

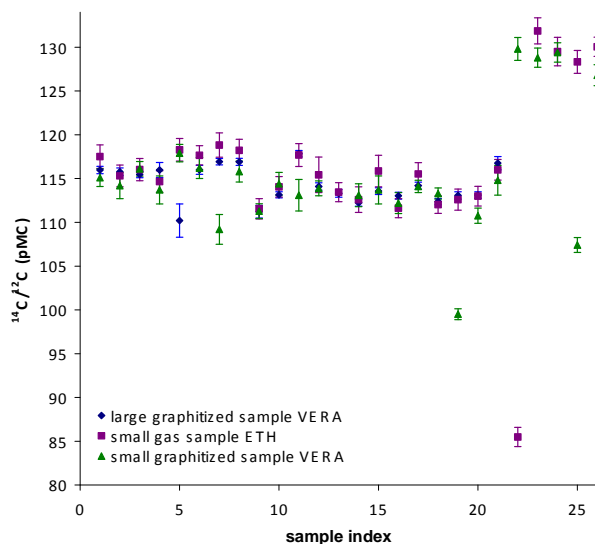
# <sup>14</sup>C AMS MEASUREMENTS OF SMALL SAMPLES

## Graphite target material versus CO<sub>2</sub> gas measurements

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AMS measurement methods for <sup>14</sup>C samples in the µg C range using a gas ion source have been developed at the ETH Zürich. Graphitization and measurement of graphitized small samples have been a focus of development at the Vienna Environmental Research Accelerator (VERA) laboratory. Comparative measurements of small samples were conducted at both laboratories. Overall measurement uncertainties coming from sample isolation and combustion were excluded from this comparison.

A large amount of CO<sub>2</sub> (from organic material) was split into one aliquot of the size of about 100 µg C and two smaller aliquots of about 10 µg C each. The larger aliquot was graphitized and measured at VERA. The two smaller aliquots were welded in DURAN<sup>®</sup> glass vials and randomly assigned either to a measurement at the ETH as CO<sub>2</sub> or as a graphitized sample at VERA.



**Fig. 1:** AMS measurement results of all samples compared.

Figure 1 shows the AMS results of all measured samples. Materials 1 - 21 are samples with

unknown <sup>14</sup>C content. Materials 22 – 26 are IAEA C-3 standards.

The results of the measurement of three ‘dead’ carbon blank materials are given in Table 1.

blank material	<sup>14</sup> C/ <sup>12</sup> C in pMC		
	A	B	C
large graphitized sample VERA	0.03	0.03	0.01
small graphitized sample VERA	0.24	0.27	0.17
gas sample ETH	0.63 <sup>a</sup>	-0.03 <sup>a</sup>	0.75 <sup>a</sup>

**Table 1:** Results of dead carbon blank material measurements. <sup>a</sup>Results of gas ion source measurements are corrected for cathode contamination and a blank count rate.

The measured <sup>14</sup>C/<sup>12</sup>C ratios agree very well, except for five outliers (see figure 1) which were excluded from further analysis. Samples of the size of 10 µg C were typically measured with a precision of about 1 % at both laboratories. A  $\chi_{red}^2$  test shows that the stated measurement precisions are accurate both at VERA and the ETH:

$$\chi_{red}^2 \text{ VERA large graphite to ETH gas sample} = 0.63$$

$$\chi_{red}^2 \text{ VERA large graphite to small graphite sample} = 1.29$$

$$\chi_{red}^2 \text{ VERA small graphite to ETH gas sample} = 1.08.$$

The results of this intercomparison are very encouraging for the development of small samples with either method.

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