

Copper ${}_{29}\text{Cu}^{63.54}$

Known to ancient civilizations.

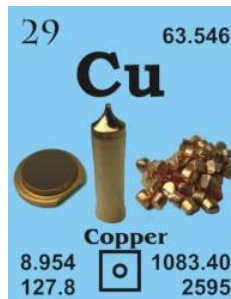
[Latin: cuprum = cyprus]

French: cuivre

German: kupfer

Italian: rame

Spanish: cobre



Atomic number	27
Density in g/cm ³	8.89
Atomic radius in pm	152
Atomic weight	58.933
Melting point in °C	1495
Boiling point in °C	2870

Description: Copper is a reddish metal, malleable and ductile, with high electrical conductivity, making it ideal for electrical wiring, probably its most important commercial use. Copper is resistant to air and water, and is used as roofing material for public buildings, where it slowly weathers to an attractive green surface patina of copper carbonate. Historically copper has been important as one of the first worked metals, especially as the alloy bronze. It is still used in coins.

COPPER SINGLE CRYSTAL PROPERTIES

State:	Single crystal
Crystal structure:	fcc
Production method:	Czochralski
Standard size:	diameter 10-60mm thickness 1-2mm
Orientation:	(100), (110) and (111)
Orientation accuracy:	<2°, <1°, <0.4° or <0.1°
Polishing:	as cut, one or two sides polished
Roughness of surface:	<0.03 μm
Purity:	99.999%
	Ag 0.8
	Bi 0.1
	Cd < 1
	Cr < 1
	Fe 0.8
	Mg < 1
Typical analysis (ppm):	Pb 0.3
	Si < 1
	Sb < 1
	Zn < 0.1
	Cu balance
	As, Ca, In, Mn, Ni, Te, Tl, Hg are below the detection limit



Crystal structure:	(cell dimensions/pm), space group, f.c.c. ($a=361.47$), Fm3m
X-ray diffractions mass absorption coefficients:	CuK α 52.9 ($\mu/\text{cm}^2\text{g}^{-1}$) MoK α 50.9 ($\mu/\text{cm}^2\text{g}^{-1}$)
Neutron scattering length:	0.7718 b/10 ⁻¹² cm
Thermal neutron capture cross-section:	3.78 σ_a / barns
Density:	8.96 kg/m ⁻³
Melting point:	1083.45 °C / 1356.6 °K
Boiling point:	2566.85 °C / 2840 °K
Molar volume:	7.09 cm ³
Thermal conductivity:	401 [300 K] Wm ⁻¹ K ⁻¹
Coefficient of linear thermal expansion:	16.5 x 10 ⁻⁶ K ⁻¹
Electrical resistivity:	1.6730 x 10 ⁻⁸ [293 K] Ωm
Mass magnetic susceptibility:	-1081 x 10 ⁻⁹ (s) kg ⁻¹ m ³
Young's modulus:	129.8 GPa
Rigidity modulus:	48.3 GPa
Bulk modulus:	137.8 GPa
Poisson's ratio:	0.343
Radi:	Cu ²⁺ 72; Cu ⁺ 96; atomic 128; covalent 117
Electronegativity:	1.90 (Pauling); 1.75 (Allred); 4.48 eV (absolute)
Effective nuclear charge:	4.20 (Slater); 5.84 (Clementi); 8.07 (Froese-Fischer)
Number of Isotopes (incl. nuclear isomers):	18
Isotope mass range:	58 -> 73

