Twins? Not quite

Lanthanoids

Ce → Lu

Actinoids

Th → Lr

Two f-block rows below the table (in line, the table would be **32 columns** wide).

They look alike, but **every actinoid is radioactive**.

4f deep, 5f outer

Lanthanoids

4f deep

Actinoids

5f outer

Ln: [Xe] $4f^{1\text{-}14}\ 5d^{0\text{-}1}\ 6s^{2}$; An: [Rn] $5f^{1\text{-}14}\ 6d^{0\text{-}1}\ 7s^{2}$.

5f, 6d, 7s are close in energy; 5f extends further out.

Oxidation states

Lanthanoids

+3 (+2, +4)

Actinoids

+3 to +7

Lanthanoids never go above **+4**.

Actinoids reach **+7** (Np, Pu).

Contraction

Lanthanoids	Actinoids
smaller	larger

Both shrink across the row.

The **actinoid contraction is greater** (5f shields poorly).

Radioactivity

Lanthanoids	Actinoids
only Pm	all

Among lanthanoids only **promethium** has no stable isotope.

All actinoids are radioactive; beyond U they are **lab-made**.

Bonding and magnetism

Lanthanoids	Actinoids
fewer	more

Actinoids are **more reactive**, form **more complexes** and oxo ions like UO_2^{2+}.

Their magnetism is **more complex**; early actinoids have **lower IE**.

One table to revise

f subshell	4f	5f
states	+3 (+2,+4)	+3…+7
contraction	smaller	larger
radioactive	Pm	all
complexes	fewer	more

Save this table for revision.

Your turn

Eu^{2+} vs Am^{3+}

more f electrons?

Which has **more f electrons**: Eu^{2+} or Am^{3+}?

SAVE this · **COMMENT** the chapter you want next · **FOLLOW** for more

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