The accelerator is a tandetron operating at 2.5 MV and equipped with a 59-sample ion source. The full automation enables overnight operation on a routine basis. In a typical measurement batch, every fourth sample is a standard. We use sucrose (IAEA-C6) as an internal working standard.

Here we present a review of the first two years of operation, where >2000 measurements were performed. Overall performance per batch is better than 1‰ for $\delta^{13}C$ and better than 0.5 pMC for $^{14}C/^{12}C$. Reproducibility tests indicate that the machine performance is better than these numbers. The final accuracy is mainly determined by target quality.

The pure machine background (*i.e.,* measured without target) is negligible (<100 ka). From background target tests, we conclude that for real measurements the background is *ca.* 50 ka.

MOLECULAR BREAKUP OF CO_2 AND HOLD-UP TIME IN A MICROWAVE ION SOURCE

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The production of C^+ in a microwave ion source injected with CO_2 gas has been investigated. The microwave ion source was operated with pure CO_2 feed gas and the extracted beam was magnetically analyzed. Efficient breakup of the CO_2 molecule was observed. In a separate experiment, a continuous flow of argon maintained the discharge and CO_2 gas was pulsed into the source through an electromagnetic valve closely coupled to the plasma chamber. The C^+ and O^+ components of the beam fell to one-half their original intensity <20 sec after the electromagnetic valve was closed. These results are considered promising for such applications as accelerator mass spectrometry of C isotopes in gaseous samples and for ion sources for radioactive ion beam facilities.

^{14}C STUDIES ON THE GISP-2 ICE CORE: DO POLAR ICE SHEETS CONTAIN A RECORD OF PAST GALACTIC COSMIC RAY FLUX?

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Recent developments have made it possible to accurately measure the very small amounts of $^{14}CO_2$ present in samples of glacial ice (Wilson and Donahue 1990). This $^{14}CO_2$ may originate as atmospheric $^{14}CO_2$ trapped in voids in the ice or may be produced *in-situ* by cosmic ray spallation of oxygen atoms in the ice (Fireman and Norris 1982). In this paper we show how the amount of $^{14}CO_2$ present in glacial ice is related to many factors, including the age of the sample, rate of cosmogenic ^{14}C production and the degree of recrystallization of the snow-pack during firnification. The $^{14}CO_2$ concentrations from the GISP-2 ice core for the last 40 ka will be presented. Two important cases in which simplifying assumptions can be made about many of these factors will be discussed. Within the Holocene portion of the GISP-2 core, ^{14}C dating can be used to estimate the age of ice samples. Within the section from the last glacial period, $^{14}CO_2$ measurements on samples of the same core were used to estimate cosmogenic ^{14}C production and thus the galactic cosmic ray flux. Measurements of cosmogenic ^{14}C production rate for the period 40–17 ka suggest that the galactic cosmic ray flux remained constant at current levels for the period 30–17 ka after a perturbation, possibly a