h-1 f-block

Group 3

Period 6 :- Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu

Z=	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
	Seene	Par	Nadiya	Prem ki	Smai	Euki	Good god	Tab	Dil	Hua	Rur	Tum	Yaswab	Loge no

Lanthanoids

Period 7 :- Actinoids

Z=	90	91	92	93	94	95	96	97	98	99	100	101
	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md
	Thode	Papad	U	Napo	Pusane	Aam	Cam	Bikeng	Cafe me	Ese	Fair mao	Madam

(102) No   Lr (103)
Noodles   Lao

General E.C. → $(n-2)f^{1-14}\ (n-1)d^{0-1}\ ns^2$

e.g., Ln → $(6-2)f^{1-14}\ (6-1)d^{0-1}\ 6s^2$

$= 4f^{1-14}\ 5d^{0-1}\ 6s^2$

Ac → $5f^{1-14}\ 6d^{0-1}\ 7s^2$

Lanthanoids

E.C. : $[Xe]\,4f^{1-14}\,5d^{0-1}\,6s^2$

Ce Pr — — — — — — Lu

58 71

(58-71)

La Hf

57 72

d-block

	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
4f	0	1	3	4	5	6	7	7	9	10	11	12	13	14	14
5d	1	1	0	0	0	0	0	1	0	0	0	0	0	0	1
6s	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

2.) O.N. :- Eu^{+2}, Yb^{+2} (Reducing agent)

- Most common :- Ln^{3+}
- Ce^{4+}, Pr^{4+}, Nd^{4+}, Tb^{4+}, Dy^{4+}

MO_2

O.A.

Prop :-

3.) Ionic Radius (Ln^{+3})

Left to Right → Ionic Radius decreases due to Increase in Effective nuclear charge (due to poor shielding of $4f^{14}$ e^- (lanthanoid contraction))

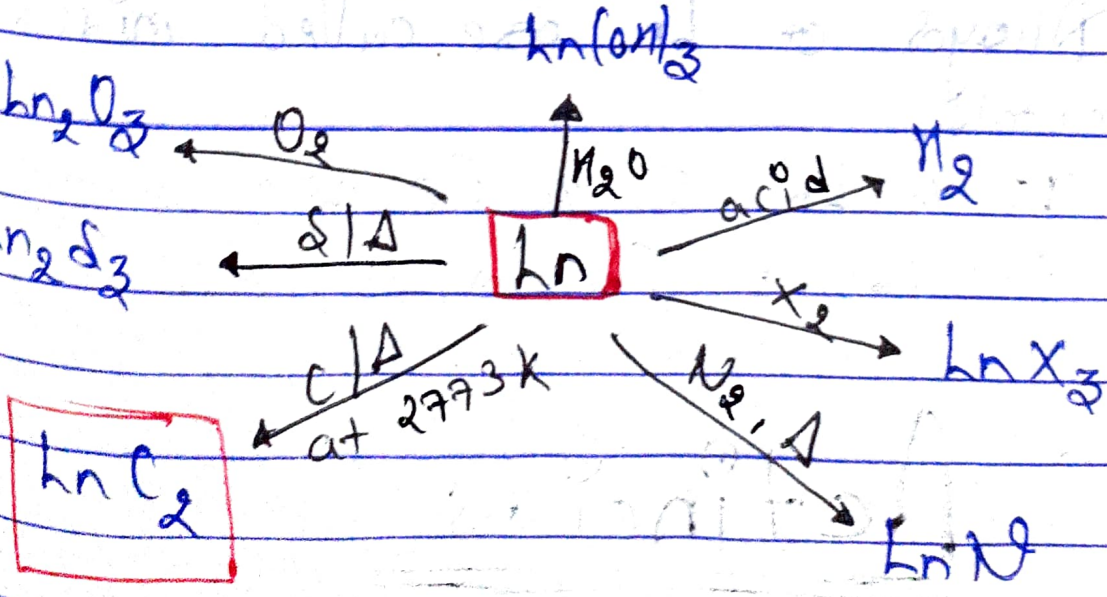
e.g., $La^{3+} > Ce^{3+} > Pm^{3+} > Sm^{3+} >$

M.I* Basic Strength of Hydroxides ($Ln(OH)_3$)

Left to Right → Basic Strength decreases

e.g., $Ce(OH)_3 > Gd(OH)_3$

4.) Chemical Rxns.



(5) General prop. :-

1.) All Ln are silvery white soft Metals.

Except (M.I$^+$:- Sm is steel hard due to strong metallic bond)

2.) Except La^{3+} & Lu^{3+} all are coloured.

3.) Except f^0 type (La^{3+} & Ce^{4+}) & f^{14} type (Yb^{2+} & Lu^{3+}) all are paramagnetic.

4.) Hardness $\propto$ atomic number.

5.) Alloys of Ln are called misch metals.

e.g., 95 % Ln 5 % Fe with some traces of Ca, S, C, etc

Actinoids

1.) E.C. :- $[Rn]5f^{1-14}6d^{0-1}7s^2$

	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
5f	0	0	2	3	4	6	7	7	9	10	11	12	13	14	14
6d	1	2	1	1	1	0	0	1	0	0	0	0	0	0	1
7s	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
OV.	3	-	3	3	3	3	3	3	3	3	3	3	3	3	3
		4	4	4	4	4	4	4	4						
			5	5	5	5	5								
				6	6	6	6								
					7	7									

2.) Size :- Left to Right :-

Size decreases due to increase in effective nuclear charge. [due to poor screening of 5f^{14} e$^{\ominus}$s i.e., Actinoid Contraction]

3.) General Prop.

1.) All are paramagnetic ✓
2.) All are silvery white metal ✓
3.) They get tarnished on exposure to alkali.
4.) All are radioactive (∵ At no. 92 onwards all elements are called transuranic elements)