

# PERIODIC TABLE Atomic Properties of the Elements

**NIST**

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VIIIA

<p><b>Frequently used fundamental physical constants</b> For the most accurate values of these and other constants, visit <a href="http://physics.nist.gov/constants">physics.nist.gov/constants</a> 1 second = 9 192 631 770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of <sup>133</sup>Cs speed of light in vacuum <math>c</math> 299 792 458 m s<sup>-1</sup> (exact) Planck constant <math>h</math> 6.6261 × 10<sup>-34</sup> J s elementary charge <math>e</math> 1.6022 × 10<sup>-19</sup> C electron mass <math>m_e</math> 9.1094 × 10<sup>-31</sup> kg proton mass <math>m_p</math> 1.6726 × 10<sup>-27</sup> kg fine-structure constant <math>\alpha</math> 1/137.036 Rydberg constant <math>R_\infty</math> 10 973 732 m<sup>-1</sup> <math>R_\infty c</math> 3.289 842 × 10<sup>15</sup> Hz <math>R_\infty hc</math> 13.6057 eV Boltzmann constant <math>k</math> 1.3807 × 10<sup>-23</sup> J K<sup>-1</sup></p>																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IA	IIA	IIIB	IVB	VB	VIB	VIIIB	VIII	IB	IIB	IIIB	IIIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
1 <b>H</b> Hydrogen 1.00794 1s	2 <b>He</b> Helium 4.002602 1s <sup>2</sup>	3 <b>Li</b> Lithium 6.941 1s <sup>2</sup> 2s <sup>1</sup>	4 <b>Be</b> Beryllium 9.012182 1s <sup>2</sup> 2s <sup>2</sup>	5 <b>B</b> Boron 10.811 1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>1</sup>	6 <b>C</b> Carbon 12.0107 1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>2</sup>	7 <b>N</b> Nitrogen 14.0067 1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>3</sup>	8 <b>O</b> Oxygen 15.9994 1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>4</sup>	9 <b>F</b> Fluorine 18.9984032 1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>5</sup>	10 <b>Ne</b> Neon 20.1797 1s <sup>2</sup> 2s <sup>2</sup> 2p <sup>6</sup>	11 <b>Na</b> Sodium 22.989770 [Ne]3s <sup>1</sup>	12 <b>Mg</b> Magnesium 24.3050 [Ne]3s <sup>2</sup>	13 <b>Al</b> Aluminum 26.981538 [Ne]3s <sup>2</sup> 3p <sup>1</sup>	14 <b>Si</b> Silicon 28.0855 [Ne]3s <sup>2</sup> 3p <sup>2</sup>	15 <b>P</b> Phosphorus 30.973761 [Ne]3s <sup>2</sup> 3p <sup>3</sup>	16 <b>S</b> Sulfur 32.065 [Ne]3s <sup>2</sup> 3p <sup>4</sup>	17 <b>Cl</b> Chlorine 35.453 [Ne]3s <sup>2</sup> 3p <sup>5</sup>	18 <b>Ar</b> Argon 39.948 [Ne]3s <sup>2</sup> 3p <sup>6</sup>
