

Trace Element and REE leaching during Diagenetic Albitization and its relationship to the Cathodoluminescence colour of Feldspars: the Tera Group, Cameros Basin (NE Spain)

Authors: González-Acebrón, L.¹, Barca, D.², Arribas, J.³, Mas, Ramón¹

¹ Dpto. Estratigrafía, Facultad de Ciencias Geológicas (UCM)- IGE, IGEO (CSIC), C/ Jose Antonio Novais 2, 28040 Madrid (Spain)

² Dipartimento di Ciencias de la Terra, Università de la Calabria (Italy).

³ Dpto. Petrología y Geoquímica, Facultad de Ciencias Geológicas (UCM)- IGE, IGEO (CSIC), C/ Jose Antonio Novais 2, 28040 Madrid (Spain)

Corresponding author: Tel: (34)913944785. E-mail: lgcebron@geo.ucm.es (L. González-Acebrón)

This study deals with the diagenetic albitization of both plagioclases and K-feldspars in the Tithonian fluvial sandstones of a rifted basin (Cameros Basin). A cathodoluminescence (CL) study of feldspars was performed using a cold instrument on sandstone thin sections. Trace elements and REE were studied on 300 µm-thick sections involving simultaneous laser ablation and inductively coupled plasma mass spectrometry (ICP-MS).

The sandstones in the lower part of the rift record have not suffered the albitization process. A clear relationship is observed between sodium contents, as the main element of some feldspars, and their CL colour (the higher the sodium content, the lower is their CL). In addition, very different profiles are obtained when comparing trace elements of non-albitized feldspars in sandstones of the lower part of the rift record to those of albitized feldspars in sandstones of the infill top. Non-albitized K-feldspars show Rb, Sr, Ba, Pb contents up to 1000 ppm. In contrast, very flat profiles of trace element contents (<250 ppm) are recorded in albitized feldspars (both K-feldspars and plagioclases). Thus, albitization implies feldspars impoverished in trace elements, including REE. This impoverishment suggests leaching of most of the initial trace elements. In addition, partially albitized grains show albitized areas related to weak zones such as cleavage and fracture planes.

Albitized plagioclases show higher REE contents than albitized K-feldspars. According to the literature, non-albitized plagioclases are richer in REE than non-albitized K-feldspars. We report here that REE patterns partly depend on the initial composition of the feldspar (K-feldspar or plagioclase) as a useful geochemical criterion for distinguishing albitized detrital plagioclases from K-feldspars.

Albitized plagioclases are riddled with primary fluids inclusions, mainly all-liquid. Around 20% of the fluid inclusions feature a gas bubble, with liquid to vapour ratios between 95:5 and 85:15. Homogenization temperatures of cogenetic fluid inclusion assemblages indicate minimum albitization temperature around 83-115°C. This temperature allowed the leaching of trace elements and REE during the albitization, interpreted as a dissolution and reprecipitation process. Additional work is carrying on determining CL colour relationship with CL spectra.