

PERIODIC TABLE

Atomic Properties of the Elements

Group	Frequently used fundamental physical constants										Physical Measurement Laboratory						Standard Reference Data					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
IA											IIIA	IVA	VA	VIA	VIIA	VIII						
1	H Hydrogen 1.008* 1s 13.5984																	He Helium 4.002602 1s ² 24.5874				
2	Li Lithium 6.94* 1s ² 2s 5.3917	Be Beryllium 9.0121831 1s ² 2s ² 9.3227																	Ne Neon 20.1797 1s ² 2s ² 2p ⁶ 21.5645			
3	Na Sodium 22.98976928 [Ne]3s 5.1391	Mg Magnesium 24.305* [Ne]3s ² 7.6462																	Ar Argon 39.948 [Ne]3s ² 3p ⁶ 15.7596			
4	K Potassium 39.0983 [Ar]4s 4.3407	Ca Calcium 40.078 [Ar]4s ² 6.1132	Sc Scandium 44.955908 [Ar]3d ⁴ 4s 6.5615	Ti Titanium 47.867 [Ar]3d ² 4s ² 6.8281	V Vanadium 50.9415 [Ar]3d ³ 4s ² 6.7462	Cr Chromium 51.9961 [Ar]3d ⁵ 4s 6.7665	Mn Manganese 54.938044 [Ar]3d ⁵ 4s ² 7.4340	Fe Iron 55.845 [Ar]3d ⁶ 4s ² 7.9025	Co Cobalt 58.933194 [Ar]3d ⁷ 4s ² 7.8810	Ni Nickel 58.6934 [Ar]3d ⁸ 4s ² 7.6399	Cu Copper 63.546 [Ar]3d ¹⁰ 4s 7.7264	Zn Zinc 65.38 [Ar]3d ¹⁰ 4s ² 9.3942	Ga Gallium 69.723 [Ar]3d ¹⁰ 4s ² 4p 5.9993	Ge Germanium 72.630 [Ar]3d ¹⁰ 4s ² 4p ² 7.8994	As Arsenic 74.921595 [Ar]3d ¹⁰ 4s ² 4p ³ 7.8886	Se Selenium 78.971 [Ar]3d ¹⁰ 4s ² 4p ⁴ 9.7524	Br Bromine 79.904* [Ar]3d ¹⁰ 4s ² 4p ⁵ 11.8138	Kr Krypton 83.798 [Ar]3d ¹⁰ 4s ² 4p ⁶ 13.9996				
5	Rb Rubidium 85.4678 [Kr]5s 4.7171	Sr Strontium 87.62 [Kr]5s ² 5.6949	Y Yttrium 88.90584 [Kr]4d ⁵ 5s 6.2173	Zr Zirconium 91.224 [Kr]4d ⁵ 5s ² 6.6339	Nb Niobium 92.90637 [Kr]4d ⁴ 5s 6.7589	Mo Molybdenum 95.95 [Kr]4d ⁵ 5s 7.0924	Tc Technetium (98) [Kr]4d ⁵ 5s ² 7.1194	Ru Ruthenium 101.07 [Kr]4d ⁷ 5s 7.3605	Rh Rhodium 102.90550 [Kr]4d ⁸ 5s 7.4589	Pd Palladium 106.42 [Kr]4d ¹⁰ 8.3369	Ag Silver 107.8682 [Kr]4d ¹⁰ 5s 7.5762	Cd Cadmium 112.414 [Kr]4d ¹⁰ 5s ² 8.9938	In Indium 114.818 [Kr]4d ¹⁰ 5s ² 5p 5.7864	Sn Tin 118.710 [Kr]4d ¹⁰ 5s ² 5p ² 7.3439	Sb Antimony 121.760 [Kr]4d ¹⁰ 5s ² 5p ³ 8.6084	Te Tellurium 127.60 [Kr]4d ¹⁰ 5s ² 5p ⁴ 9.0097	I Iodine 126.90447 [Kr]4d ¹⁰ 5s ² 5p ⁵ 10.4513	Xe Xenon 131.293 [Kr]4d ¹⁰ 5s ² 5p ⁶ 12.1298				
6	Cs Cesium 132.9054520 [Xe]6s 3.8939	Ba Barium 137.327 [Xe]6s ² 5.2117		Hf Hafnium 178.49 [Xe]4f ¹⁴ 5d ⁴ 6s ² 6.8251	Ta Tantalum 180.94788 [Xe]4f ¹⁴ 5d ⁵ 6s ² 7.5496	W Tungsten 183.84 [Xe]4f ¹⁴ 5d ⁶ 6s ² 7.8640	Re Rhenium 186.207 [Xe]4f ¹⁴ 5d ⁶ 6s ² 7.8335	Os Osmium 190.23 [Xe]4f ¹⁴ 5d ⁶ 6s ² 8.4382	Ir Iridium 192.227 [Xe]4f ¹⁴ 5d ⁷ 6s ² 8.9670	Pt Platinum 195.084 [Xe]4f ¹⁴ 5d ⁹ 6s 8.9588	Au Gold 196.966569 [Xe]4f ¹⁴ 5d ¹⁰ 6s 9.2256	Hg Mercury 200.592 [Xe]4f ¹⁴ 5d ¹⁰ 6s ² 10.4375	Tl Thallium 204.38* [Hg]6p 6.1083	Pb Lead 207.2 [Hg]6p ² 7.4167	Bi Bismuth 208.98040 [Hg]6p ³ 7.2855	Po Polonium (209) [Hg]6p ⁴ 8.414	At Astatine (210) [Hg]6p ⁵ 9.31751	Rn Radon (222) [Hg]6p ⁶ 10.7485				
7	Fr Francium (223) [Rn]7s 4.0727	Ra Radium (226) [Rn]7s ² 5.2784		Rf Rutherfordium (261) [Rn]5f ¹⁴ 6d ⁴ 7s ² 6.01	Db Dubnium (268) [Rn]5f ¹⁴ 6d ³ 7s ² 6.8	Sg Seaborgium (266) [Rn]5f ¹⁴ 6d ⁴ 7s ² 7.8	Bh Bohrium (272) [Rn]5f ¹⁴ 6d ⁵ 7s ² 7.7	Hs Hassium (277) [Rn]5f ¹⁴ 6d ⁶ 7s ² 7.6	Mt Meitnerium (276) [Rn]5f ¹⁴ 6d ⁷ 7s ² 7.6	Ds Darmstadtium (281) [Rn]5f ¹⁴ 6d ⁸ 7s ² 7.6	Rg Roentgenium (280) [Rn]5f ¹⁴ 6d ⁹ 7s ² 7.6	Cn Copernicium (285) [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7.6	Uut Ununtrium (284) [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7.6	Fl Flerovium (289) [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7.6	Uup Ununpentium (288) [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7.6	Lv Livermorium (293) [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7.6	Uus Ununseptium (294) [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7.6	Uuo Ununoctium (294) [Rn]5f ¹⁴ 6d ¹⁰ 7s ² 7.6				
			La Lanthanum 138.90547 [Xe]5d ⁶ 6s ² 5.5769	Ce Cerium 140.116 [Xe]4f ¹ 5d ¹ 6s ² 5.5386	Pr Praseodymium 140.907 [Xe]4f ³ 6s ² 5.473	Nd Neodymium 144.242 [Xe]4f ⁴ 6s ² 5.5250	Pm Promethium (145) [Xe]4f ⁵ 6s ² 5.582	Sm Samarium 150.36 [Xe]4f ⁶ 6s ² 5.6437	Eu Europium 151.964 [Xe]4f ⁷ 6s ² 5.6704	Gd Gadolinium 157.25 [Xe]4f ⁷ 5d ¹ 6s ² 6.1498	Tb Terbium 158.92535 [Xe]4f ⁹ 6s ² 5.8638	Dy Dysprosium 162.500 [Xe]4f ¹⁰ 6s ² 5.9391	Ho Holmium 164.93033 [Xe]4f ¹¹ 6s ² 6.0215	Er Erbium 167.259 [Xe]4f ¹² 6s ² 6.1077	Tm Thulium 168.93422 [Xe]4f ¹³ 6s ² 6.1843	Yb Ytterbium 173.054 [Xe]4f ¹⁴ 6s ² 6.2542	Lu Lutetium 174.9668 [Xe]4f ¹⁴ 5d ¹ 6s ² 5.4259					
			Ac Actinium (227) [Rn]6d ⁷ 7s ² 5.3802	Th Thorium 232.0377 [Rn]6d ² 7s ² 6.3067	Pa Protactinium 231.03688 [Rn]5f ² 6d ⁷ 7s ² 5.89	U Uranium 238.02891 [Rn]5f ³ 6d ⁷ 7s ² 6.1941	Np Neptunium (237) [Rn]5f ⁴ 6d ⁷ 7s ² 6.2655	Pu Plutonium (244) [Rn]5f ⁶ 7s ² 6.0258	Am Americium (243) [Rn]5f ⁷ 7s ² 5.9738	Cm Curium (247) [Rn]5f ⁷ 6d ⁷ 7s ² 5.9914	Bk Berkelium (247) [Rn]5f ⁹ 7s ² 6.1978	Cf Californium (251) [Rn]5f ¹⁰ 7s ² 6.2817	Es Einsteinium (252) [Rn]5f ¹¹ 7s ² 6.3676	Fm Fermium (257) [Rn]5f ¹² 7s ² 6.50	Md Mendelevium (258) [Rn]5f ¹³ 7s ² 6.58	No Nobelium (259) [Rn]5f ¹⁴ 7s ² 6.65	Lr Lawrencium (262) [Rn]5f ¹⁴ 7s ² 7p 4.90					

