release at 1100°C which would be consistent with a rapid evolution of gas due to melting. So far the stepped heating experiments provide no clue to distinguish which of the mixing models suggested above is responsible for the observed nitrogen isotopic distribution, thus it may be necessary to resort to physical and/or chemical separations in conjunction with stepped heating.

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U-Th-Pb SYSTEMATICS IN SHERGOTTITES: YOUNG AGES AND LOW μ

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We report on U-Th-Pb in Shergotty, Zagami and EETA 79001. The Rb-Sr, Sm-Nd and K-Ar ages of these meteorites indicate young ages of metamorphism and of possibly young igneous activity. One of our objectives was to determine the initial Pb in Shergotty. Results on whole rock samples: from the interior (3A); with a sawn surface (14); and with fusion crust (13) showed a wide range of Pb isotopic ratios. The interior sample has the least radiogenic Pb, but the highest $\mu \equiv {}^{238}U/{}^{204}Pb = 17.3$. In a Pb isotope evolution diagram (Fig. 1), this sample plots close to a 4.56AE (meteorite) isochron. However, this sample could not have existed as a closed system for more than 1.75AE, evolving from primordial Pb. A second interior sample (3C and "+" symbols, Fig. 1) was leached with a mixture of 1M HBr and 2M HCl (L1) and 1M HNO_3 (L2), leaving a residue (R). R has lower μ and higher ${}^{204}Pb/{}^{206}Pb$ than 3A. The leaches are much more radiogenic and have high μ (69 and 49) resulting from dissolution of phosphate and mesostasis. We analyzed separates of Plag and Px subjected to the above acid-leach procedures. The Pb in both the residues of Plag and of Px are almost identical to that of the whole rock residue (R). Pb in their leaches is more radiogenic and plots close to the data array of leaches for the whole rock. These results indicate that Pb in the two major mineral phases was homogeneous. The initial lead (I) in Table 1 is calculated at 190my. The lower intersection of a chord through the data on a coupled Pb-U evolution diagram gives an age of 190 ± 30my for all samples (except 13,14). Samples of Zagami and EETA 79001 were also subjected to the same leaching procedures. The whole rock sample of EETA 79001 has $\mu = 11.0$ and the residue is slightly more radiogenic than Shergotty. Zagami leaches also plot close to the other leaches, but the residue is much less radiogenic and well above the meteorite isochron. In summary, the initial leads of these shergottites are highly evolved and developed in low μ environments ($\sim$ 5). They represent melts formed rather recently with large increases of μ (Pb loss or U enrichment). From the initial Pb we conclude that the parent planet(s) must have a substantially higher volatile element concentration than the Earth ($\sim$ by $\times$ 2). If the parent planet was Mars this implies a high original volatile content on that planet and the loss of any early atmosphere, leaving a residual secondary atmosphere today. The nature of the melting event which produced the shergottites is not clear. It could be due to rather young impact melting of a very ancient crust or of young indigenous igneous activity from an old mantle source (e.g. terrestrial basalts). The effects of the impacts which produced the currently observed shock features and last stage breakup are not discernable in the U-Th data. (#517).

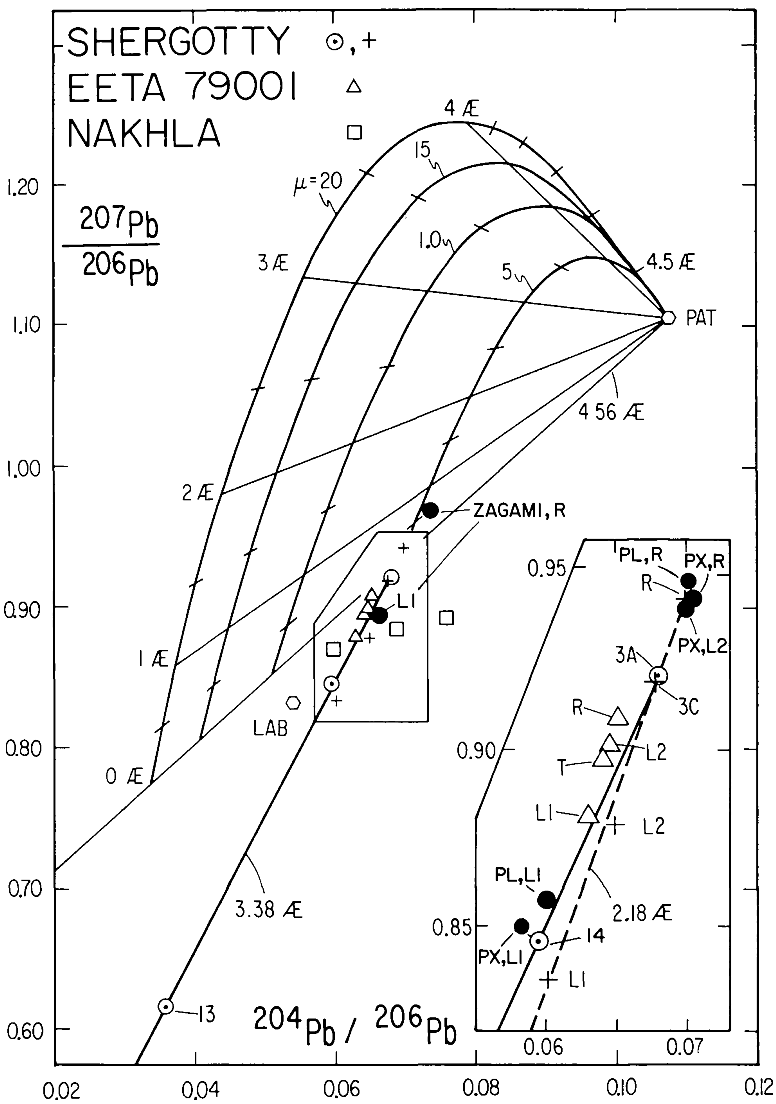

Fig. 1

Table 1

Sample	**208/206**	**207/206**	**204/206**	**μ**
Shergotty				
WR	2.4046	0.9427	0.06976	3.10
Plagioclase	2.4178	0.9482	0.07023	1.82
Pyroxene	2.4010	0.9427	0.07037	2.24
Initial	2.410	0.947	0.07072	—
EETA 79001	2.2972	0.9091	0.06519	1.53
Zagami	2.4759	0.9697	0.07343	—