

What is the role of silica in extraction of Cu from copper pyrite ore?

Answer: Silica ( $\text{SiO}_2$ ) is used in the processes of smelting of copper pyrite ( $\text{CuFeS}_2$ ) ore and in conversion of produced copper matte (refined copper sulfide) into a crude metal as a flux (purifying agent).

It reacts with solid impurities, such as iron oxide, and forms a liquid slag with density, smaller than the copper matte. Though, the slag can be easily separated from the desired product.

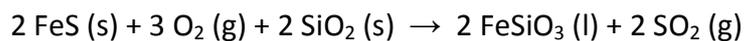
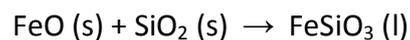
Smelting is an exothermic reaction between copper pyrite ore, oxygen of air and fluxes (such as silica and limestone) at  $1200\text{ }^\circ\text{C}$  (above the melting point of copper, but below that of the iron and silica) to form a liquid called "copper matte". The high temperature allows reactions to proceed rapidly, and allow the matte and slag to melt, so they can be "tapped out" of the furnace.

In the smelting process such chemical reactions are taking place:

1) oxidizing of the copper pyrite:



2) conversion of iron oxides and sulfides into molten slag:



The matte, which is produced in the smelter, contains around 70% copper primarily as copper sulfide as well as iron sulfide. The sulfur is removed at high temperature as sulfur dioxide by blowing air through molten matte. The iron sulfide is also converted into molten slag (reaction is shown above).