

## Stable isotopes of copper available from ISOFLEX

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Enrichment Level	Chemical Form
Cu-63	29	34	62.929601	69.17%	99.90%	Metal
Cu-63	29	34	62.929601	69.17%	99.90%	Oxide
Cu-65	29	36	64.927794	30.83%	89.70-99.00%	Metal
Cu-65	29	36	64.927794	30.83%	89.70-99.00%	Oxide

**29**  
**Cu**

The discovery of copper dates from prehistoric times. There are reports that copper beads dating to 9000 BC have been found in Iraq. Techniques for refining copper from its ore were discovered around 5000 BC, and it was used in pottery in North Africa by about 4000 BC. Part of the reason it was used so early is that it is relatively easy to shape, although it is too soft to be used in most tools. When combined with other metals, the resulting alloys are harder than copper — bronze, for example, which is a mixture of copper and tin. Copper's name derives from the Latin word *cuprum*, meaning "the island of Cyprus."

Copper has a distinctive reddish-brown color; it is ductile and has a face-centered cubic crystal. It is insoluble in water and dissolves in nitric acid and hot sulfuric acid; it is slightly soluble in hydrochloric acid and is soluble in ammonium hydroxide, ammonium carbonate and potassium cyanide solutions. Copper is more resistant to atmospheric corrosion than iron, forming a green layer of hydrated basic carbonate. Heating the metal in dry air or oxygen yields black copper(II) oxide, which on further heating at high temperatures converts to the red cuprous form. Copper(II) ion readily forms complexes with various ligands. It forms a deep blue solution in aqueous ammonia.

The metal, its compounds and its alloys have numerous applications in every sphere of life, making it one of the most important metals. Almost all coinages in the world are made out of copper or its alloys. The metal is an excellent conductor of electricity and heat and is used in electric wiring, switches and electrodes. Other applications include plumbing, piping, roofing, cooking utensils, construction materials and electroplated protective coatings.

Although the toxicity of metallic copper is very low, many copper(II) salts may have varying degrees of toxicity. Inhalation of dusts, mists or fumes of the metal can cause nasal perforation, cough, dry throat, muscle ache, chills and "metal fever." Copper in trace amounts is a nutritional requirement, however, used metabolically in plant and animal enzymes and other biological molecules.

### Properties of Copper

<b>Name</b>	Copper
<b>Symbol</b>	Cu
<b>Atomic number</b>	29
<b>Atomic weight</b>	63.546

## Properties of Copper (continued)

<b>Standard state</b>	Solid at 298 °K
<b>CAS Registry ID</b>	7440-50-8
<b>Group in periodic table</b>	11
<b>Group name</b>	Coinage metal
<b>Period in periodic table</b>	4
<b>Block in periodic table</b>	d-block
<b>Color</b>	Copper, metallic
<b>Classification</b>	Metallic
<b>Melting point</b>	1083.4 °C
<b>Boiling point</b>	2567 °C
<b>Thermal conductivity</b>	401 W/(m·K) at 298.2 °K
<b>Electrical resistivity</b>	1.678 $\mu\Omega\cdot\text{cm}$ at 20 °C
<b>Electronegativity</b>	1.9
<b>Specific heat</b>	0.386 c in J/g·K at 20 °C
<b>Heat of vaporization</b>	300 kJ·mol <sup>-1</sup>
<b>Heat of fusion</b>	13.10 kJ·mol <sup>-1</sup>
<b>Density of solid</b>	8.92 g/cm <sup>3</sup>
<b>Electron configuration</b>	[Ar]3d <sup>10</sup> 4s <sup>1</sup> (electron configuration of Cu <sup>+</sup> [Ar]3d <sup>10</sup> and Cu <sup>2+</sup> [Ar]3d <sup>9</sup> )
<b>Oxidation states</b>	+1 or +2