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Feldspar and silica authigenesis in the Carpathian Keuper dolostones, Slovakia

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Authigenesis is a common feature existing in the Keuper dolostones of the western Carpathian of Slovakia. The Keuper Formation is one of the common Triassic formations in the region and is lithologically rather complex due to steadily changing conditions of deposition ranging from continental to lagoonal to littoral and finally to true marine.

The authigenic minerals are mainly quartz and feldspars. The authigenic quartz occurred either as a replacement fabric of fossil skeletons and sometimes replaces or fills gypsum molds. It occurs also as pore-filling fabrics in which the quartz terminations are euhedral to subhedral. The replacement of evaporates by quartz is an indication that silica precipitation postdated or accompanied sulphate reduction and/or dissolution. Illite the common observed clay minerals in the studied Keuper rocks is a probable source for silica saturation. Releasing of silica is promoted by the processes of dolomitization and compaction that were commonly influenced the studied rocks.

The authigenic feldspars (albite and orthoclase) are observed in the Keuper dolostones. Albite occurs as prismatic euhedral crystals with common albite twinning, orthoclase with idiomorphic shapes and frequent inclusions of carbonates. Clay minerals and detrital feldspars are the main sources for the necessary silica and alumina required for the crystallization of authigenic feldspars, whereas, the sea water and interstitial waters are the most important sources for the required alkalies. Marine to slightly evaporative environment for the studied dolostones favor the authigenic formation of feldspars.

Late epidiagenesis to anchimetamorphism processes may result in the evolution of such authigenesis of the Keuper carbonates, a processes also observed by some features influenced the associated sandstones of the Keuper succession.