



Copper Ore 銅礦產品介紹



(1) Introduction 產品介紹

The concentration of copper in ores averages only 0.6%. Most copper is mined as copper sulfides from large open pit mines. The minerals found in land ores are concentrated from crushed ores to the level of 10–15% copper by froth flotation or bioleaching. After flash smelting, it was electrolytically refined. This step exploits the relatively easy reduction of copper oxides to copper metal.

由於銅礦含銅量在 1% 以下，其開採後的處理手續遠比鐵礦複雜許多，首先磨成粉狀，加水、加油，以浮選法得到較高含量的銅，再放入鍛燒爐中融化製成銅塊，最後用電解法去除雜質，成為純度百分之 99.9% 的銅錠。

(2) Features 產品特性

Copper is a soft, malleable, and ductile metal with very high thermal and electrical conductivity. A freshly exposed surface of pure copper has a pinkish-orange color. It is used as a conductor of heat and electricity, as a building material, and as a constituent of various metal alloys.

純銅是柔軟的金屬，表面剛切開時為紅橙色帶金屬光澤，延展性好、導熱性和導



電性高，因此在電纜、電氣和電子元件是最常用的材料，也可用作建築材料，以及組成眾多種合金。

Many electrical devices rely on copper wiring because of its multitude of inherent beneficial properties, such as its high electrical conductivity, tensile strength, ductility, creep (deformation) resistance, ease of soldering, and ease of installation. The major applications of copper are electrical wire, roofing and plumbing, and industrial machinery. It is used mostly as a pure metal, but when greater hardness is required, it is put into such alloys as brass and bronze. Moreover, copper is recyclable without any loss of quality, both from raw state and from manufactured products.

銅透過熔解、鑄造、壓延等工序改變形狀，便可製成汽車零件以及電子零件，經過加工的銅製品統稱為「伸銅品」。銅合金的機械性能優異，電阻率低，其中最重要的是青銅和黃銅；銅也是耐用的金屬，可以多次回收而無損其機械性能。

(3) List of Copper Ores

Name	Formula	% Copper when pure
Chalcopyrite	CuFeS_2	34.5
Chalcocite	Cu_2S	79.8
Covellite	CuS	66.5
Bornite	$2\text{Cu}_2\text{S}\cdot\text{CuS}\cdot\text{FeS}$	63.3
Tetrahedrite	$\text{Cu}_3\text{SbS}_3 + x(\text{Fe}, \text{Zn})_6\text{Sb}_2\text{S}_9$	32-45
Digenite	Cu_9S_5	78.1
Malachite	$\text{CuCO}_3\cdot\text{Cu}(\text{OH})_2$	57.7
Azurite	$2\text{CuCO}_3\cdot\text{Cu}(\text{OH})_2$	55.1
Cuprite	Cu_2O	88.8
Chrysocolla	$(\text{Cu}, \text{Al})_2\text{H}_2\text{Si}_2\text{O}_5(\text{OH})_4\cdot n(\text{H})$	37.9



Name	Formula	% Copper when pure
	2O)	
Tennantite	Cu ₁₂ As ₄ S ₁₃	51.6
Dioptase	CuSiO ₂ (OH) ₂	45.3
Enargite	Cu ₃ As ₄ S ₄	48.4

銅礦石列表

名稱	化學式	銅含量%
黃銅礦	CuFeS ₂	34.5
輝銅礦	Cu ₂ S	79.8
銅藍	CuS	66.5
斑銅礦	2Cu ₂ S·CuS·FeS	63.3
黝銅礦	Cu ₃ SbS ₃ + x(Fe,Zn) ₆ Sb ₂ S ₉	32–45
藍輝銅礦	Cu ₉ S ₅	78.1
孔雀石	CuCO ₃ ·Cu(OH) ₂	57.7
藍銅礦	2CuCO ₃ ·Cu(OH) ₂	55.1
赤銅礦	Cu ₂ O	88.8
矽孔雀石	(Cu,Al) ₂ H ₂ Si ₂ O ₅ (OH) ₄ ·n(H ₂ O)	37.9
砷黝銅礦	Cu ₁₂ As ₄ S ₁₃	51.6
翠銅礦	CuSiO ₂ (OH) ₂	45.3
硫砷銅礦	Cu ₃ As ₄ S ₄	48.4

(4) Physical and Chemical Characteristics 物理與化學性質

The softness of copper partly explains its high electrical conductivity (59.6 × 10⁶ S/m) and high thermal conductivity, second highest (second only to



silver) among pure metals at room temperature.

