

# Study on the effects of various sample pretreatment conditions in accelerator mass spectrometry analysis of $^{14}\text{C}$ at KOMAC

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**Keywords:** Accelerator mass spectrometry, graphitization, radiocarbon dating

Accelerator mass spectrometry (AMS) is a powerful detection means with an ultra-sensitivity and high precision as compared with other traditional mass spectrometry methods. The sensitivity of AMS analysis ranges between  $10^{-12}$  and  $10^{-16}$ . Since the main advantage of AMS compared to traditional mass spectrometry methods is the ability of AMS to measure rare  $^{14}\text{C}$  concentration in mg and even sub-mg size amounts, AMS can be applied in the technique of radiocarbon dating in the fields of archeology, geology, biomedicine applications and many others. A 3-MV tandem accelerator was re-installed to Korea multi-purpose accelerator complex (KOMAC) from Seoul National University in 2017. For confirmation of the feasibility of 3-MV AMS system, we carried out a careful investigation on various sample pretreatment conditions in each steps including chemical pretreatment,  $\text{CO}_2$  collection, and reduction of  $\text{CO}_2$  (graphitization). The results shows that the mean  $F^{14}\text{C}$  value of blank anthracite is  $0.0026 \pm 0.0006$  and the mean  $F^{14}\text{C}$  value of SRM 4990C Oxalic acid-II is  $1.3439 \pm 0.0057$ . Most of the  $F^{14}\text{C}$  values are within its associated one-sigma uncertainty. In addition to the current results, we plan to determine the adequate sample preparation procedure of collecting radiocarbon reflecting the sample age for our facility. Here, the current state of an optimized sample preparation method and the results of the acceptance tests for  $^{14}\text{C}$  dating performance with blank and the reference samples are reported.

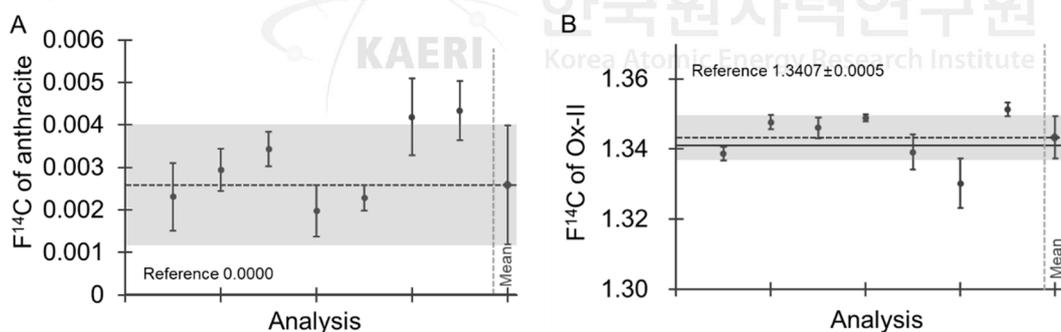


Fig. 1.  $F^{14}\text{C}$  of (A) blank anthracite and (B) SRM 4990C Oxalic acid-II (Ox-II). Symbols and error bars to the right of the dashed light black line show the mean value (reported) and its associated one-sigma uncertainty indicated by gray bar area. The solid black line show the mean value of samples (measured).

## Acknowledgments

This work was supported by the operation fund of KOMAC (Korea Multi-purpose Accelerator Complex) of the MSIT (Ministry of Science and ICT).

