

Sedimentary and diagenetic processes of glauberite deposits during the Lower Miocene in western part of Ebro Basin (Spain)

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Glauberite deposits in continental Tertiary sediments are well represented in several evaporitic formations of the Ebro Basin (ORTI and SALVANY, 1991). These formations are composed mainly of calcium sulphate (anhydrite and gypsum) and halite, and come from the evolution of extensive playa-lake and very shallow lake complexes in the central areas of the basin.

One of the best well-known glauberite deposits is located in the Alcanadre area, in the western zone of the Ebro Basin, which has been studied by SALVANY and ORTI (1987) and SALVANY (1989). The glauberite forms several beds intercalated within one of the thick gypsiferous units (200 m) of the Lerin Formation (lower Miocene), and is associated with halite, polyhalite, anhydrite, magnesite and dolomite.

After a petrographic study it was possible to recognize a number of sedimentary and early diagenetic processes, resulting from brine evolution in the playa-lake environment. The precipitation sequence was: gypsum-anhydrite, glauberite, halite-polyhalite. Gypsum shows laminated facies and precipitated as fine crystals on the floor of the saline lake. Anhydrite was formed in the playa zone and grew as interstitial nodules. Major lithofacies displayed by the glauberite are nodular and enterolithic. Also, flow, load and convolution-like structures are common in glauberite beds. In all these cases the glauberite shows a texture ranging from a fine-grained type to macrocrystalline aggregates up to 2-3 cms, and was formed either from gypsum-anhydrite replacement or interstitial primary growth. Polyhalite replaces both gypsum and glauberite, occurs as a laminated lithofacies, and displays a spherulitic microstructure which reveals pseudomorphs after glauberite and gypsum precursors. Also, this polyhalite is associated with halite. The halite precipitated as primary crystals on the floor of the shallow saline lake. The high Mg contents in the brines transformed the original CaCO_3 into dolomite or magnesite, which show micritic texture and appear as host material between sulphates. Due to dissolution by concentrated brines (stream inflow or rainflow), some retrodiagenetic processes have been seen also: polyhalite was replaced by glauberite and anhydrite, and glauberite was replaced by anhydrite.

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