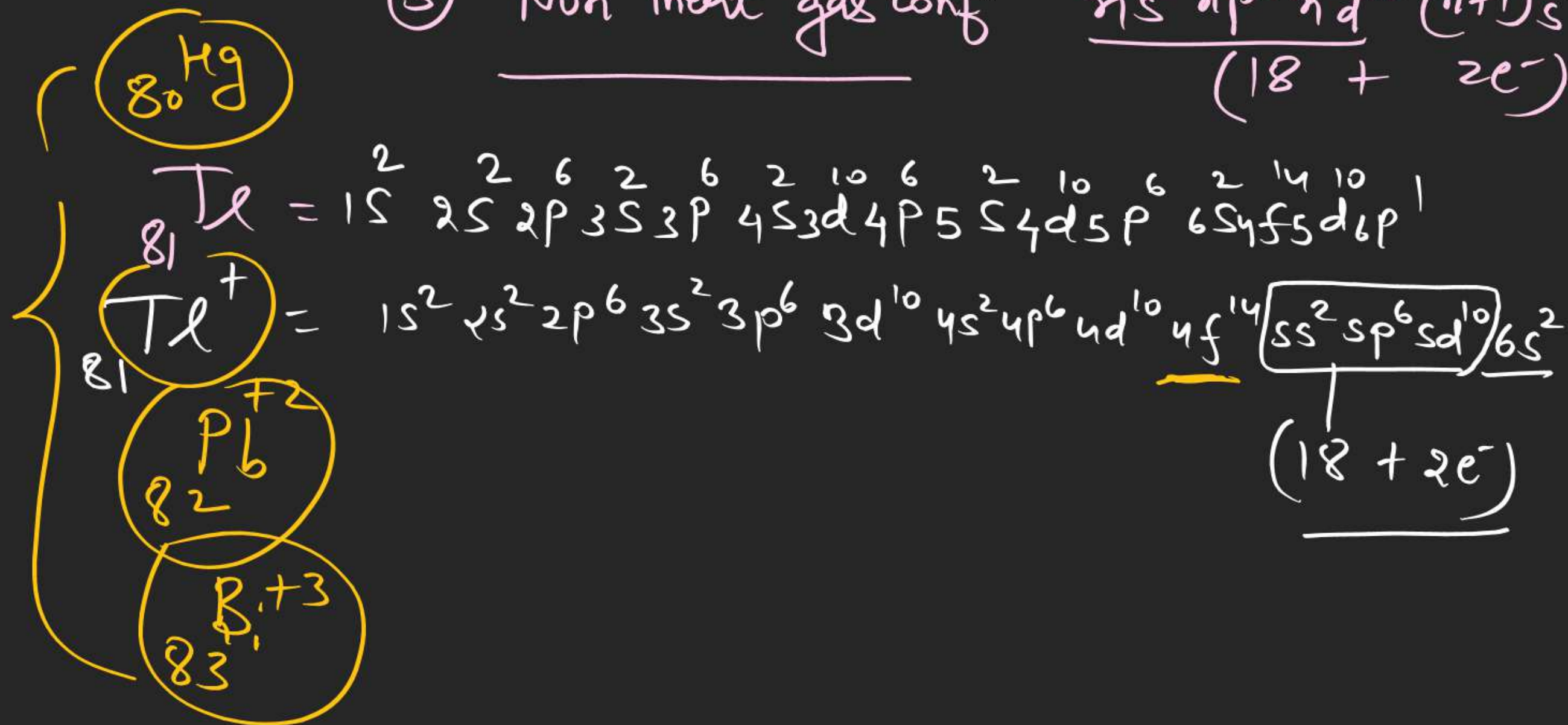
① Inert gas conf. cation = $\frac{n s^2 n p^6}{8 e^-}$



(2) Pseudo inert gas conf. = $\frac{n s^2 n p^6 n d^{10}}{18 e^-}$



③ Non inert gas conf: $\frac{n s^2 n p^6 n d^{10} (n+1) s^2}{(18 + 2e^-)}$



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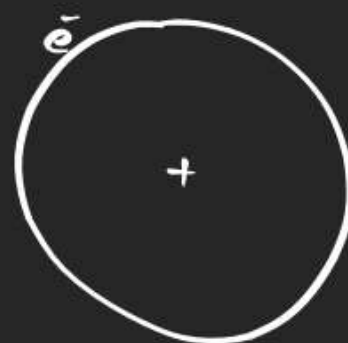
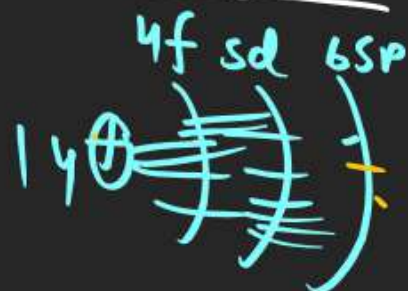
Inert gas



Pseudo



non inert gas conf



[S.E] Power

$s > p > d > f$

Note \Rightarrow order of Polarising power

Order of covalent ch.

