NOTES AND NEWS

TALC IN THE SALINES OF THE POTASH FIELD NEAR CARLSBAD, EDDY COUNTY, NEW MEXICO*

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Very thin micaceous flakes of a then unidentified mineral, now known to be talc, were first noted about 20 years ago as one of the constituents of the water-insoluble residues from some of the potash cores obtained by drilling near Carlsbad, Eddy County, New Mexico. The residues consisted largely of iron-stained clay, with sand grains and other materials. The flakes first floated to the surface of the water used in dissolving the salines of the cores and sank to the bottom on standing overnight.

A few years later when the cores of Government well drill tests Nos. 20, 21, and 22 had to be disposed of, for lack of storage space, they were dissolved in water and the insoluble residues saved. All three cores contained talc, most abundantly in the core from test No. 22. It was floated off and saved. A total weight of about 5 grams was so recovered.

The location of these three test holes is as follows:

Test No. 20. Sec. 1, T.23S., R.32E., Lea County, N. Mex.
Test No. 21. Sec. 11, T.21S., R.34E., Lea County, N. Mex.
Test No. 22. Sec. 26, T.23S., R.30E., Eddy County, N. Mex.

Similar flakes, in smaller quantities, were noted from time to time in other cores from Eddy and Lea Counties.

The talc occurred in the cleavage cracks of halite, of sylvite, and between halite and sylvite. In places it formed a rectangular boxwork with included halite, the walls easily breaking into separate transparent flakes with inclusions of reddish clay and of iron oxide. The flakes are so thin that it was difficult to obtain any appreciable weight of them. They were best collected electrostatically by using a small charged camel's hair brush on bright sunny days. About a tenth of a gram was at first so concentrated. Chemical tests indicated a hydrous magnesium silicate, though a definite test for boron was obtained. The boron is probably present as inclusions of lueneburgite.[1]

The largest of the single flakes of talc are about 7 millimeters across and exceedingly thin. Feebly coherent aggregates of flakes reach a maximum size of about a centimeter. The thickest flake measured is about a hundreth of a millimeter thick. They are colorless and transparent but

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[1] Schaller, W. T., and Henderson, E. P., Mineralogy of drill cores from the potash field of New Mexico and Texas: *U. S. Geol. Survey, Bull.*, **833**, 47–48 (1932).

contain various impurities so that in bulk the sample has a reddish-brown color due to iron oxide. Most of the flakes have an irregular outline though a few tend toward a six-sided shape.

Mr. Joseph M. Axelrod found that the purest material gave an x-ray diffraction pattern identical with that of talc. Optically, the talc from New Mexico was seen to be nearly uniaxial, negative, with β and γ values very close to 1.580. This value is slightly lower than the 1.589 given by Larsen-Berman, but a range of 1.575 to 1.585 is recorded.[2] There seem to be very few determinations of the indices of refraction for talc recorded in the literature.

About 0.3 gram of the flakes were finally collected for chemical analysis to leave no doubt as to their composition. The analyzed flakes contained only a small quantity of impurities.

Analysis of talc from test No. 22, Eddy County, New Mexico

SiO_2	59.5
MgO	29.4
R_2O_3	1.8
K_2O	1.7
Ignition	6.6
B_2O_3	Present
	99.0

The R_2O_3 is largely impure iron oxide. No test for sulfate was obtained. B_2O_3 was not determined but is present, probably as inclusions of luneburgite.

The analysis yields the ratios of $SiO_2 : MgO : H_2O = 4.00 : 2.95 : 1.47$. The value for ignition includes H_2O at 110° (not separately determined) and possibly other volatiles, so that the 6.57 per cent ignition loss does not necessarily indicate a high-water talc.

A re-examination, by W. T. Schaller, of the thin section from a part of the core from the Ballard well (Eddy County, Sec. 18, T. 21 S., R. 30 E.), represented in part by Plate 23*C* of U. S. Geological Survey, Bulletin 833, shows that the supposed "polyhalite fibers" in the rectangular cleavage cracks of halite are probably thin flakes of talc standing on edge. The typical boxwork structure already mentioned for the talc is well shown in the upper portion of the illustration. Similarly, the supposed "minute areas of polyhalite" shown in Plate 23*B*, when re-examined, prove to be not polyhalite but six-sided crystals of an unidentified mineral with indices of refraction lower than the index of halite (1.544) mixed with a few flakes (indices higher than 1.544) of what is probably talc.

[2] Foshag, W. F.. and Wherry, E. T., Notes on the composition of talc: *Am. Mineral.*, **7**, 168 (1922).

This type of occurrence of talc, with sodium and potassium chlorides of sedimentary deposits, does not seem to have been noted before. Its occurrence in the cleavages of halite and sylvite (Plate 23*C* of Bulletin 833) would indicate that its formation in the salines is secondary and later than their deposition. The talc has been definitely recognized in three cores from New Mexico and probably is present in several others; it seems to be rather widespread in this field.

NATURAL EX-SOLUTION INTERGROWTHS OF MAGNETITE AND HEMATITE

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The object of this note is to record three natural occurrences of ex-solution intergrowths of magnetite and hematite. Investigation of the equilibrium relationships of Fe_3O_4, Fe_2O_3 and oxygen[1] has shown that at high temperatures hematite and magnetite form a partial solid solution, which unmixes on slow cooling to form an intergrowth of hematite lamellae in the (111) directions of the magnetite, the orientation being explicable in terms of shared O-planes (the (0001) O-planes of the hematite and the (111) O-planes of the magnetite). The degree of solid solution possible increases with temperature, as indicated by the following data quoted from Greig et alia:

Temperature ° C.	Composition of Maximum Solid Solution	
	Fe_3O_4	Fe_2O_3
1075	92	8
1200	87	13
1388	75.5	24.5
1452	70	30

The ex-solution texture bears some resemblance to that resulting from the replacement of magnetite by hematite (martitization) during either hypogene or supergene oxidation of magnetite, but there are distinctive points of difference. In the ex-solution intergrowths the hematite lamellae are evenly distributed through the magnetite in blades of uniform size, and there is no concentration of the hematite at the crystal margins, or in patches or along fractures, whereas with oxidation of the magnetite,

[1] Greig, J. W., Posnjak, E., Merwin, H. E., and Sosman, R. B., *Am. Jour. Sci.*, **30**, 239–316 (1935).