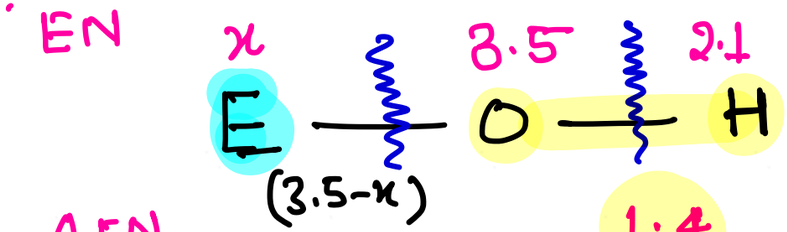
ALLEN CAREER INSTITUTE KOTA (RAJASTHAN)

PERIODIC TABLE

Nature of hydroxide



$\Delta EN = |x - 3.5| = 1.4$

amphoteric

(d-Block / p-Block)

Case-1

$|x - 3.5| > 1.4$

for S-Block Elements

$E^{+n} + nOH^-$

Nature of hydroxide will be basic

Case-2

$1.4 > |x - 3.5|$

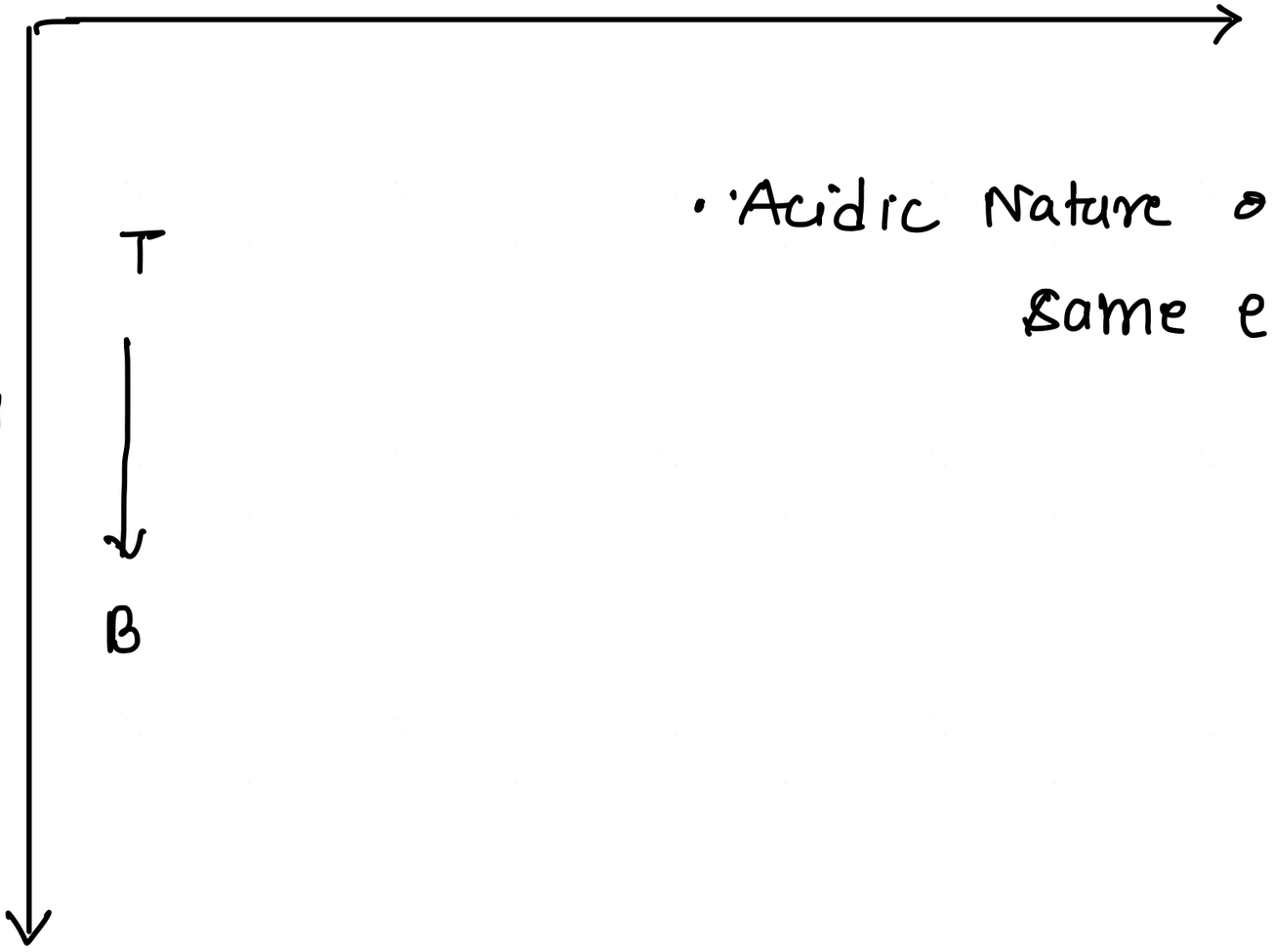
generally from P-Block

$EO^{-n} + nH^+$

Nature of hydroxide is acidic thats why called oxyacid.

