

Copper Mining and Extraction: Sulfide Ores

Answers

1. Place these products in the extraction process in ascending order of copper content.

Matte
Ore
Cathode copper
Blister
Anode copper
Copper concentrate
Fire refined copper

The correct order is:

Ore (0.25 to 0.5% copper)
Concentrate (30% copper)
Matte (50-70% copper)
Blister (98% copper)
Fire refined (99% copper)
Anode (99% copper)
Cathode (99.99% copper)

2. Use a periodic table to find the atomic masses of the elements in cuprite and chalcocite. Then work out the percentage of copper in each mineral. Don't forget to double the copper mass as it is Cu_2 .

The masses are:

$$A_r(\text{Cu}) = 64; A_r(\text{O}) = 16; A_r(\text{S}) = 32$$

$$\text{The molar mass of } \text{Cu}_2\text{O} = 128 + 16 = 144$$

The percentage of copper in Cu_2O is therefore $128/144 \times 100 = 89\%$

$$\text{The molar mass of } \text{Cu}_2\text{S} = 128 + 32 = 160$$

The percentage of copper in Cu_2S is therefore $128/160 \times 100 = 80\%$

3. Which of the minerals in the table are sulfides?

Chalcocite, bornite and chalcopyrite.

4. Why is sulfur dioxide scrubbed from the smelter flue gases?

The sulfur dioxide produces sulfuric acid in the acid plant. It would cause acid rain if released into the atmosphere as well as serious health risk to anyone living anywhere near the furnaces. The sulfuric acid has a high value because it is used to leach copper oxide ores.

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