A PRELIMINARY STUDY OF MAGMATIC VOLATILES IN ANGRITES.

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Introduction: Angrites are a rare group of achondrites notable for their critical silica undersaturation, lack of shock metamorphic features and ancient crystallisation ages [1-3]. They are sub-divided into plutonic or basaltic angrites on the basis of their inferred petrogenesis. Similar studies to those already carried out on HEDs and shergottites [4, 5] could be used to shed light on magmatic processes on the angrite parent body (APB). Here we present results from carbon and nitrogen stepped combustion experiments on the plutonic angrites Angra dos Reis (AdoR) and NWA 2999, and the basaltic angrite D'Orbigny.

Results are summarized below. Magmatic volatiles are released once the silicate matrix starts to become plastic, usually between 800-1000°C; depending on the CRE age of the specimen, it is possible for this to be mixed with a spallogenic component, the effects of which can be removed following correction. We have not yet applied this correction to the data but expect it to have little effect on either carbon or nitrogen abundance, and to reduce isotopic composition by < 2‰. We also discount NWA 2999 from further consideration, because it contained large amounts of terrestrial organic carbon which swamped all other potential carbon-bearing components.

Name	Total C (ppm)	$\delta^{13}C$ (‰)	Magmatic C (ppm)	$\delta^{13}C$ (‰)
AdoR	801	-21.6	63	-21.4
NWA 2999	6990	-29.5	-	-
D'Orbigny	199	-8.8	9	-11.4

Name	Total N (ppm)	$\delta^{15}N$ (‰)	Magmatic N (ppm)	$\delta^{15}N$ (‰)
AdoR	15	+8	3	-2
NWA 2999	84	-2	-	-
D'Orbigny	12	+8	1	+14

Discussion: the overall ^{13}C-enrichment of D'Orbigny compared to AdoR is partly the result of carbonates ($\delta^{13}C$ ~ 0 to +5‰) lining vugs in the meteorite. There are also differences in magmatic carbon and nitrogen between the two meteorites. AdoR has a higher abundance of the component, with lighter isotopic composition. This is consistent with the petrogeneses of the meteorites, with D'Orbigny having outgassed during its ascent: McCoy et al. [7] calculated that the vesicles present in D'Orbigny could have formed from as little as ~ 12.5 ppm CO_2 dissolved in the magma. Stepped combustion analyses of further angrites should reveal whether there is a relationship between sample petrogenesis and magmatic volatiles.

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