$\text{non inert gas} > \text{Pseudo} > \text{Inert}$
 $\text{Conf.} \quad \text{inert}$

CuCl > NaCl

AgCl > KCl

AuCl > RbCl

CuCl₂ < CdCl₂

GaCl₂ < CdCl₂ < PbCl₂

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S.E



$S > P > d > f$

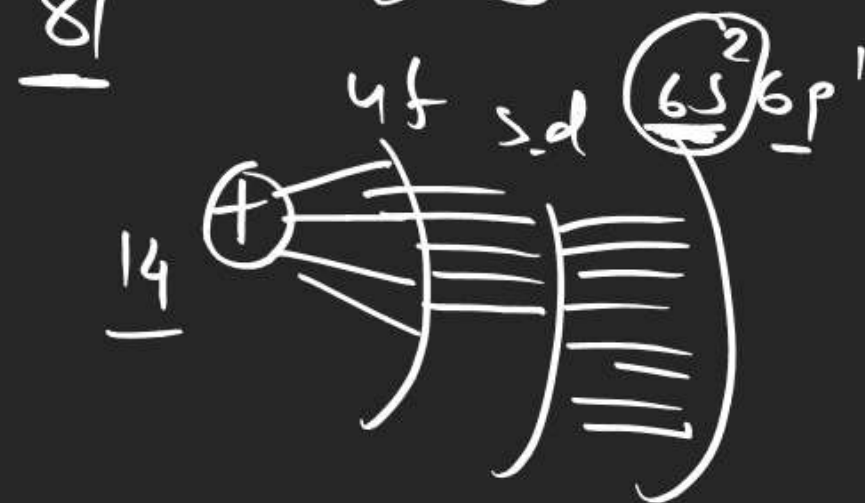
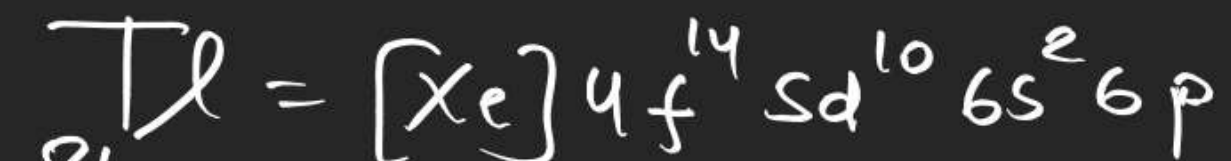
Inert pair effect

13^{th}	14^{th}	15^{th}
B $\begin{cases} +3 \end{cases}$	C $\begin{cases} +2 \\ +4 \end{cases}$	N $\begin{cases} +3 \\ +5 \end{cases}$
Al $\begin{cases} +1 \\ +3 \end{cases}$	Si $\begin{cases} +2 \\ +4 \end{cases}$	P $\begin{cases} +3 \\ +5 \end{cases}$
Ga $\begin{cases} +1 \\ +3 \end{cases}$	Ge $\begin{cases} +2 \\ +4 \end{cases}$	As $\begin{cases} +3 \\ +5 \end{cases}$
In $\begin{cases} +1 \\ +3 \end{cases}$	Sn $\begin{cases} +2 \\ +4 \end{cases}$	Sb $\begin{cases} +3 \\ +5 \end{cases}$
Tl $\begin{cases} +1 \\ +3 \end{cases}$	Pb $\begin{cases} +2 \\ +4 \end{cases}$	Bi $\begin{cases} +3 \\ +5 \end{cases}$

Generally higher oxidation becomes more stable than lower oxidation state but in p-block 13 to 15 group on moving down lower oxidation state becomes more stable than the higher due to poor S-E of ns of uf sub shell.

