EGU21-11122
https://doi.org/10.5194/egusphere-egu21-11122
EGU General Assembly 2021

Tauride Carbonate Platform Bauxite Deposits (Turkey) as an Alternative Source for Gallium

Hatice Nur Bayram, Ali Erdem Bakkalbasi, Zeynep Doner, Ali Tugcan Unluer, Huseyın Kocaturk, Demet Yıldırım, and Murat Budakoğlu
İstanbul Technical University, Mine Faculty, Geological Engineering, Istanbul, Turkey (hnnurbayram@gmail.com)

Mediterranean type karstic bauxite deposits are considered as the primary source for aluminum (Al) production in Europe. During the Al production, Gallium (Ga) is extracted from the so called Bayer-liquor during the processing of bauxite to alumina. Ga, a rare metal, is widely used in modern chemistry and electronic industry. During the past decades, the worldwide demand for Ga has been continuously increasing. In Turkey, karstic bauxite deposits are generally found with shallow marine carbonate rocks which were deposited during Mesozoic period and located in Tauride Carbonate platform. Most of these karstic bauxite deposits can be hosted considerable Ga enrichments, with other immobile elements such as rare earth elements (REE), titanium (Ti), lithium (Li), and iron (Fe). This work focuses on the revealing of the potential Ga enrichments in bauxides from different deposits of Turkey (Mortaş-Doğankuzu, Konya; Küçükkoraş, Karaman; Acıelma-Yoğunoluk, Kahramanmaraş bauxite deposits). Geochemical data of major and trace elements of studied bauxite deposits show that these deposits have significant Ga enrichments (up to 72.6 ppm), as well as the REE (up to 580 ppm), Ti (up to 1.8%), and Li (up to 428 ppm) enrichments. In addition, the Ga enrichments show strong positive correlation with heavy rare earth elements (HREE) and moderate positive correlation with Al, Fe, Ti, Li and Sn elements. In this context, it can be concluded that the most probable source for Ga is rock forming aluminosilicates of the source rock due to the substitution with Al^{3+} and Fe^{3+}. During weathering process Ga exhibiting immobile behavior much like Al and Fe. Gallium is than incorporated into Al-bearing phases and thus enriched in the bauxite. Presence of Li content can be also interpreted as a contribution from micaceous source such as meta-carbonate rocks of Tauride platform. Moreover, geochemical association between Ga, Ti, Li, tin (Sn) and HREE can be explained by the redox and pH conditions causing other ions seperated from shallow environments.