LEIDSE GEOLOGISCHE MEDEDELINGEN, Vol., 42 pp. 59—60, published separately 15-8-1967

# K-AR AGE OF HORNBLENDE FROM A HORNBLENDITE VEIN IN THE ALPINE-TYPE ULTRAMAFIC MASS OF THE ÉTANG DE LERS (ARIÈGE), FRENCH PYRENEES

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The Alpine-type ultramafic mass of Étang de Lers in the French Pyrenees (the type locality of lherzolite) is transected by a number of hornblendite veins. These veins cut through the lherzolite-pyroxenite layering and obviously are the youngest ultramafic rocks present. Geological field evidence and petrofabric analysis indicate that the whole mass, including the hornblendite veins, was emplaced among Mesozoic sediments as a solid block in Upper Albian or Lower Cenomanian time, immediately before the main phase of Alpine orogenic movements. The rocks of the ultramafic mass are metamorphic tectonites affected by two Alpine sets of fracture cleavages. They do not show, however, any effects of the Alpine low-grade regional metamorphism that affected the country rocks. A detailed study of this ultramafic mass is given in the Ph. D. thesis by Avé Lallemant (1967).

K-Ar age measurements were made on the hornblende from a hornblendite vein. The sample was collected at an altitude of 1365 m, about 175 m E. of the northern shore of l'Estagnon (the small pond S. W. of the Étang de Lers). Hornblende makes up about 75 % of the vein rock. Subordinate constituents are brownish augite and opaque ore minerals. The hornblende has a somewhat patchy appearance, with pleochroism from Z = dark yellowish brown (locally with slightly greenish tinge) to Y = brown to chesnut-brown and X = colourless, $n_Z = 1.702 \pm 0.002$, $n_X \approx 1.672$, $Z/c = 6°$ and $2V_X = 80°$. Part of the hornblende crystals are slightly bent.

The potassium content of the hornblende was determined by flame-photometry. Argon was measured by stable isotope dilution, using $^{38}Ar$ spike and a Reynolds-type all-glass mass-spectrometer. The analytical results and calculated age are as follows:

| K | radiogenic $^{40}Ar$ | atmospheric $^{40}Ar$ | Age (m.y.) |
|---|---|---|---|
| (% Wt) | (p.p.m. Wt.) | (% total $^{40}Ar$) | |
| 1.15 | $9.82 \times 10^{-3}$ | 40.8 | $116 \pm 5$ |
| 1.16 | $9.77 \times 10^{-3}$ | 50.0 | |

(The age calculation is based upon the decay constants of $^{40}K$:

$\lambda_e = 5.85 \times 10^{-11}\ yr^{-1}$,

$\lambda\beta = 4.72 \times 10^{-10}\ yr^{-1}$,

and a $^{40}K$ abundance of 0.0118 at. % of total K).

Following the "Geological Society Phanerozoic time-scale" (1964), the K-Ar age of $116 \pm 5$ m.y. points to crystallization of the hornblende in Barremian (possibly Hauterivian or Lower Aptian) time. According to Kulp's (1961) time-scale, however, this age should indicate crystallization in Albian time. The meaning of the hornblende K-Ar age is not clear. It could mean that this age was imposed on the hornblende during the upward movement of the ultramafic mass, or during Alpine low-grade regional metamorphism shortly after its emplacement. However, the hornblendite veins and ultramafic rocks do not show any recrystallization phenomena, while hornblende is known to have a high resistance to metamorphism with regard to its K-Ar age. Therefore, a possible alternative interpretation might be that the hornblende K-Ar age represents the time of original crystallization of the ultramafic rocks in the Upper Mantle, just before their emplacement into the present position.

*Acknowledgments.* The authors thank Prof. Dr. E. den Tex for helpful suggestions and Dr. H. J. Kisch for determining the optical properties of the hornblende. This work forms part of the research programme of the "Stichting voor Isotopen-Geologisch Onderzoek", supported by the Netherlands Organization for the Advancement of Pure Research (Z.W.O.).

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