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innovators in isotopes

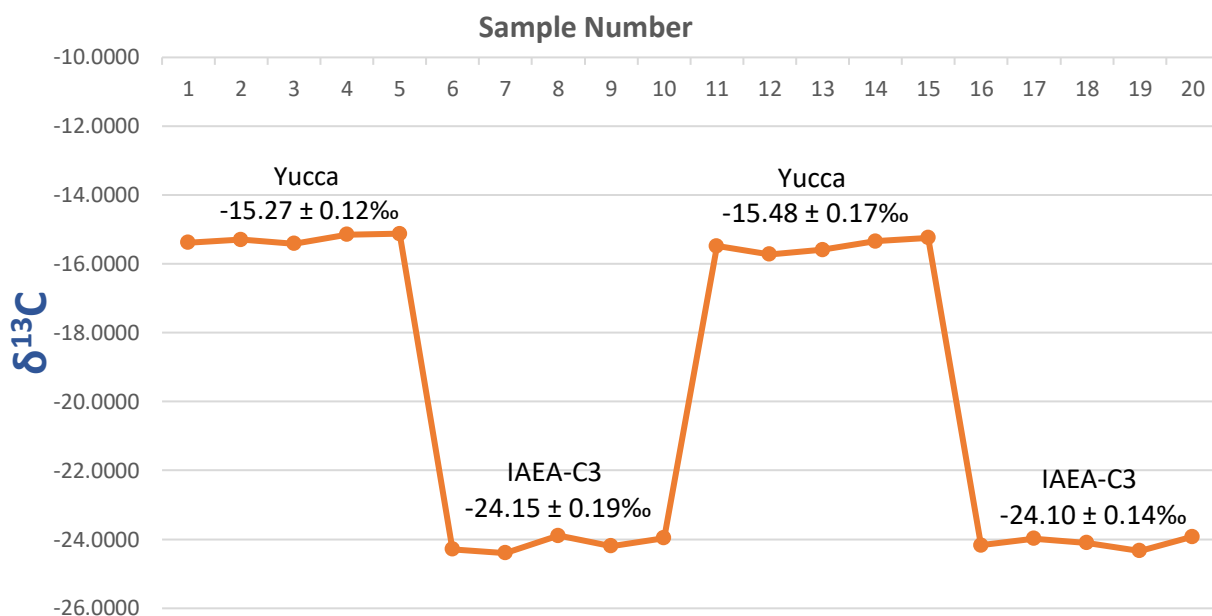
Data bulletin – accuracy and precision in $\delta^{13}\text{C}$ measurements with a uniquely optimised laser ablation IRMS system

A system has been developed which optimises the interface between a Sercon HS2022 coupled to a CryoFlex sample preparation device and a Teledyne 213 laser. This unique design optimises pressure, flow and sample transfer between the ablated sample, cryogenic focusing and IRMS for isotopic measurements. This new design results in an extremely low system blank, and excellent accuracy and precision for different sample types, even when measuring very small amounts of sample.

Laser ablation systems are rarely optimised for IRMS measurements, rather their cells are designed for the more commonly used hyphenation with an ICP-MS. Therefore, many researchers find their measurements suffer from high blanks and inefficient sample transfer which may result in a less than optimal limit of detection. This is not ideal when high temporal resolution is required, as is the case when looking at climatic variations in tree ring samples. In a collaborative project with Natural Resources Institute Finland (LUKE), Sercon have developed a fully optimised system for samples from which isotopic measurements can be made from the smallest of ablated areas.

The laser ablation cell has been redesigned to allow excellent control over very small gas flow rates, allowing the efficient transfer of small amounts of ablated sample. The cryogenic focusing system has been optimised to efficiently combust and focus the sample for efficient transfer to the HS2022 – the most sensitive small radius IRMS on the market.

The results below show good accuracy when compared to EA-IRMS measurements on identical samples, and good precision, in measurements of Yucca plant and IAEA-C3 cellulose standard. No inter-sample memory effect was observed between samples with different $\delta^{13}\text{C}$ values, whilst the mean blank beam area was 1.22nA.



	Yucca	IAEA-CH3	Yucca	IAEA-CH3
	-15.38	-24.29	-15.48	-24.17
	-15.30	-24.40	-15.73	-23.98
	-15.41	-23.89	-15.59	-24.10
	-15.15	-24.12	-15.35	-24.34
	-15.13	-23.96	-15.25	-23.93
SD	0.12	0.19	0.17	0.14
Mean	-15.27	-24.15	-15.48	-24.10
Expected	-14.99	-24.84	-14.99	-24.84

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