106 番元素シーボーギウムオキシ塩化物の揮発性研究に向けた等温ガスクロマトグラフ法の開発

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Development of Isothermal Gas Chromatography for Volatility Study of the Seaborgium Oxychloride ([1]*Graduate School of Health Science, Tokushima University,* [2]*ASRC, JAEA* [3]*College of Science, Ibaraki University,* [4]*Graduate School of Science and Technology, Niigata University,* [5]*Graduate School of Science and Engineering, Ibaraki University,* [6]*Graduate school of Biomedical Science, Tokushima University*) ○Ryo Otani,[1,2] Tetsuya K. Sato,[2,3] Ryota Aoki,[2,3] Kaori Shirai,[4] Hayato Suzuki,[2,5] Kazuaki Tsukada,[2] Masato Asai,[2] Yuta Ito,[2] Yuichiro Nagame,[2] Minoru Sakama[6]

Due to strong relativistic effects caused by increasing the atomic number, chemical properties of seaborgium (Sg, element 106) is likely to be different from those of lighter homologues, molybdenum (Mo, element 42) and tungsten (W, element 74). The adsorption enthalpy of the Sg dioxydichloride on a quartz surface ($\Delta H_{ads}(SgO_2Cl_2)$) has been reported to be －98 kJ/mol [1]. The result, however, is still ambiguous because the value was evaluated based on a few experimental points with large statistics errors. To obtain a reliable $\Delta H_{ads}(SgO_2Cl_2)$ for a discussion of an influence of relativistic effects, a stable gas chemistry apparatus with good reproducibility is mandatory.

In this study, we have conducted offline experiments of an isothermal gas chromatography[3] with short-lived Mo isotopes originated from a ^{252}Cf fission source. We searched for experimental parameters for an on-line experiment. At the presentation, we will present the obtained optimum conditions for gas chromatographic separation of group-6 elements and determined $\Delta H_{ads}(MoO_2Cl_2)$

Keywords：Seaborgium, Isothermal gas chromatography, Adsorption enthalpy

106 番元素シーボーギウム(Sg)は、大きな原子番号に起因する強い相対論効果[1]の寄与により，同族元素モリブデン(Mo)やタングステン(W)からの予想とは異なる性質をもつ可能性が示唆されている．先行研究において、石英表面における Sg オキシ塩化物の吸着エンタルピー$\Delta H_{ads}(MoO_2Cl_2)$は－98 kJ/mol[2]と求められたが，誤差の大きな実験点から求められたために曖昧な結果となっている．

本研究では、信頼性のある Sg オキシ塩化物の $\Delta H_{ads}(MoO_2Cl_2)$測定のために、標的槽直結型等温ガスクロマトグラフ実験装置[3]を用いて、^{252}Cf の自発核分裂で放出される Mo を対象にオフライン等温ガスクロマトグラフ実験をおこない、オンライン実験に向けた最適条件を求めるとともに、Mo のオキシ塩化物の吸着エンタルピーの決定を試みた。

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