DIVNOE METEORITE: PRELIMINARY RESULTS OF RB-SR AGE DATING; **M. I. Smoliar, Moscow State University, Geological Department, Moscow 119899, USSR, M. I. Petaev, Yu. A. Shukolyukov, Vernadsky Institute of Geochemistry and Analytical Chemistry, USSR Academy of Sciences, Moscow 117975, USSR.**

In the abstracts presented at the last conference [1-5] we reported structural, mineralogical, chemical and isotopic data suggesting the magmatic nature of the Divnoe meteorite formed probably as residue in partial melting of the primary subchondrite matter. The meteorite was classified as unique anomalous achondrite. In this paper we try to investigate the Rb-Sr system in order to determine the meteorite age and its eventual connection with the known types of meteorites.

Sample preparation. Taking into account the extremely inhomogeneous distribution and low contents of Rb and Sr, we have chosen to study an aliquote (TR, 2g by weight) of the non-magnetic fraction of the total rock (12g) and of an arbitrary fragment (f1,0.8g). Since chemical data implied the contamination of meteorite in earth alkaline, both samples, after crashing in agate mortar, were washed in water for 8 hours at 90 C in order to remove possible contamination. The aqueous solution was decanted from the washed residue. Three kinds of samples have undergone isotopic analysis: aqueous leachate (WS), washed (WR) and unwashed samples. We failed to measure isotopic composition of Sr in the aqueous leachate of sample f1 (f1 WS).

Chemical treatment of the samples. The samples were dissolved with mixture of fluoric and nitric acids in a teflon vessel under atmospheric pressure. Rb and Sr were separated using a cation exchange column (200-400 mesh Dowex 50x8 resin) with 2.3 N HCl as an eluent. All the acids used were purified by double distillation without boiling. The water was distilled thrice (with boiling). Total blank contribution is 0.2 ng in Rb and 0.5 ng in Sr.

Isotopic analysis has been carried out on the mass-spectrometer MI 1201T allowing registering the $^{87}Sr/^{86}Sr$ ratio up to 0.01%. Fig. 1 shows reproducibility of SRM-987 analyses. The accuracy in the present work is, however, from 10 to 100 times lower, since we had to measure extremely low amounts of Sr ranging from 150 ng to 20 ng. Rb/Sr ratio was measured by double isotopic dilution using one mixed traser $^{85}Rb + ^{84}Sr$. Rb/Sr ratio measurment error, determined by reproducibility on standart sample ST-2, makes 1%.

The experimental results are shown in the Table 1 and on the Fig. 2. Since all points within the error limits fall on a straight line (to put it more exactly, the line drawn through points "f1 WR" and "TR WR" passes through all the remaining points), our suggestion about earth contamination seems not to be confirmed. The isochrone was processed by means of the K. Ludwig's program ISOPLOT using York's algorithm (Model-1 was used, which assumes that the only cause for scatter from a straight line are the assigned errors and the points are weigted proportional to the invers-square of these errors). The isochrone age makes 772 ± 22 ma, while the initial $(^{87}Sr/^{86}Sr)_o = 0.70153 \pm 22$. Errors of age and initial ratio are calculated according to the maximum likelihood method and are given as 95% confidence limit.

Discussion. The young age obtained for the Divnoe meteorite turned out to be somewhat unexpected for us, since all the young Rb-Sr ages known up to date have been obtained only for SNC meteorites and heavy-shocked chondrites. Oxygen isotopes suggest that the Divnoe is certainly not a SNC meteorite and the observed structural and mineralogical features of shock give us no ground to suggest shock reset of the Rb-Sr system. Thus the age obtained is probably either cristallization or metamorphism age.

DIVNOE: RB-SR DATING: Smoliar M. I. et al.

Using the values obtained for the age and initial $(^{87}Sr/^{86}Sr)_o$ one can calculate the model ratio $^{87}Rb/^{86}Sr$ in the parent rock of the Divnoe meteorite. Since oxygen isotopes imply possible relation of the Divnoe meteorite with the parent body of HED meteorites, we have put the initial Sr ratio equal to BABI and the time of Sr evolution in parent rock equal to 3.8 By, thus we get $^{87}Rb/^{86}Sr$ = 0.045 ± 7. This value, being lower then that observed in chondrites, remains within the limits of corresponding values for earth mantle rocks and is quite acceptable for the Divnoe meteorite which is a typical sample of its parent body mantle rock. In this case age obtained corresponds rather to metamorthism then cristallisation, since otherwise the parent rock should possess a higher initial $^{87}Sr/^{86}Sr$ ratio due to higher chondrite Rb/Sr ratio. However any interpretation of data obtained requires additional studies of other isotopic systems.

Table of results

	$^{87}Rb/^{86}Sr$	$^{87}Sr/^{86}Sr$	[Rb] [mkg/g]	[Sr] [mkg/g]
TR	.7740 ±100	.70957 ± 70	0.183	0.668
TR WR	.5754 ± 97	.70782 ± 18	0.1122	0.566
TR WS	2.377 ± 24	.72779 ± 38	6.8	8.3
F1	.1759 ± 18	.70353 ± 10	0.0580	0.958
F1 WR	.09385 ±113	.70242 ± 19	0.0393	1.217

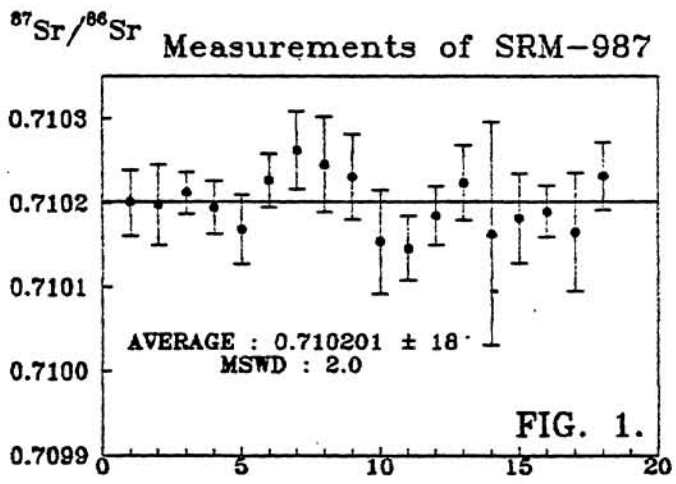

FIG. 1.

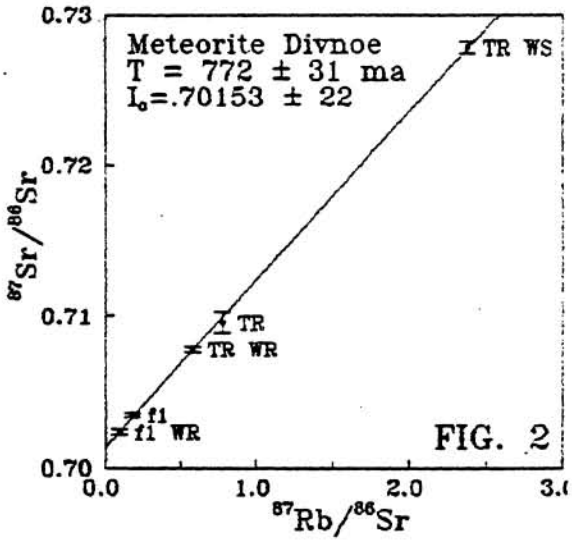

FIG. 2

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