

## Iron ${}_{26}\text{Fe}^{55.847}$

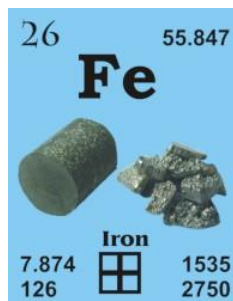
Known to ancient civilizations.

French: fer

German: Eisen

Italian: ferro

Spanish: hierro



Atomic number	26
Density in g/cm <sup>3</sup>	7.874
Atomic radius in pm	156
Atomic weight	55.845
Melting point in °C	1535
Boiling point in °C	2750

**Description:** Iron, when absolutely pure, is lustrous, silvery and soft (workable). This is the most important of all the metals and it is used chiefly as steel in which there is carbon (up to 1.7%). Stainless steels are alloys with other metals, mainly nickel. Iron rusts in damp air and dissolves readily in dilute acids. Its uses are legion.

### IRON SINGLE CRYSTAL PROPERTIES

<b>State:</b>	single crystal
<b>Crystal structure:</b>	bcc
<b>Production method:</b>	Strain annealing
<b>Standard size:</b>	diameter 6-10mm thickness 1-2mm
<b>Orientation:</b>	(100), (110) and (111)
<b>Orientation accuracy:</b>	<2°, <1°, <0.4° or <0.1°
<b>Polishing:</b>	as cut, one or two sides polished
<b>Roughness of surface:</b>	<0.03µm
<b>Purity:</b>	99.98%
	C 3
	H < 1
	O 9
	N < 5
	Cu 1.60
	Fe 1.80
	Ni < 1
	Pb 0.30
	Si 0.30
	Ga, Hf and Ta are below the detection limit
<b>Density:</b>	7.86 g/cm <sup>3</sup>
<b>Melting point:</b>	1534.85 °C / 1808 °K
<b>Boiling point:</b>	2749.85 °C / 3023 °K
<b>Molar volume:</b>	7.09 cm <sup>3</sup>
<b>Thermal conductivity:</b>	80.2 [300 K] Wm <sup>-1</sup> K <sup>-1</sup>
<b>Coefficient of linear thermal expansion:</b>	12.3 x 10 <sup>-6</sup> K <sup>-1</sup>
<b>Electrical resistivity:</b>	9.71x 10 <sup>-8</sup> [293 K] Wm

#### Typical analysis (ppm):



<b>Mass magnetic susceptibility:</b>	ferromagnetic
<b>Young's modulus:</b>	152.3 GPa (cast); 208 GPa (steel)
<b>Rigidity modulus:</b>	60.0 GPa (cast); 81 GPa (steel)
<b>Bulk modulus:</b>	109.5 GPa (cast); 160 GPa (steel)
<b>Poisson's ratio:</b>	0.27 (cast); 0.27 (steel)
<b>Radii:</b>	Fe <sup>3+</sup> 67; Fe <sup>2+</sup> 82; atomic 124; covalent 116; van de
<b>Electronegativity:</b>	1.83 (Pauling); 1.64 (Allred); 4.06 eV (absolute)
<b>Effective nuclear charge:</b>	3.75 (Slater); 5.43 (Clementi); 7.40 (Froese-Fischer)
<b>Number of Isotopes (incl. nuclear isomers):</b>	16
<b>Isotope mass range:</b>	49 -> 63
<b>Crystal structure, (cell dimensions / pm), space group</b>	bcc
<b>X-ray diffraction: mass absorption coefficients:</b>	CuK $\alpha$ 308 ( $\mu/r$ ) / cm <sup>2</sup> g <sup>-1</sup> MoK $\alpha$ 38.5 ( $\mu/r$ ) / cm <sup>2</sup> g <sup>-1</sup>
<b>Neutron scattering length:</b>	0.954 b/10 <sup>-12</sup> cm
<b>Thermal neutron capture cross-section:</b>	2.56 sa / barns

