

# **Chemostratigraphic characteristics of potassium chloride deposit in the Khemisset Triassic evaporite basin (Morocco)**

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Potash is recognized as a critical resource for enhancing agricultural productivity and ensuring food security. The increasing demand for potash, coupled with its scarce availability in Africa and the potential for supply disruptions, underscores the necessity of exploring K-rich geological deposits within evaporite basins as a strategic national initiative. Morocco, in Africa, hosts several evaporitic basins formed through the development of complex structural systems characterized by NE-trending half-grabens during the Mesozoic Triassic period. The basins of Mohammedia-Benslimane-ElGara-Berrechid, Doukkala, Essaouira, Boufekrane, and Khemisset are promising sites for potash evaporitic deposits, with Khemisset being particularly well-known and thoroughly investigated. This basin predominantly features Triassic detrital evaporitic syn-rift sequences and basaltic rocks that unconformably overlie the Paleozoic Hercynian basement. Due to its significant scientific and economic value, the Khemisset basin emerges as a key target for potash deposit exploration. This study aims to explore and characterize the chemostratigraphy of the basin's mineralized layers, using core-logging, portable X-ray fluorescence (p-XRF), and facies analysis of selected drill cores. Our findings demonstrate that the basin consists of stratified evaporitic facies, including halite, potash, anhydrite, and clay, organized vertically into four distinct facies associations: halite-clays, halite-anhydrite-potash, halite-anhydrite, and halite-potash. These associations indicate a lagoon environment affected by marine incursions and flood events. The stratified facies support the established model of brine evolution, marked by multiple sedimentary evaporitic rhythmic cycles that commence with brine recharge (largely from detrital sources) and conclude with brine saturation (primarily from marine sources). Our results and data from the literature most strongly suggest that the mineralized level of the Khemisset evaporite basin is scientifically and economically important and warrants further research and exploration with the ultimate goal of genesis model development and future potash ore extraction.