DISCUSSIONS OF "ELECTRON PROBE ANALYSES OF COPPER IN
MENEGHINITE" BY KURT FREDRIKSSON, *Am. Mineral.* **49**, 1467–1469

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Fredriksson has shown in the mentioned paper that Cu is evenly distributed in meneghinite and that it is therefore part of the chemical composition with the formula $Cu_2Pb_{26}Sb_{14}S_{48}$ (or $CuPb_{13}Sb_7S_{24}$) as proposed by Berry and Moddle (1941).

In 1960 Euler and Hellner presented the result of the crystal-structure determination of meneghinite for the subcell $a = 11.363$, $b = 24.057$, $c = 4.128$ Å. The formula $Pb_{12}Sb_8S_{24}$ without Cu was used at the beginning of least square method; it changed till the end to $Pb_{13}Sb_7S_{24}$; in the last Fourier synthesis one Cu atom, distributed statistically on a 4-fold position, appeared in a tetrahedral hole. Therefore we assumed Cu to be necessary in the composition of meneghinite and derived the formula $CuPb_{13}Sb_7S_{24}$. A further argument was given by Robinson (1948), when he could not find meneghinite as a phase in the pure system $PbS-Sb_2S_3$.

REFERENCES

BERRY, L. G. AND D. A. MODDLE (1941) Studies of mineral sulfo-salts: V-Meneghinite from Ontario and Tuscany. *Univ. Toronto Studies, Geol. Ser.* **46**, 5–17.

EULER, R. AND E. HELLNER (1960) Über komplex zusammengesetzte sulphidische Erze VI. Die Kristallstriktur des Meneghinits, $CuPb_{13}Sb_7S_{24}$, *Zeit. Krist.* **113**, 345–372.

ROBINSON, S. C. (1948) Studies of mineral sulpho-salts: XIV-Artificial sulphantimonites of lead. *Univ. Toronto Studies, Geol. Ser.* **52**, 54–70.