物理性質：銅不但柔軟，導電性 (59.6×10^6 S/m)、導熱性 (401 W/(m·K)) 也佳，室溫下在金屬單質中僅次於銀。

Copper does not react with water, but it does slowly react with atmospheric oxygen to form a layer of brown-black copper oxide which protects the underlying metal from further corrosion.

化學性質：銅不和水反應，卻與空氣中的氧氣緩慢反應，形成一層棕褐色的氧化銅，這層銅鏽能保護下面的銅免受進一步腐蝕。

(5) Copper Alloys 銅合金

Brass is an alloy of copper and zinc, and bronze usually refers to copper-tin alloys. Copper is one of the most important constituents of silver and karat gold solders used in the jewelry industry, modifying the color, hardness and melting point of the resulting alloys

黃銅是銅鋅合金，可用於製造精密儀器，亦用於鑼、鈸、鈴、號等樂器的製作。青銅則通常指銅錫合金，硬度大，用於製造精密軸承、高壓軸承、船舶上抗海水腐蝕的機械零件以及各種板材。銅在珠寶業中是 K 金、K 銀等合金的重要成分，也用於 K 金的焊料，能改變合金的顏色、硬度和熔點。

The alloy of copper and nickel, called cupronickel, is used in low-denomination coins. The alloy of 90% copper and 10% nickel, remarkable for its resistance to corrosion, is used for various objects exposed to seawater.

銅和鎳的合金稱為白銅，不易生鏽，多用於製造硬幣和裝飾品。90%銅和 10%鎳的合金抗腐蝕性能優異，用於各種接觸海水的零件部位。

(6) Countries of Origin 銅礦出產地

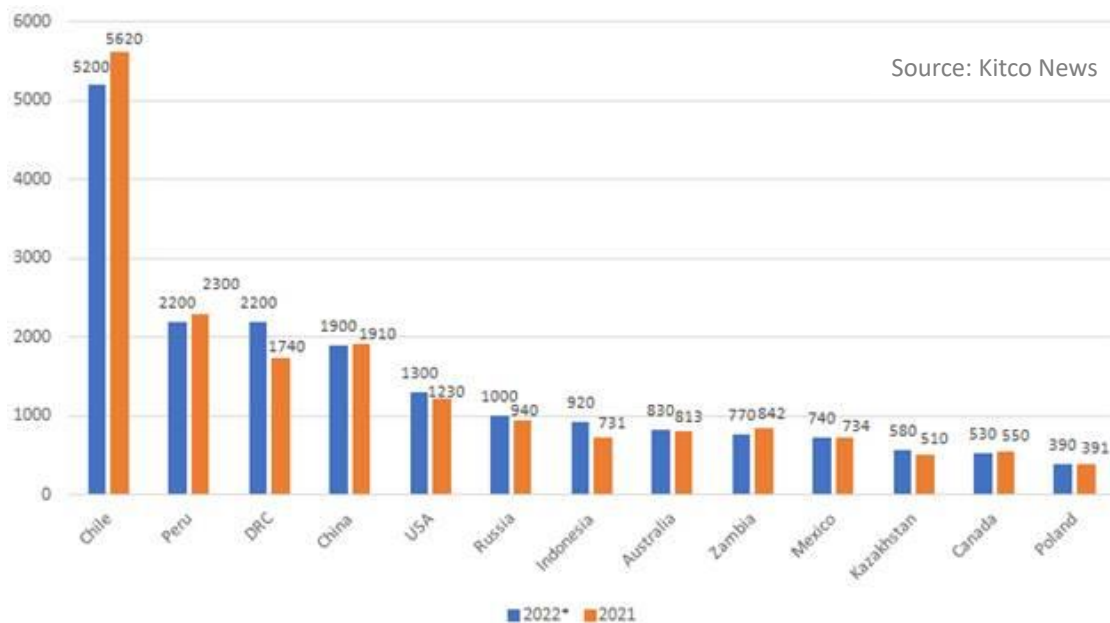
In 2022, Chile was the top producer of copper with at least one-third of the world share, followed by Peru, DRC, China, and the United States.

智利是目前銅礦最豐富的國家，其儲量占全球的 29%，產量、出口量亦居世界第一位，其他儲量較多的國家有秘魯、剛果民主共和國、中國、美國等。



The chart below shows the world's largest copper producing countries in 2022.

2022 年世界主要產銅國家如下圖。



資料來源：Kitco News

Source: Kitco News