L ⟶ R

Acidic Nature of hydroxide/oxyacids increases



Basic Nature increases

T

B

• Acidic Nature of oxyacid of ∝ oxidation No.
Same element

PERIODIC TABLE

Ex. Compare Basic Nature of following hydroxide.?

i) $LiOH < NaOH < KOH < RbOH < CsOH$

on going T ⟶ B in a group basic Nature increase

ii) $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2 < Sr(OH)_2 < Ba(OH)_2$

iii) $Li(OH) > Be(OH)_2$ on L ⟶ R Acidic Nature ↑ and Basic Nature ↓

iv) $KOH > Ca(OH)_2 > Cu(OH) > Zn(OH)_2$

v) $NaOH > Mg(OH)_2 > Al(OH)_3$

Ex. Compare acidic Nature of oxyacids.

(i) $\overset{+5}{HNO_3} > \overset{+3}{HNO_2}$

(ii) $\overset{+6}{H_2SO_4} > \overset{+4}{H_2SO_3}$

(iii) $\overset{+1}{HClO} < \overset{+3}{HClO_2} < \overset{+5}{HClO_3} < \overset{+7}{HClO_4}$

Acidic nature ∝ oxidation No.

(iv) $HClO > HBrO > HOI$ → T ⟶ B

Acidic Nature decrease

(v) $H_3PO_4 > H_3AsO_4$

T ⟶ B

Acidic Nature ↓

(vi) $\overset{+5}{H_3PO_4}$ $\overset{+3}{H_3PO_3}$ $\overset{+1}{H_3PO_2}$

HW
NCERT | 12th
P-Block

Ex. Select the amphotaric species from following.

BeO, Na_2O, Al_2O_3, ZnO, PbO,

PbO_2, P_2O_5, SO_3, $Al(OH)_3$, $NaOH$

$Be(OH)_2$, H_3PO_3, Cr_2O_3, $Mg(OH)_2$, $Zn(OH)_2$

$Pb(OH)_2$, $Ca(OH)_2$ HNO_3, $HBrO_4$, HIO_4

PERIODIC TABLE

- **Inert pair effect** → this effect is observed only in p-Block.

Ve = 3

B [He], $2s^2$, 2p1 — Valency = +3

Al [Ne], $3s^2$, 3p1 — Valency = +3

Ga [Ar], $4s^2$, $3d^{10}$, 4p1 — valency = +3

In [Kr] $5s^2$, $4d^{10}$, 5p1 — valency = +3

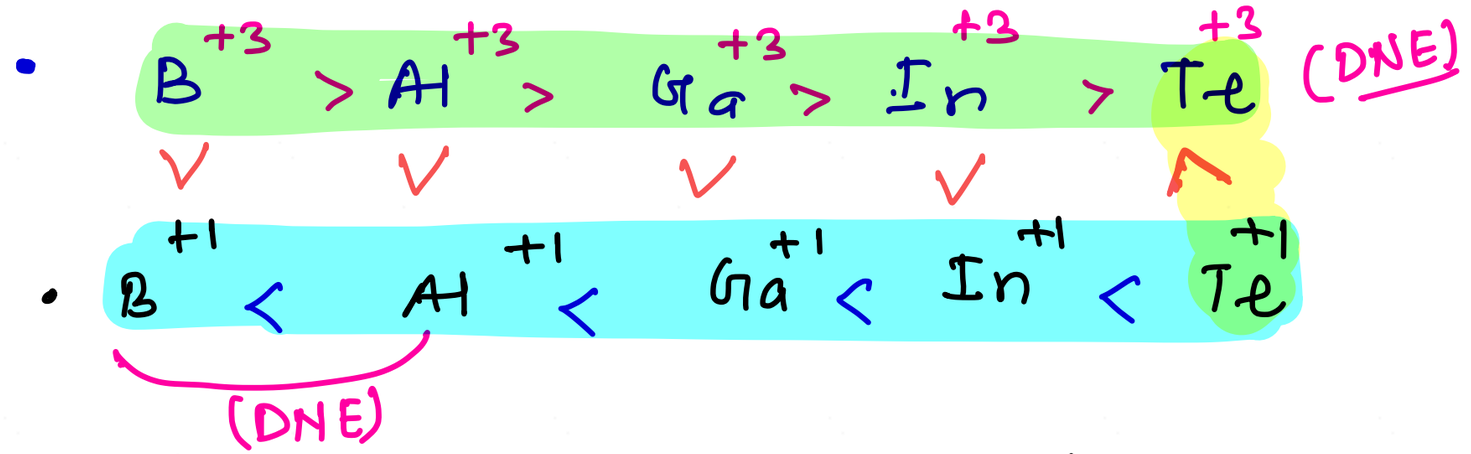
Tl [Xe], $6s^2$, $4f^{14}$, $5d^{10}$, 6p1 — Valency = +1

