ACCELERATOR MASS SPECTROSCOPY AT TOKYO UNIVERSITY TANDEM

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Use of accelerator as an ultra-sensitive mass-spectrometer has a greate advantage in radio-isotope dating in that it requires less measuring time and less sample material. This method is being developed in many laboratories in the world.[1]) We report our developement at Tokyo University tandem accelerator by two groupes, one aiming detection of ^{10}Be for cosmo-science and the other of ^{14}C.

Our accelerator mass spectroscopy (AMS) system is illustrated in Fig 1. Major compontnts added specifically for AMS are a beam monitor in the 90° analyser magnet and an electro-static deflector. The beam monitor measures the stable isotope current accelerated at the same time (^{9}Be when ^{10}Be is to be detected) and serves to monitor ion production efficience at the ion source and beam transmission of the accelerator. The electro-static deflector eliminates background ions which originate from charge exchange in the accelerating tube. Ions are detected with an SSD preceded by a gas absorber to discriminate isobars (^{10}B against ^{10}Be). SSD will be replaced by a ΔE-E gas counter in order to increase particle identification power. Another detector was prepared in the beam switching magnet. It is a position sensitive ΔE-E gas counter to form a spectrograph in conjunction with the magnet, though background ions were too numerous without an electro-static deflector.

Beryllium samples were prepared in the form of BeO and mounted in the sample cone for HICONEX 834 sputter ion source, and BeO^- ions were extracted in back-focucing geometry. Fig 2 shows sample cone used. BeO were mixed with silver powder, pressed into small hole in the cone and baked in vacuum before mounted into the ion source. $^{10}Be^{16}O^-$ and $^{9}Be^{17}O^-$ ions were injected and accelerated together and $^{10}Be^{3+}/^{9}Be^{3+}$ ratio were measured. Transmission of $^{10}Be^{3+}$ between analyser magnet and detector were measured with

$^{10}B^{3+}$ beam in order to get correct $^{10}Be/^{9}Be$ ratio. Comparison of the ^{10}Be concentration in the sample with that measured by radioactivity shows a reasonable agreement.

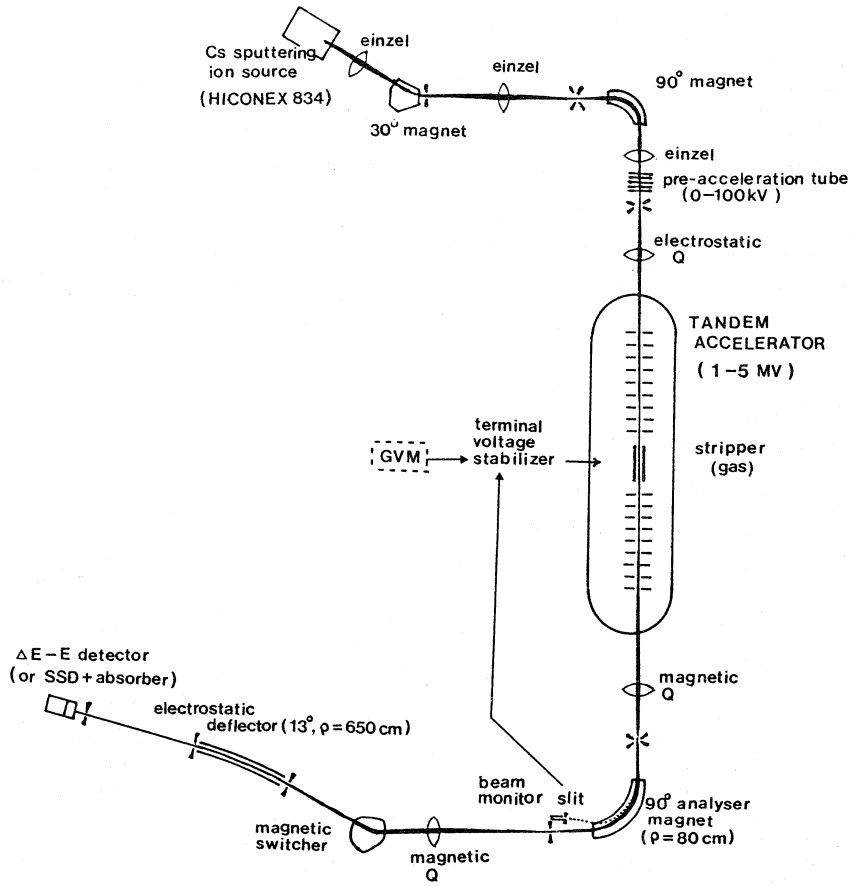

Fig 1. Accelerator mass spectroscopy system at Tokyo University Tandem.

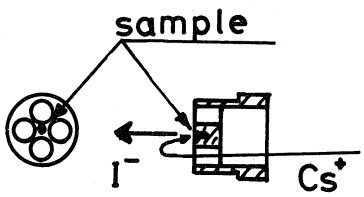

Fig 2. Sample cone.

[1] Proceedings of the First Conference on Radiocarbon Dating with Accelerators, Rochester, April 1978, H.E.Gove,ed. Proceedings of the Tenth International Radiocarbon Conference - Bern, August 1979, Radiocarbon, vol 22, nOs 2 & 3, 1980. Proceedings of Symposium on Accelerator Mass Spectrometry, Argonne, May 1981, ANL/PHY-81-1.