

Die Genese von Dolomit in Sedimenten

Mineralogie und Petrographie in Einzeldarstellungen
Herausgegeben von W. v. Engelhardt und J. Zemann, Band 4

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H. E. USDOWSKI: Die Genese von Dolomit in Sedimenten. Springer-Verlag, Berlin, Heidelberg, New York. 1967. 95 S. u. 44 Abb. DM 29.60, \$ 7.40.

The monograph by USDOWSKI is an admirable attempt to treat the problems of sediment diagenesis in general and of dolomitization in particular as chemical reactions in heterogeneous systems of multiple components. This approach is a prerequisite for an understanding of the dolomite genesis, as this reviewer emphasized in his critical analysis article, which appeared in this Journal a year ago (Hsu 1966). The publication of USDOWSKI's thorough treatise at this time, therefore, is specially welcome and appreciated by the reviewer.

The monograph presents a resume of the graphical representation of phase equilibria; a brief summary of the published data and a detailed presentation of the author's own research results of phase equilibria in systems involving the components CaCO_3 , MgCO_3 , CaSO_4 , MgSO_4 , CaCl_2 , MgCl_2 , and water; as well as a discussion of the application of such chemical data to problems of early and late diagenesis. It is encouraging to find that USDOWSKI's data confirm the results of previous workers that the $\text{Mg}^{2+}/\text{Ca}^{2+}$ ratio of the solution at calcite-dolomite-solution equilibrium under diagenetic conditions is not particularly high. USDOWSKI was, therefore, able to interpret the chemistry of subsurface waters (*Porenlösungen*) in terms of their equilibria with the solid phases of the enclosing media (sediments). The corollary that sediment diagenesis is a necessary consequence of groundwater motion has been expressed by this reviewer and others (e. g., Hsu 1963; SEEVER 1965).

The reviewer found it unsettling, however, that the author seemed to have little misgivings about the accuracy of his results. The difficulty of attaining equilibrium during dolomite solubility experiments has been emphatically pointed out by this reviewer (Hsu 1967), and the problem did not seem to have been resolved by the author. The reproducibility of the experimental data was stated to be within 2 mol-%, but no supporting data were

published. The experimental data were presented in such a form that the reviewer cannot make any judgement if equilibration has indeed been achieved during experimentation. Furthermore, the experimental conditions have not been sufficiently specified. For example, the total pressure was stated, but the partial pressure of CO_2 , which greatly influences the solubility of carbonates, was not reported. This grave omission raises further doubts as to the significance of USDOWSKI's data.

The reviewer further regrets that the author failed to discuss a series of similar experiments by Russian workers (YANAT'EVA 1957, and other articles cited by Hsu 1967). A comparison of the degrees of agreement or discrepancy between these two separate studies of the same problem should be included in this monographic treatment of phase equilibria in carbonate and sulphate systems.

The monograph by USDOWSKI, despite of its several shortcomings, is a very valuable addition to the literature of dolomite genesis. It is particularly useful to students who wish to familiarize themselves with the chemistry of dolomitization, and the experimental data presented by the author should certainly be taken into consideration by all research workers interested in the origin of dolomite.

References

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