

Group 3 / IIIB; Lanthanides

or "Rare Earths"

- ▶ Lanthanides are also called "rare earth". They are not really rare just hard to produce, and the present-day monopoly of China has exercised the media quite a bit. That's because they appear in many high-tech uses and are thus important for the well-being of industrialized countries.
- Lanthanides are chemically very similar because they all look the same to outsiders - their outermost electron configuration is identical.
- ▶ Actinides are evil elements and that's why we are going to ignore them
- ▶ *Table of Basic Data*

Basics

Name <i>(German)</i>	Lanthanum <i>La</i> <i>Lanthan</i>	Cerium <i>Ce</i> <i>Cer</i>	Praseodymium <i>Pr</i> <i>Praseodym</i>	Neodymium <i>Nd</i> <i>Neodym</i>	Promethium <i>Pr</i> <i>Promethium</i>	Samarium <i>Sa</i> <i>Samarium</i>	Europium <i>Eu</i> <i>Europium</i>	Gadolinium <i>Gd</i> <i>Gadolinium</i>	Terbium <i>Tb</i> <i>Terbium</i>	Dysprosium <i>Dy</i> <i>Dysprosium</i>	Holmium <i>Ho</i> <i>Holmium</i>	Erbium <i>Er</i> <i>Erbium</i>	Thulium <i>Tm</i> <i>Thulium</i>	Ytterbium <i>Yb</i> <i>Ytterbium</i>	Lutetium <i>Lu</i> <i>Lutetium</i>
Atomic number	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
Atomic mass [u]	138,9	140,1	140,9	144,2	146,9	150,3	151,25	157,2	158,9	162,5	164,9	167,2	168,9	173	174,9
Melting point [K]	1193	1069	1204	1283	1353	1345	1095	1584	1633	1682	1743	1795	1818	1097	1929
Melting point [°C]	920	796	931	1010	1080	1072	822	1311	1360	1409	1470	1522	1545	824	1656
Melting point [°F]	1688	1464	1708	1850	1976	1962	1512	2392	2480	2568	2678	2772	2813	1515	3013
Boiling point [K]															3675
Density [g/cm³]	6,16	6,77	6,48	7,00	7,22	7,54	5,25	7,89	8,25	8,56	8,78	9,05	9,32	6,97	9,84
Ionization energy [eV]	5,57	5,47	5,42	5,49	5,55	5,63	5,67	6,14	5,85	5,93	6,02	6,10	6,18	6,25	5,42
Electronegativity															1,27
Atomic radius [pm]															1,74
Ionic radius [pm]															
Oxidation numbers															3
Lattice typ Transformation temp. [°C]															
Lattice constant [Å] (a or c)															
Young's - Modul us [GPa]															69
Therm. expansion coefficient α [10 ⁻⁶ K ⁻¹]															

- In case of doubt all numbers are for room temperatures
- fcc = [face centered cubic](#); lattice const. = a
- bcc = [body centered cubic](#)
- sc = [simple cubic](#)
- hp = simple [hexagonal](#)
- hcp = [hexagonal close packed](#); lattice constants a and c.
- op = [simple orthorhombic](#), [monoclinic](#), [triclinic](#)
- tp = [simple tetragonal](#)
- dia = [diamond structure](#)
- r = [trigonal](#) or rhomboedral trigonal