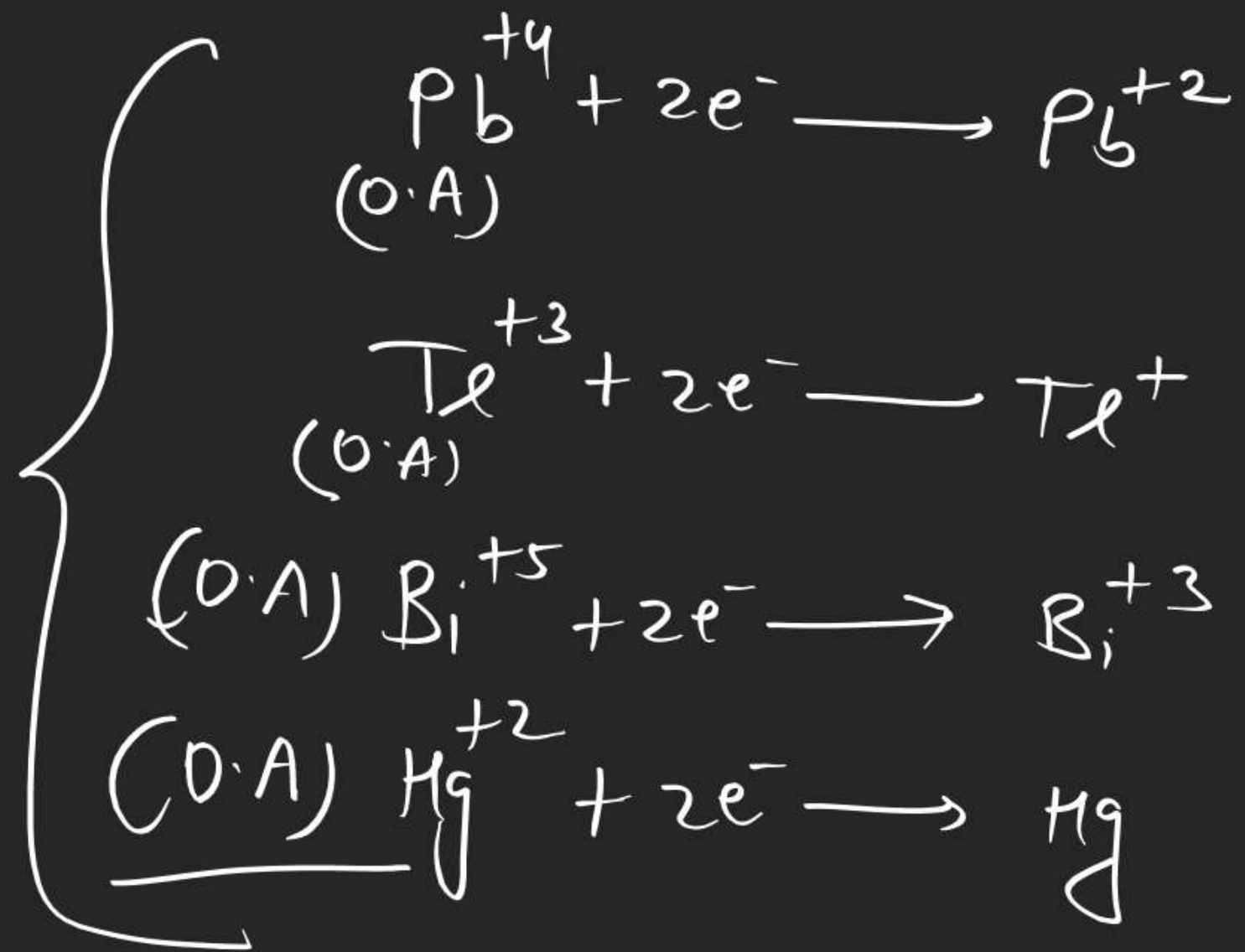
Note \Rightarrow the tendency of inertness of ns e^- towards bonding is called inert pair effect

