GEOCHEMISTRY OF THE EARTH SURFACE AND PROCESSES OF MINERAL FORMATION

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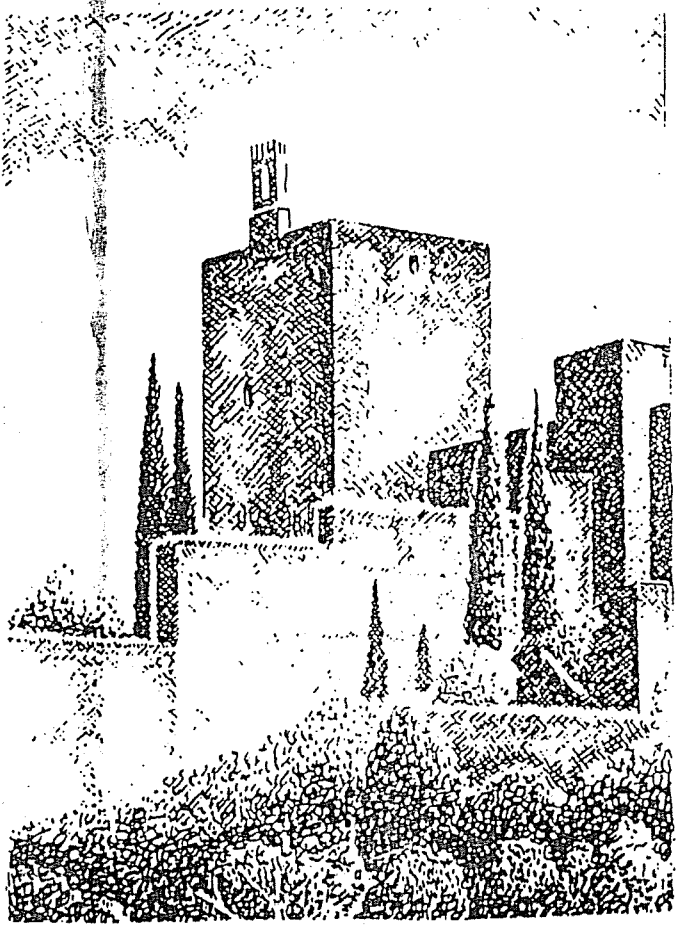

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Sr CONTNTS IN SULPHATE [illegible] MAINLY GYPSUM AND ANHYDRITE OF MARINE AND [illegible] MARINE EVAPORITIC FORMATIONS

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Sr content is a main geochemical factor to be considered in the genetic study of sulphate evaporitic formations, and particularly of calcium sulphate (gypsum/anhydrite) deposits. The possibility that Sr becomes a geochemical indicator for these formations, in a similar way as bromine is for chlorides, accounts for the attention that in the evaporitic literature is being dedicated to this subject in the last years.

From experimental data and studies carried out in brines as well as in recent and ancient calcium sulphate deposits (GEISLER, 1982; ORTI CABO et al., 1984; GEISLER-CUSSEY, 1986), some important facts related to the worth of Sr as a salinity indicator have been noticed. Probably the most significative one is the correlation observed in samples of actual salt works between the progressive increase in brine concentration and the corresponding increase of Sr content in gypsum precipitates.

However, available literature on Sr behaviour in sulphate evaporitic formations does not allow, for the moment, to solve precisely some major problems in gypsum/anhydrite rocks as: 1) the possibility to distinguish between marine and non marine origin, 2) to characterize properly with this element the calcium sulphate diagenetic transformations cycle (primary gypsum → anhydrite → secondary gypsum). In this sense, the references collected by GEISLER-CUSSEY (1985), as well as her own data, suggest that a significative variation in Sr content throughout the whole cycle does not exist.

Present paper purpose is to contribute new data in order to better document this questions. So, the study of Sr contents in a great number of Spanish calcium sulphate formations of different lithologies (primary and secondary gypsum, anhydrite and glauberite), ages (Triassic to Actual), environments (marine and continental) and lithofacies, is offered.

Determinations have been made by A.A.S. Previously, the fine grounded samples have been attacked with HCl to eliminate carbonates and after that they have been leached with ammonium acetate in order to dissolve calcium sulphate. Moreover, the existence of significant quantities of Sr solid phases in the samples has been controlled by X-Ray diffraction. Generally, values higher than 3000 ppm are related to the presence of such phases and must be considered with caution.

From older to younger ones the studied formations are the following:

a) Triassic. Middle Muschelkalk of the Catalanides (anhydrite; marine-transitional env.). Borehole.
b) Triassic. Keuper of the Catalanides (secondary gypsum and anhydrite, marine-transitional env.). Outcrop and borehole.
Keuper of the Valencia-Cuenca basin (secondary gypsum and anhydrite; marine-transitional env.). Borehole.
Keuper of the Ebro basin (secondary gypsum and anhydrite; marine-transitional env.). Borehole.
c) Lower Liassic. Hettangian of the Valencia-Cuenca basin (anhydrite; marine env.). Borehole.
Hettangian of the Ebro basin (anhydrite; marine env.). Borehole.

d) Upper Cretaceous. Albacete-Cuenca basin (anhydrite, marine env.). Borehole.
e) Eocene (Lutetian). Vallfogona and Beuda gypsum (secondary gypsum and anhydrite; marine env.). Outcrop.
f) Upper Eocene (Priabonian). Odena gypsum (secondary gypsum and anhydrite) Outcrop, mine and borehole.
g) Palaeogene. Tajo basin (anhydrite; continental env.). Borehole.
h) Oligocene of eastern Ebro basin (Catalan sector). Copons gypsum (secondary gypsum; continental env.). Outcrop.
i) Oligocene and Miocene of western Ebro basin (Navarrese sector) (secondary gypsum and glauberite; continental env.). Outcrop and borehole.
j) Miocene of eastern Tajo basin (Altomira-Bascuñana) gypsum (primary gypsum; continental env.). Outcrop and borehole.
k) Miocene of the Tajo basin. El Castellar mine (secondary gypsum, anhydrite and glauberite; continental env.). Borehole.
l) Messinian of Alicante and Mallorca (primary and secondary gypsum; marine env.). Outcrop and borehole.
m) Today's gypsum deposits from salt works of the Mediterranean coast: Santa Pola (Alicante), Roquetas (Almería), La Trinitat (Ebro delta, Tarragona), San Pedro del Pinatar (Murcia).

These data have only a preliminary character with respect to a more extensive work that is being prepared in relation to a research plan on petrology, geochemistry and isotopy of some Spanish evaporitic formations. Despite this fact, these analysis allow us to establish some remarks:

a) In today's gypsum sediments from salt works each facies is characterized by a relatively well defined Sr mean content. These facies values, however, may vary significantly from one salt work to another depending on local operating conditions.

b) Also, primary gypsum from ancient marine formations generally exhibits Sr contents characteristic of each facies (selenites, gipsarenites, lenticular facies, etc). In this sense, the use of Sr profiles (Sr-increasing upwards, Sr-decreasing upwards) to complement lithofacies profiles may help to understand the genesis of depositional sequences.

c) The marine or continental origin of a particular primary gypsum sulphate formation can not be deciphered directly from its Sr content, due to the fact of the large variation boundaries of many continental formations contents.

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