



Contribution ID: 111 Contribution code: RTA-1

Type: Oral Presentation

## Improvement of Cl-36 measurements at the Tsukuba 6 MV AMS facility

Wednesday, 23 October 2024 13:30 (20 minutes)

Long-lived nuclides  $^{10}\text{Be}$ ,  $^{14}\text{C}$ ,  $^{26}\text{Al}$ ,  $^{36}\text{Cl}$ ,  $^{41}\text{Ca}$ ,  $^{90}\text{Sr}$ , and  $^{129}\text{I}$  have been successfully detected with the 6 MV accelerator mass spectrometer at the University of Tsukuba [1].  $^{36}\text{Cl}$  is one of the most difficult radionuclides to measure due to contamination with the interfering isobaric  $^{36}\text{S}$ . Sulfur itself is easily present in the environment, making its removal difficult. In order to separate and discriminate  $^{36}\text{S}$ , we have studied acceleration conditions, methods to reduce  $^{36}\text{S}$  in the beam itself emitted from the Cs sputtering ion source, and to separate and identify the spectrum between  $^{36}\text{Cl}$  and  $^{36}\text{S}$  incident on the detector [2]. To reduce  $^{36}\text{S}$ , we compared the material of the cathode in which the sample is loaded, a copper cathode filled with AgBr powder and a cathode with Ta metal attached. The sample cathode made of Cu, filled with AgBr, and with a 1 mm diameter hole had the lowest contamination of  $^{36}\text{S}$ . When the sample volume is large, AgCl is placed on the entire surface. In addition, we attempted to suppress  $^{36}\text{S}$  contamination by covering the surface of the wheel disk with a 0.5 mm Ta plate. As a result, the contribution of  $^{36}\text{S}$  was reduced by a factor of 50.  $^{36}\text{Cl}$  detection performances of  $\text{Cl}^{5+}$  (30.0 MeV),  $\text{Cl}^{7+}$  (48.0 MeV), and  $\text{Cl}^{8+}$  (54.0 MeV) were compared by acceleration at 6 MV. We also compared how the spectrum separation changes with the gas pressure in the gas ionization chamber. As a result, background values were  $\sim 3 \times 10^{-15}$  for all charge numbers  $q=5+$ ,  $7+$ , and  $8+$ .  $\text{Cl}^{7+}$  (48.0 MeV) is commonly used for  $^{36}\text{Cl}$  AMS at the University of Tsukuba because the beam transmittance is as high as about 14% and the effect of interfering nuclides on the spectrum is small. In this presentation, we will report on progress in  $^{36}\text{Cl}$  AMS detection techniques and applied researches with the 6 MV tandem accelerator.

### References

- [1] K. Sasa et al., Nucl. Instrum. Methods Phys. Res. B, 437 (2018) 98.
- [2] S. Hosoya, K. Sasa et al., Nucl. Instrum. Methods Phys. Res. B, 438 (2018) 131.

### Student Submission

No

**Primary authors:** Dr SASA, Kimikazu (University of Tsukuba); Mrs MATSUMURA, Masumi (University of Tsukuba); Mr YOSHIDA, Tetsuro (University of Tsukuba); Mr TAKAHASHI, Tsutomu (University of Tsukuba)

**Presenter:** Dr SASA, Kimikazu (University of Tsukuba)

**Session Classification:** Radiohalide Techniques and Applications

**Track Classification:** Radiohalide Techniques and Applications