Research and Reports on Metals

Short Communication A SCITECHNOL JOURNAL

Unveiling the Metallurgical Traits of Low Grade Gold Ore for Geometallurgical Analysis

Seham S. Alterary*

Department of Chemistry, King Saud University, Riyadh, Saudi Arabia

***Corresponding author:** Seham S. Alterary, Department of Chemistry, King Saud University, Riyadh, Saudi Arabia; E-mail: seham@ksu.edu.sa

Received date: 01-Feb-2023, Manuscript No. RRMT-23-93467;

Editor assigned date: 03-Feb-2023, PreQC No. RRMT-23-93467(PQ);

Reviewed date: 17-Feb-2023, QC No. RRMT-23-93467;

Revised date: 24-Feb-2023, Manuscript No. RRMT-23-93467(R);

Published date: 03-Mar-2023, DOI: 10.4172/Rrmt.1000159.

Description

Mineral characterization refers to the process of identifying and describing the various minerals that make up a sample or rock. This is done by using a combination of techniques, including visual inspection, chemical analysis, X-ray diffraction, and electron microscopy [1]. Visual inspection involves examining the physical properties of the minerals, such as color, luster, hardness, and cleavage. Chemical analysis can be used to determine the chemical composition of the minerals, including their elemental composition and the presence of specific minerals or compounds. X-ray diffraction is a technique that uses X-rays to determine the crystalline structure of minerals. This technique can be used to identify specific minerals based on their unique crystal structure [2]. The characterization is an important process in geology and materials science, as it allows scientists to understand the properties and composition of rocks and minerals, which in turn can provide insights into the geological history and formation of the sample [3].

Electron microscopy involves using a microscope that can produce high-resolution images of the minerals at a microscopic level [4]. This technique can be used to identify minerals based on their physical properties and crystal structure. Mineral characterization of low-grade gold ore for geometallurgy purposes typically involves several steps to identify the mineralogy and distribution of gold and other valuable minerals in the ore [5].

Sample preparation

The first step is to obtain representative samples from the ore body. The samples must be prepared for analysis by crushing, milling, and sieving to obtain a homogeneous sample size suitable for analysis [6].

Mineralogical analysis: The second step is to perform a mineralogical analysis using techniques such as X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), and Mineral Liberation Analysis (MLA). XRD identifies the mineral phases present in the sample, while SEM provides information on mineral morphology and microstructure[7]. MLA provides information on the liberation of minerals from the ore, which is critical for predicting their behavior during mineral processing [8].

Gold analysis: The third step is to analyze the gold content of the sample. This can be done using fire assay or Atomic Absorption Spectroscopy (AAS) techniques. Fire assay is the most common method used for analyzing gold content in ores, while AAS is used for rapid analysis of gold content in solutions [9].

Mineralogical mapping: The fourth step is to perform mineralogical mapping to identify the distribution of gold and other valuable minerals in the ore. This can be done using techniques such as X-ray Fluorescence (XRF), Electron Microprobe Analysis (EMPA), and Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS). Mineralogical mapping is critical for understanding the variability of mineralogy and gold distribution within the ore body, which is necessary for optimizing mineral processing operations [10].

Overall, mineral characterization of low-grade gold ore for geometallurgy purposes requires a multi-disciplinary approach combining various analytical techniques to provide a comprehensive understanding of the ore's mineralogy and gold distribution. This information is then used to develop a geometallurgical model that can be used to optimize mineral processing operations and predict the behavior of the ore during processing.

References

1. Dominy SC, O'Connor L, Parbhakar-Fox A, Glass HJ, Purevgerel S (2018) Geometallurgy-A route to more resilient mine operations. Minerals 8: 560 .
2. Lishchuk V, Lamberg P, Lund C (2015) Classification of geometallurgical programs based on approach and purpose. InSGA 6: 124.
3. Lishchuk V. (2016) Geometallurgical programs–critical evaluation of applied methods and techniques 8: 485.
4. Mwanga A, Rosenkranz J, Lamberg P(2015) Testing of ore comminution behavior in the geometallurgical context-A review. Minerals 5: 276-97.
5. Lishchuk V, Pettersson M (2021) The mechanisms of decision-making when applying geometallurgical approach to the mining industry. Mineral Economics. 34: 71-80 .
6. Lund C, Lamberg P, Lindberg T. Practical way to quantify minerals from chemical assays at Malmberget iron ore operations–An important tool for the geometallurgical program. Minerals Engineering 49: 7-16 .
7. Sepúlveda E, Dowd PA, Xu C. (2018) Fuzzy clustering with spatial correction and its application to geometallurgical domaining. Mathematical Geosciences. 50: 895-928.
8. Alruiz OM, Morrell S, Suazo CJ, Naranjo A (2009) A novel approach to the geometallurgical modelling of the Collahuasi grinding circuit. Minerals Engineering. 22: 1060-1067.
9. Dominy SC, O'Connor L, Glass HJ, Xie Y (2018) Geometallurgical study of a gravity recoverable gold orebody. Minerals 8: 186.
10. Dehaine Q, Tijsseling LT, Rollinson GK, Buxton MW, Glass HJ (2021) Geometallurgical characterisation with portable FTIR: Application to sediment-hosted Cu-Co ores. Minerals. 12: 15.

Citation: *Alterary SS (2023) Unveiling the Metallurgical Traits of Low Grade Gold Ore for Geometallurgical Analysis. Met Mater Int 7:1.*