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Discovery of a New Environment for Platinum Mineral in Limestone Rocks

Introduction

Platinum (Pt), a highly valuable and rare metal, is typically found in mafic and ultramafic igneous rocks. Its presence in the Earth's crust is generally very low. This study addresses a significant gap in geological knowledge by investigating the chemical composition of pure limestone rocks, a geological setting not previously associated with platinum occurrences. The research was motivated by the potential for discovering valuable elements in unconventional geological environments, particularly given the rich, yet underexplored, mineral resources in the Arabian Peninsula, specifically Yemen.

Methodology

Pure limestone samples were collected from various layers in the Amran region of Yemen. These samples underwent detailed chemical analysis using X-ray Fluorescence (XRF) spectrometry to determine their elemental composition, with a specific focus on platinum and other rare elements. The results were then compared with limestone samples from other regions to establish the uniqueness of the findings

Results

The chemical analyses revealed the consistent presence of platinum in all investigated pure limestone layers. The average platinum concentration was found to be 0.0071%, which translates to 71 grams per ton of limestone. This concentration is considered economically viable for extraction. Furthermore, the study identified other significant rare elements, including Samarium (Sm), Molybdenum (Mo), Niobium (Nb), Gallium (Ga), Neodymium (Nd), Europium (Eu), Vanadium (V), and Gold (Au). The discovery of Samarium, in particular, is noteworthy as it is not typically found in nature through conventional means. The presence of Iridium (Ir) and specific patterns of Rare Earth Elements (REEs) also suggests a potential meteoritic origin or impact influence, warranting further investigation

Conclusions

This research confirms the unexpected presence of economically viable concentrations of platinum in pure limestone rocks, a novel geological environment for this precious metal. The study proposes that the primary source of platinum in these limestone formations is likely the accumulation of marine organisms over millions of years, as their bodies contain trace amounts of platinum. This discovery has significant economic implications; similar to how the price of aluminum decreased after the discovery of efficient extraction methods, the identification of this new, accessible platinum reserve could lead to a substantial reduction in its market price, making it more widely available for industrial applications. The findings also highlight the potential for further research into the geological history of the region, particularly regarding possible meteoritic impacts, given the presence of Iridium and unique REE patterns. This study contributes valuable insights into unconventional mineral deposits and opens new avenues for resource exploration and utilization.

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Biography

PhD Supervisor, School of Advanced Studies of the Romanian Academy (SCOSAAR), Professor PhD, Doctor of Economics (Finance), Scientific Researcher of the Romanian Academy, Professor in International Financial Relations, FinTech and Entrepreneurship, Evaluation Expert and Rapporteur for EU Projects, Expert in investment projects, capacity building, sustainable development at local and global level, founder of companies and NGOs - more than 25 years experienced in financial and banking consulting and EU project management, scientific research in the multidisciplinary field, international reviewer. Experience in investment projects, EU funding, evaluation, and rapporteur for EU projects, written books, scientific papers, and articles published, publisher and editor in international journals, and reviewer.

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