



FiberLaboratory

RESEARCH TO BUSINESS

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Reducing the oxidation of sulfide ores in mine concentrators

In the grinding and flotation of sulfide ores, inert gases such as carbon dioxide can be used. This prevents the oxidation of sulfidic ores, which is useful in many ways in the beneficiation process.



Sulfide minerals: Sulfide minerals are the world's most significant source of a wide variety of metals and are the most important group of ore minerals.

Beneficiation: The beneficiation of minerals is usually done by the froth-flotation method.

Stability: Low oxygen maintains the stability of sulfide ores, while exposure to oxygen or oxidants causes instability.

Sustainable methods for separating minerals from ore, including as its main steps comminuting the ore followed by flotation beneficiation has become one of the key topics in mining industry.

State of the art

The central problem of current technology is the uncontrolled oxidation of ore during the grinding and froth flotation. Oxidation leads to equipment corrosion, increased consumption of flotation chemicals, and complicates their performance, resulting in weakened flotation results. Oxidation also increases the concentrations of dissolved metals, sulfites, sulfates, and other dissolved oxidation products in process waters, often significantly complicating the treatment and recycling of these waters. In mines, gypsum precipitation is commonly used to remove dissolved sulphates and metals ions from water. These settling basins are typically large and open to rainwater.

Technology

The method developed at Xamk Fiber Laboratory utilizes a novel, easily implemented modification to existing grinding and froth flotation beneficiation techniques, and it leverages the specific physical properties of carbon dioxide to create an **oxygen-free mineral beneficiation process**. The dissolution of sulfidic ores as sulphates and metal ions in the process water is reduced if oxygen is unable to oxidize the ore during the grinding and froth flotation. By reducing ore oxidation in mine concentrators, it is possible to significantly increase the internal recycling rate of process waters while also reducing the need for process water purification. Additionally, the method involves water treatment where the thickening has been enhanced by filtering, which can significantly increase the closing degree of water recycling in the process.

Advantages

The method significantly reduces the oxidation of ore processed in mineral concentrators. The best conditions for implementing the flotation process are achieved when no oxidation products that alter the minerals' surfaces are formed. More selective flotation and a significant reduction in chemical usage (especially xanthate consumption) are achieved. Carbon dioxide is a more efficient a flotation gas than air.

Options for companies

Xamk is looking for partners for licensing and use of the technology.

Direct contract research or joint research and development cooperations are also possible.

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