

Bromine analysis - a powerful tool to solve stratigraphical problems in exploration boreholes for salt caverns

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Abstract

The behavior of the trace element Br in evaporating seawater and diagenetic reactions of evaporates is often studied. The incorporation of Br in Cl-minerals is well understood and is used as a tool for genetic interpretation.

Mineralogical and geochemical investigations were carried out on halites from the German Zechstein evaporates of the Staßfurt-Formation (Zechstein 2) from the Gorleben salt dome. The analysis of the halites showed a characteristic Br trend from the bottom of the Zechstein 2 Hauptsalz (z2HS) up to the top near the potash seam (z2SF). With this typical trend line each unit of the Hauptsalz can be distinguished even in the regional extension of the whole Zechstein basin.

This characteristic and standardized Br trend line was tested on cuttings, every 5 to 10 meters, of two cavern exploration wells of salt caverns in northern Germany. The results of the investigation methods and the methodology itself will be presented, as well as the interpretation within the geological context. It was possible to verify, to detail and to correct the geological, stratigraphical and structural interrelation in the neighborhood of the cavern wells.

It will be demonstrated that it is nowadays possible to identify the stratigraphic position of the drill bit as early as during the drilling process, applying only Br analyses of cuttings. This allows an exact positioning of coring intervals and also makes it possible to minimize the number of cores.

The sample preparation can easily be performed by separation of less than 10 to 20 mg of clear halite crystals under the binocular and the subsequent Br analysis with ion chromatography. This fast and inexpensive geologic/mineralogical method presents reliable data, so that the cavern can exactly be positioned and critical mining areas can be responded to.