19 <b>K</b> Potassium 39.0983 [Ar]4s <sup>1</sup>	20 <b>Ca</b> Calcium 40.078 [Ar]4s <sup>2</sup>	21 <b>Sc</b> Scandium 44.955910 [Ar]3d <sup>1</sup> 4s <sup>2</sup>	22 <b>Ti</b> Titanium 47.867 [Ar]3d <sup>2</sup> 4s <sup>2</sup>	23 <b>V</b> Vanadium 50.9415 [Ar]3d <sup>3</sup> 4s <sup>2</sup>	24 <b>Cr</b> Chromium 51.9961 [Ar]3d <sup>5</sup> 4s <sup>1</sup>	25 <b>Mn</b> Manganese 54.938049 [Ar]3d <sup>5</sup> 4s <sup>2</sup>	26 <b>Fe</b> Iron 55.845 [Ar]3d <sup>6</sup> 4s <sup>2</sup>	27 <b>Co</b> Cobalt 58.933200 [Ar]3d <sup>7</sup> 4s <sup>2</sup>	28 <b>Ni</b> Nickel 58.6934 [Ar]3d <sup>8</sup> 4s <sup>2</sup>	29 <b>Cu</b> Copper 63.546 [Ar]3d <sup>10</sup> 4s <sup>1</sup>	30 <b>Zn</b> Zinc 65.409 [Kr]3d <sup>10</sup> 4s <sup>2</sup>	31 <b>Ga</b> Gallium 69.723 [Ar]3d <sup>10</sup> 4s <sup>2</sup> 4p <sup>1</sup>	32 <b>Ge</b> Germanium 72.64 [Ar]3d <sup>10</sup> 4s <sup>2</sup> 4p <sup>2</sup>	33 <b>As</b> Arsenic 74.92160 [Ar]3d <sup>10</sup> 4s <sup>2</sup> 4p <sup>3</sup>	34 <b>Se</b> Selenium 78.96 [Ar]3d <sup>10</sup> 4s <sup>2</sup> 4p <sup>4</sup>	35 <b>Br</b> Bromine 79.904 [Ar]3d <sup>10</sup> 4s <sup>2</sup> 4p <sup>5</sup>	36 <b>Kr</b> Krypton 83.798 [Ar]3d <sup>10</sup> 4s <sup>2</sup> 4p <sup>6</sup>
37 <b>Rb</b> Rubidium 85.4678 [Kr]5s <sup>1</sup>	38 <b>Sr</b> Strontium 87.62 [Kr]5s <sup>2</sup>	39 <b>Y</b> Yttrium 88.90585 [Kr]4d <sup>1</sup> 5s <sup>2</sup>	40 <b>Zr</b> Zirconium 91.224 [Kr]4d <sup>2</sup> 5s <sup>2</sup>	41 <b>Nb</b> Niobium 92.90638 [Kr]4d <sup>4</sup> 5s <sup>1</sup>	42 <b>Mo</b> Molybdenum 95.94 [Kr]4d <sup>5</sup> 5s <sup>1</sup>	43 <b>Tc</b> Technetium (98) [Kr]4d <sup>5</sup> 5s <sup>2</sup>	44 <b>Ru</b> Ruthenium 101.07 [Kr]4d <sup>7</sup> 5s <sup>1</sup>	45 <b>Rh</b> Rhodium 102.90550 [Kr]4d <sup>8</sup> 5s <sup>1</sup>	46 <b>Pd</b> Palladium 106.42 [Kr]4d <sup>10</sup> 5s <sup>0</sup>	47 <b>Ag</b> Silver 107.8682 [Kr]4d <sup>10</sup> 5s <sup>1</sup>	48 <b>Cd</b> Cadmium 112.411 [Kr]4d <sup>10</sup> 5s <sup>2</sup>	49 <b>In</b> Indium 114.818 [Kr]4d <sup>10</sup> 5s <sup>2</sup> 5p <sup>1</sup>	50 <b>Sn</b> Tin 118.710 [Kr]4d <sup>10</sup> 5s <sup>2</sup> 5p <sup>2</sup>	51 <b>Sb</b> Antimony 121.760 [Kr]4d <sup>10</sup> 5s <sup>2</sup> 5p <sup>3</sup>	52 <b>Te</b> Tellurium 127.60 [Kr]4d <sup>10</sup> 5s <sup>2</sup> 5p <sup>4</sup>	53 <b>I</b> Iodine 126.90447 [Kr]4d <sup>10</sup> 5s <sup>2</sup> 5p <sup>5</sup>	54 <b>Xe</b> Xenon 131.293 [Kr]4d <sup>10</sup> 5s <sup>2</sup> 5p <sup>6</sup>
55 <b>Cs</b> Cesium 132.90545 [Xe]6s <sup>1</sup>	56 <b>Ba</b> Barium 137.327 [Xe]6s <sup>2</sup>	57 <b>La</b> Lanthanum 138.9055 [Xe]5d <sup>1</sup> 6s <sup>2</sup>	58 <b>Ce</b> Cerium 140.116 [Xe]5d <sup>1</sup> 6s <sup>2</sup>	59 <b>Pr</b> Praseodymium 140.90765 [Xe]4f <sup>3</sup> 6s <sup>2</sup>	60 <b>Nd</b> Neodymium 144.24 [Xe]4f <sup>4</sup> 6s <sup>2</sup>	61 <b>Pm</b> Promethium (145) [Xe]4f <sup>5</sup> 6s <sup>2</sup>	62 <b>Sm</b> Samarium 150.36 [Xe]4f <sup>6</sup> 6s <sup>2</sup>	63 <b>Eu</b> Europium 151.964 [Xe]4f <sup>7</sup> 6s <sup>2</sup>	64 <b>Gd</b> Gadolinium 157.25 [Xe]4f <sup>7</sup> 5d <sup>1</sup> 6s <sup>2</sup>	65 <b>Tb</b> Terbium 158.92534 [Xe]4f <sup>9</sup> 6s <sup>2</sup>	66 <b>Dy</b> Dysprosium 162.500 [Xe]4f <sup>10</sup> 6s <sup>2</sup>	67 <b>Ho</b> Holmium 164.93032 [Xe]4f <sup>11</sup> 6s <sup>2</sup>	68 <b>Er</b> Erbium 167.259 [Xe]4f <sup>12</sup> 6s <sup>2</sup>	69 <b>Tm</b> Thulium 168.93421 [Xe]4f <sup>13</sup> 6s <sup>2</sup>	70 <b>Yb</b> Ytterbium 173.04 [Xe]4f <sup>14</sup> 6s <sup>2</sup>	71 <b>Lu</b> Lutetium 174.967 [Xe]4f <sup>14</sup> 5d <sup>1</sup> 6s <sup>2</sup>	
87 <b>Fr</b> Francium (223) [Rn]7s <sup>2</sup>	88 <b>Ra</b> Radium (226) [Rn]7s <sup>2</sup>	89 <b>Ac</b> Actinium (227) [Rn]6d <sup>1</sup> 7s <sup>2</sup>	90 <b>Th</b> Thorium 232.0381 [Rn]6d <sup>2</sup> 7s <sup>2</sup>	91 <b>Pa</b> Protactinium 231.03688 [Rn]5f <sup>2</sup> 6d <sup>1</sup> 7s <sup>2</sup>	92 <b>U</b> Uranium 238.02891 [Rn]5f <sup>3</sup> 6d <sup>1</sup> 7s <sup>2</sup>	93 <b>Np</b> Neptunium (237) [Rn]5f <sup>4</sup> 6d <sup>1</sup> 7s <sup>2</sup>	94 <b>Pu</b> Plutonium (244) [Rn]5f <sup>6</sup> 7s <sup>2</sup>	95 <b>Am</b> Americium (243) [Rn]5f <sup>7</sup> 7s <sup>2</sup>	96 <b>Cm</b> Curium (247) [Rn]5f <sup>7</sup> 6d <sup>1</sup> 7s <sup>2</sup>	97 <b>Bk</b> Berkelium (247) [Rn]5f <sup>9</sup> 7s <sup>2</sup>	98 <b>Cf</b> Californium (251) [Rn]5f <sup>10</sup> 7s <sup>2</sup>	99 <b>Es</b> Einsteinium (252) [Rn]5f <sup>11</sup> 7s <sup>2</sup>	100 <b>Fm</b> Fermium (257) [Rn]5f <sup>12</sup> 7s <sup>2</sup>	101 <b>Md</b> Mendelevium (258) [Rn]5f <sup>13</sup> 7s <sup>2</sup>	102 <b>No</b> Nobelium (259) [Rn]5f <sup>14</sup> 7s <sup>2</sup>	103 <b>Lr</b> Lawrencium (262) [Rn]5f <sup>14</sup> 7p <sup>1</sup>	
116 <b>Uuh</b> Ununhexium (292)	117 <b>Uuq</b> Ununquadium (289)	118 <b>Uuo</b> Ununoctium (286)	119 <b>Uuq</b> Ununquadium (289)	120 <b>Uuq</b> Ununquadium (289)	121 <b>Uuq</b> Ununquadium (289)	122 <b>Uub</b> Unubium (285)	123 <b>Uuq</b> Ununquadium (289)	124 <b>Uuq</b> Ununquadium (289)	125 <b>Uuq</b> Ununquadium (289)	126 <b>Uuq</b> Ununquadium (289)	127 <b>Uuq</b> Ununquadium (289)	128 <b>Uuq</b> Ununquadium (289)	129 <b>Uuq</b> Ununquadium (289)	130 <b>Uuq</b> Ununquadium (289)	131 <b>Uuq</b> Ununquadium (289)	132 <b>Uuq</b> Ununquadium (289)	

Solids  
 Liquids  
 Gases  
 Artificially Prepared

Atomic Number: 58  
Symbol: Ce  
Name: Cerium  
Atomic Weight: 140.116  
Ground-state Configuration: [Xe]4f15d6s2  
Ionization Energy (eV): 5.5387