ENRICHMENT OF SUB-MILLIGRAM SIZE CARBON SAMPLES

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Enrichment of carbon isotopes has been developed in the past for conventional dating to extend the radiocarbon time scale beyond 50 ka. For AMS, the necessary system can be scaled down considerably. We have developed an enrichment system for use in conjunction with the Groningen AMS. Our goal is to increase the $^{14}C$ count rate for very small (even for AMS) samples.

We enriched samples in the form of CO by thermodiffusion. We built a column with a height of 3 m, with a central hot wire with a temperature of ca. 900 K. The enriched CO is collected in a reservoir connected to a graphitization cell. For $^{13}C$ we obtained an enrichment of about a factor of 3, depending on various parameters. Consequently, we expect for $^{14}C$ an enrichment of about a factor of 6. Preliminary AMS measurements will be presented at the conference.

AMS AT THE MUNICH GAS-FILLED ANALYZING MAGNET SYSTEM GAMS

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For AMS measurements with heavy isotopes (e.g., $^{59}$Ni), the deflection of the ions by a gas-filled magnet is a very effective and efficient method to suppress isobaric background. Interacting with the gas atoms, the ions get an average magnetic rigidity depending on their nuclear charge. Measurements were done at Argonne National Laboratory (Paul et al. 1989) with a Split Pole and in Munich (Korschinek et al. 1994) with a Q3D-spectrograph. The weak points of these systems are field arrangements, where only 40–50% of the ion paths in the gas-filled regions are covered by magnetic field. Therefore, a simple bending magnet should reveal optimum conditions. Here nearly the total length of the trajectories in the gas is covered by magnetic field, so the statistics of the charge state fluctuations improve, while the small-angle scattering is unchanged. For these reasons we have set up a dedicated gas-filled magnet system GAMS ($\varphi = 135^\circ$, $R=90$ cm). The first and the third of the detector’s four energy loss sections are split to obtain the position and angle of the incoming ions. For additional suppression of isotopic background a 3.5 m time-of-flight path has been installed. First measurements of the nuclides $^{36}$Cl, $^{55}$Mn, $^{59}$Ni and $^{60}$Fe have been performed. Background limits achieved here were $^{59}$Ni/Ni $< 1 \times 10^{-13}$, $^{60}$Fe/Fe $< 1 \times 10^{-14}$ and $^{36}$Cl/Cl $< 3 \times 10^{-15}$.

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