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Stability

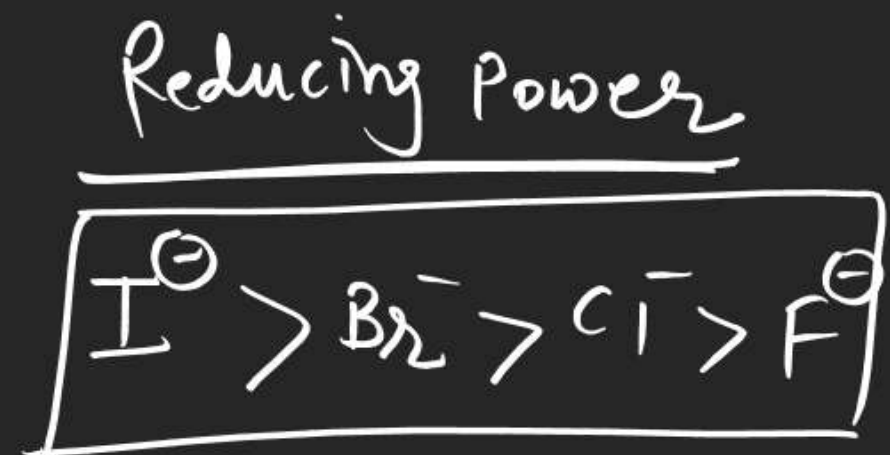




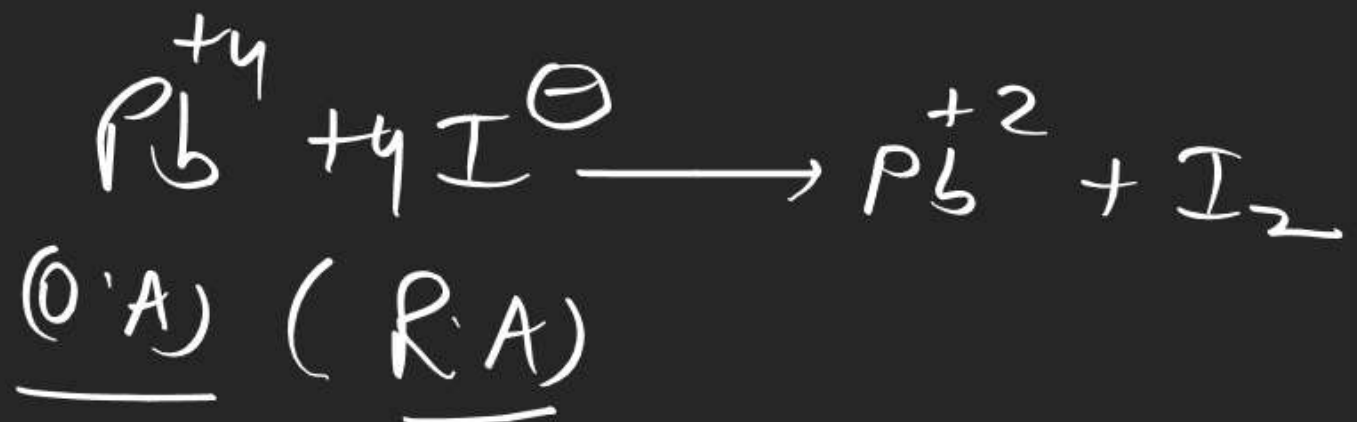
(Red lead)



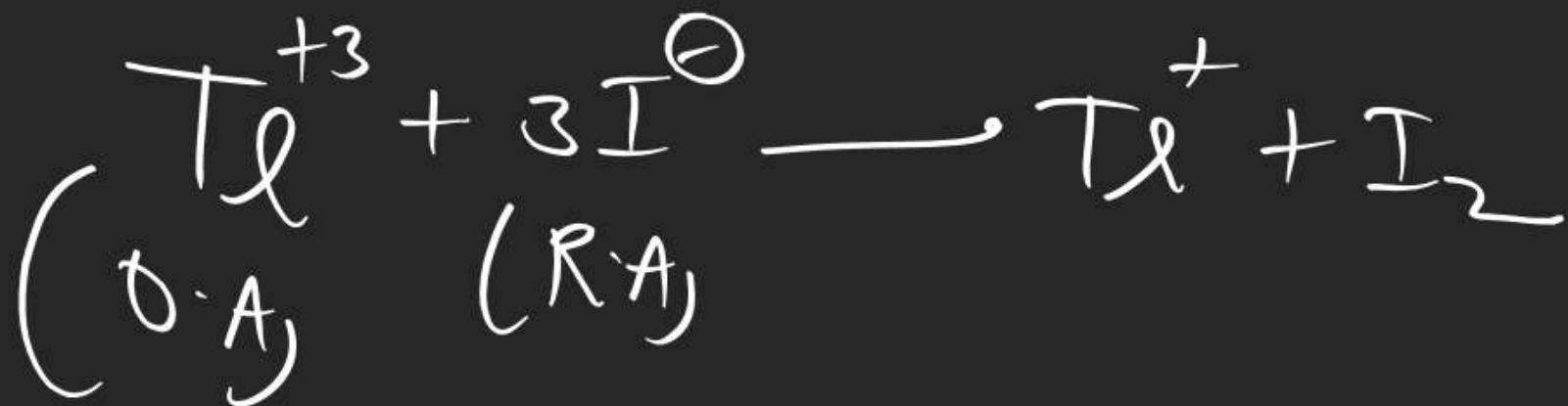
Note \Rightarrow tetravalent compound of lead
are strong oxidising agent



or PbI_4 does not exist why?



or TlI_3 does not exist with I^{\ominus}



BiI_5 does not exist



(O.A) (R.A)

Ques TlI_3 exist with I_3^{\ominus} why?