↳ due to very low energy of ns electron pair they anounces them set inert

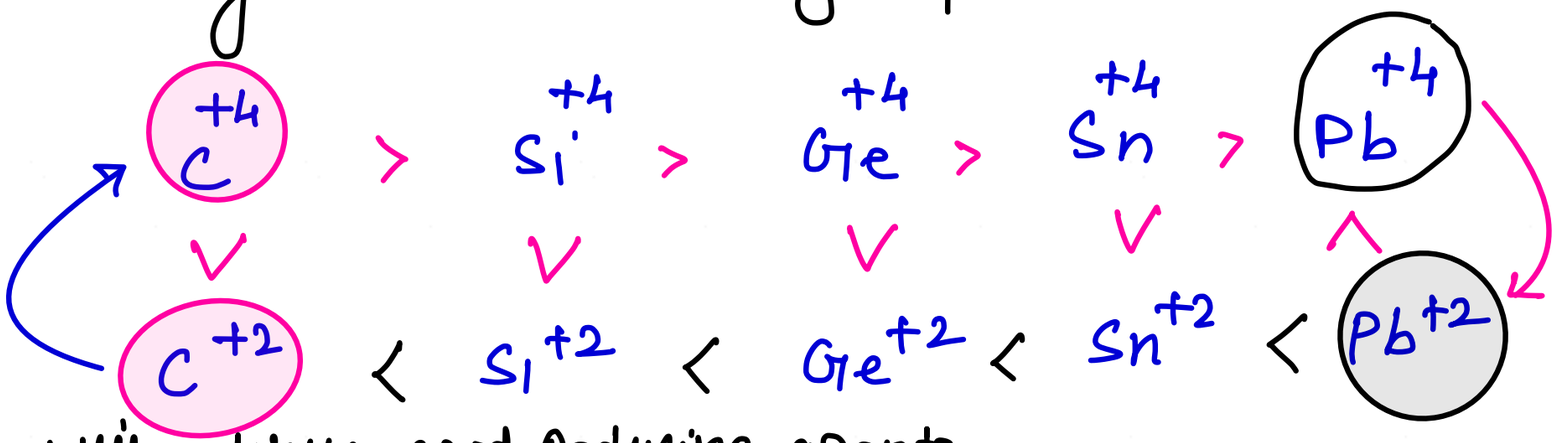
Top
↓
Bottom

valence s shell electrons becomes inert due to low energy so valency of element reduces by factor ② this effect is know as inert pair effect

PERIODIC TABLE



- Similarly for other groups also



C^{+2} will always good Reducing agents.

whenever Pb^{+4} is there that will be good oxidising agent

- Increase in oxidation No is Oxidation
- decrease in oxidation No is Reduction
- Species which get reduced is oxidising agent
- Species which oxidise is Reducing agen

PERIODIC TABLE

Hydrides

EN(M) < EN(H)

EN(H) < EN(E)

S-Block (H^-)

$MH_n \rightarrow M^{+n} + nH^{\ominus}$

$nH^{\ominus}$ → Basic Nature

$NaH_{(s)} \rightarrow Na^+_{(s)} + H^-_{(s)}$

$H^-_{(s)}$ → basic Nature

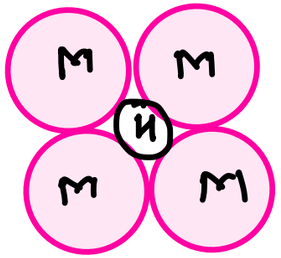
on going ↓

(T.S) ↓

Basic Nature of hydride increases

d-Block

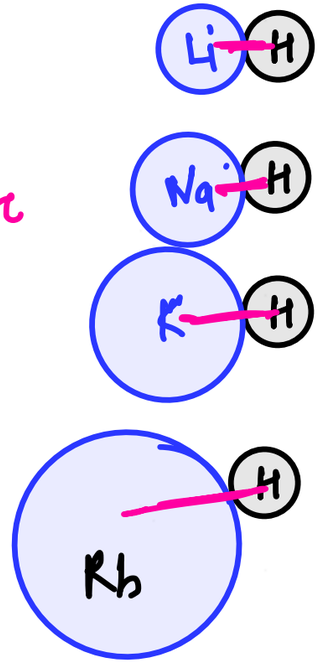
- (adsorbed)
- occulated



P-Block (H^+) (generally)

$EH_n \rightarrow E^{-n} + nH^{\oplus}$

Acidic



On going top to bottom thermal stability decreases so more H^+ produces means more acidic

Ex. Arrange the following in increasing order of given property.