Frequently used fundamental physical constants

For the most accurate values of these and other constants, visit physics.nist.gov/constants

1 second = 9 192 631 770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of ¹³³Cs

speed of light in vacuum *c* 299 792 458 m s⁻¹ (exact)

Planck constant *h* 6.626 07 x 10⁻³⁴ J s (*h* = *h*/2π)

elementary charge *e* 1.602 177 x 10⁻¹⁹ C

electron mass *m_e* 9.109 38 x 10⁻³¹ kg

m_ec² 0.511 999 MeV

proton mass *m_p* 1.672 622 x 10⁻²⁷ kg

fine-structure constant *α* 1/137.035 999

Rydberg constant *R_∞* 10 973 731.569 m⁻¹

R_∞c 3.289 841 960 x 10¹⁵ Hz

R_∞hc 13.605 69 eV

Boltzmann constant *k* 1.380 6 x 10⁻²³ J K⁻¹

- Solids
- Liquids
- Gases
- Artificially Prepared

Atomic Number: 58

Ground-state Level: 1G₄

Symbol: **Ce**

Name: Cerium

Standard Atomic Weight: 140.116

Ground-state Configuration: [Xe]4f5d6s²

Ionization Energy (eV): 5.5386

[†]Based upon ¹²C. () indicates the mass number of the longest-lived isotope.

*IUPAC conventional atomic weights; standard atomic weights for these elements are expressed in intervals; see iupac.org for an explanation and values.