

Question #47778, Chemistry, Other

Assuming that copper metal can be extracted from a given mass of any ore at the same cost, which of the two minerals could be mined profitably for copper? Malachite or chalcopyrite?

Answer:

Malachite $\text{Cu}_2(\text{CO}_3)(\text{OH})_2$ $M=141 \text{ g/mol}$

Chalcopyrite CuFeS_2 $M=183.5 \text{ g/mol}$

Calculate the percentage of copper in each of the minerals:

%Cu in malachite: $2\text{Cu} / \text{Cu}_2(\text{CO}_3)(\text{OH})_2 = 2 \cdot 63.5 / 141 = 0.90 = 90\%$

%Cu in chalcopyrite: $\text{Cu} / \text{CuFeS}_2 = 63.5 / 183.5 = 0.346 = 34.6 \%$

This implies that more than malachite copper in chalcopyrite, so for the extraction of copper metal is advantageous to use malachite.