PERIODIC TABLE

(a) $NaH < KH < RbH < CsH$ [Basic Nature]

(b) $HF < HCl < HBr < HI$ [Acidic Nature]

(c) $CH_4 > SiH_4 > GeH_4 > SnH_4 > PbH_4$ [thermal stability]

(d) $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$ [Basic Nature]

(e) $H_2O < H_2S < H_2Se < H_2Te$ [Acidic Nature]

DESCRIPTION OF PERIOD SUBSHELL

Nature of hydrides : Metal hydrides are Basic and Non-metal hydrides are Acidic in nature.

Order of stability of hydrohalides : HF > HCl > HBr > HI

Order of acidic strength :

In 17^{th} group : HF < HCl < HBr < HI

In 16^{th} group :

H20,H2S,H2Se,H2Te,H2Po

In 15^{th} group : NH3 < PH3 < AsH3 < SbH3 < BiH3

Thermal stability decreases, Acidic character increases

DESCRIPTION OF PERIOD SUBSHELL

TABLE

Q. In which of the following compound EN of carbon is maximum?

(A) C_2H_6 (B) C_2H_4

(C) C_2H_2 (D) Same in all

Q. Which bond is maximum polar

(A) C – I (B) N – O

(C) C – F (D) P – F

DESCRIPTION OF PERIOD SUBSHELL

Q. Arrange in correct order of acidic strength

$HClO_4 > HClO_3 > HClO_2 > HClO$

$HNO_3 > HNO_2$

$H_2SO_4 > H_2SO_3$

$N_2O_5 > N_2O_3$

$SO_3 > SO_2$

$Sb_2O_5 > Sb2O_3$

$HNO_3 > H_2CO_3 > H_3BO_3$

$HClO_4 > HBrO_4 > HIO_4$

$H_3PO_4 > H_3AsO_4 > H_3SbO_4$

$N_2O_5 > P_2O_5 > As_2O_5$

$HOF > HOCl > HOBr > HOI$

$N_2O_3 > P_2O_3 > As_2O_3 > Sb_2O_3$

$SO_3 > SeO_3 > TeO_3$

$H_2SO_3 > H_2SeO_3 > H_2TeO_3$

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PERIODIC TABLE

Density

- In a group on going top to bottom mass increases and volume increases

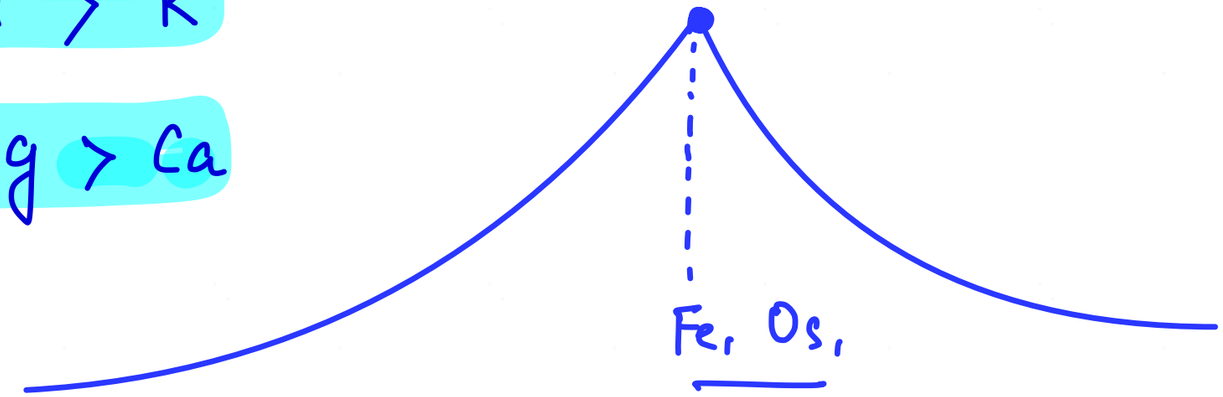
$$d = \frac{\text{mass (dominating)}}{\text{volume}}$$

- on going top to botton density increases

exception

Na > K

Mg > Ca



- Electronic configuration
- packing Efficiency
- Chemical bonding
  - → ionic
  - → Co-valent bond
  - → vanderwal
  - H-Bond
  - other

PERIODIC TABLE

• Variation

groups

i) In s Block density increases down the group.

ii) In p block density increases down the group

iii)

period → from s-Block to Mid-d-Block density increases and then density decreases.

- Li° → Lightest metal

highest → Ir = 22.63 g/cm³, Os = 22.60 g/cm³

highest liquid = Hg = 13.6 g/cm³