Aluminium-26 measurements with beryllium-10 counting statistics

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The production rate of ^{26}Al ($T_{½}$ = 720,000 years) in quartz at the earth's surface is a factor of 6 higher than ^{10}Be. Nevertheless, ^{10}Be is much more widely used in exposure-dating applications for the simple reason that beam currents of $^{27}Al^-$ ions are generally low, in the range 0.1-0.5 μA. By comparison, $^{9}BeO^-$ currents of several μA are readily achieved.

The atomic Al^- negative ion has been used almost universally for AMS measurement of ^{26}Al because this choice eliminates any interference from ^{26}Mg due to the instability of the Mg^- ion. Beam currents of the AlO^- molecular ion are typically a factor of 20 higher than for Al^- ions, but have not been exploited because magnesium does form the MgO^- molecular ion, and hence the rate of ^{26}Mg ions completely overwhelms the ^{26}Al detector.

The Munich group have shown that it is possible to use the AlO^- ion provided that a gas-filled magnet (GFM) is used to suppress the large flux of ^{26}Mg ions [Arazi *et al.*, (2004) *Nucl. Instr. Meth.* **B223-224,** 259-262]. We are following the same approach, and achieve a reduction in counting rate of ^{26}Mg ions by a factor of 1000 from the GFM alone. Discrimination against the residual flux of ^{26}Mg ions is achieved with a multi-element gas-ionisation detector. This system is now in routine operation for ^{26}Al measurements, and allows us to achieve comparable counting statistics for ^{26}Al and ^{10}Be from the same sample.

Details of the AMS method, our experience to date, and potential applications will be presented.