(1986), argued that the spherules were carbon-saturated at 1200–1225 °C and therefore that the silicate liquid must have contained graphite. However, in the Fe-C system the stable graphite liquidus is much steeper than the metastable cohenite liquidus, and although these alloys were cohenite-saturated, they were not graphite-saturated. Hence, the silicate magma probably did not contain graphite and carbon was not the dominant control on $f(O_2)$. Thus, it may be possible to reconcile the main constraints on ureilite petrogenesis without high pressures.

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U-Pb study of the Acapulco meteorite.

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The Acapulco meteorite is currently studied by a consortium in order to elucidate the origin and history of its parent body. This meteorite is characterized by an approximately chondritic bulk chemistry; its major element composition is close to that of average H-chondrites. Volatile elements and noble gases are however enriched nearly to the level of C1 chondrites, and U and Th show an even higher enrichment (Palme *et al.,* 1981). The texture of Acapulco is equigranular; chondrules are absent. Previous work with long-lived isotopes indicated some unexpected results considering the recrystallized texture and the estimated high equilibration temperature (1350 °K): a K/Ar age of 4.7 ± 0.3 Ga, an internal Sm-Nd isochron indicating an recrystallization age of 4.60 ± 0.03 Ga and recently an Ar/Ar age of 4.51 Ga (Palme *et al.,* 1981; Prinzhofer *et al.,* 1992).

We present U and Pb concentrations and Pb isotopic compositions measured in bulk samples and mineral separates from Acapulco.

Small bulk samples show slightly radiogenic Pb isotopic compositions ($^{206}Pb/^{204}Pb$ = 22–36); similar to the majority of meteorites, they appear to have more radiogenic Pb than could have been derived from U-decay. The U concentrations range from 64 to 96 ppb. Compared to C1, Acapulco is enriched in U by a factor of 5–10. ^{204}Pb concentrations of the fragments (~6 ppb) are lower than C1 level (47 ppb); they lie in the range of H 4–6 chondrites (0.2 up to 7 ppb) (Tatsumoto *et al.,* 1976).

Three different mineral phases were separated and analyzed: plagioclase, troilite and phosphate. The phosphate separate shows a high U-concentration. Using the modal abundance of the minerals, phosphates account for half of the U in the bulk rock. The Acapulco phosphate contains more ^{204}Pb (17.1 ppb) than phosphates from L-, H- and LL-chondrites, and its resulting Pb isotopic composition is less radiogenic. The Pb/Pb model age of the phosphate relative to primordial lead is 4.557 ± 0.002 Ga.

The plagioclase is the main carrier of the ^{204}Pb in the bulk meteorite (80%). Different separates show low U concentrations; the Pb isotopic compositions are close to the primordial lead, but distinct.

The Pb isotopic composition of the troilite is intermediate; U and Pb concentrations are similar to those measured by Unruh in troilites from L-chondrites (Unruh, 1982).

Table 1. U-Pb data of some Acapulco samples.

	$^{206}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{208}Pb/^{204}Pb$	Pb (ppb)	U (ppb)	$^{238}U/^{204}Pb$
WR 28	22.801 ±0.0019	18.688 ±0.020	32.198 ±0.043	507.8	89.6	11.385 ±0.055
WR 37	26.220 ±0.022	20.802 ±0.022	32.627 ±0.043	455.5	95.7	14.64 ±0.21
Troi	13.00 ±0.68	12.53 ±0.41	31.98 ±0.81	109.0	3.7	1.72 ±0.25
Plag 28	9.345 ±0.009	10.348 ±0.013	29.411 ±0.043	1912.0	0.01	0.0022 ±0.0004
Phos	148.09 ±0.18	96.42 ±0.14	48.68 ±0.08	5107.0	2759.7	137.0 ±1.1

WR = small fragment, troi = troilite, plag = feldspar, phos = phosphate. All data are corrected for mass discrimination and analytical blank.

The U-Pb systematics clearly indicate that this meteorite has been affected by two distinct processes: the plagioclase data indicate an old perturbation or reequilibration process, whereas the isotopic composition of the troilite and the bulk fragments translates a recent addition of radiogenic lead. We will discuss these data and evaluate different models concerning the history of Acapulco.

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The continuing search for the location of ^{15}N-enriched nitrogen in Acfer 182.

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Acfer 182 is an unusual chondrite, with abundant small chondrules and CAIs (mean diameter *ca.* 100 μm), and rich in metal (*ca.* 15 vol%). It is closely related to ALH 85085, and, like that meteorite, is highly enriched in ^{15}N (bulk $\delta^{15}N$ *ca.* +600‰; $\delta^{15}N_{max}$ = +1584‰ at 900 °C; Grady and Pillinger, 1992). Stepped combustion of Acfer 182 (see Fig. 1) releases ^{15}N over a wide temperature range, indicating that its carriers must be dispersed throughout the meteorite, possibly occurring in carbonaceous material, fine-grained matrix, clasts and metal. The highest relative abundance of ^{15}N is found in phase "N_C," so far unidentified mineralogically, with a C/N *ca.* 10, which releases its nitrogen on combustion of the whole-rock at 850–950 °C. N_C is more apparent in Acfer 182 than ALH 85085, accounting for *ca.* 8 ppm of the total nitrogen inventory of 85.4 ppm.

An attempt to isolate N_C by physical means proved unsuccessful (Grady and Pillinger, 1992); therefore, chemical treatments were tried: an HF/HCl-resistant residue was prepared from 9 g of fragments. Examination of the remaining material confirmed that it was dominantly composed of Mg-Al spinels, chromite, hibonite and Cr-rich sulphides. Approximately two thirds of the original amount of nitrogen in the sample has been lost on dissolution (see Fig. 1), including any associated with Fe-Ni metal. There has been a reduction of over 50% of the nitrogen which was released up to 500 °C and presumed present in a carbonaceous component, without significant change in $\delta^{15}N$ value or C/N ratio. The most visible difference between results from the whole-rock and HF/HCl-resistant residue is that the combustion temperature of N_C has decreased to 550–700 °C, with a concomitant drop in $\delta^{15}N$ from +1584‰ to +1274‰. It is unlikely that a minor (even heavier) sub-fraction of the ^{15}N-rich material has been removed; now that N_C combusts at a temperature closer to the more abundant "organic" nitrogen, it is probable that mixing lowers the observed $\delta^{15}N$. N_C itself does not seem to