

infiTOF Application

Analysis of special helium gas (^3He)



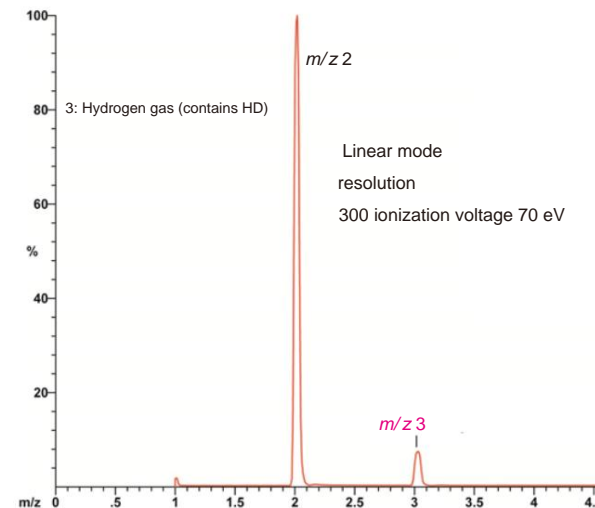
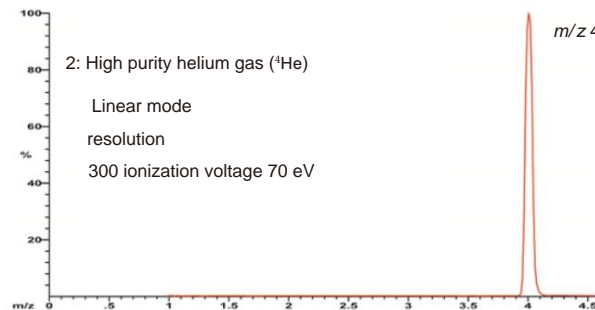
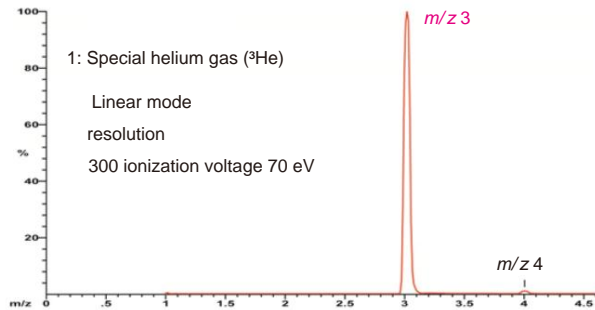
infiTOF-DUO

Helium-3 (^3He) is an isotope that exists in the atmosphere at only one millionth of helium-4 (^4He), and is used in nuclear fusion research and neutron detection.

Using the multiturn time-of-flight mass spectrometer infiTOF, we analyzed special helium gas from which helium-3 was purified.

[Analysis target and comparison target, 1: Special helium gas (^3He), 2: High purity helium gas (GC grade 99.999%), 3: Hydrogen gas (contains HD)]

[Analysis method]
- Introduce the target gas into the EI ion source through a 0.1 mm ID capillary tube at a flow rate of 2 mL/min.



- As a result of analyzing special helium gas and high-purity helium gas in linear mode, it was confirmed that although special helium gas contains a trace amount of m/z 4 component, the main component is m/z 3.
- Linear mode is a mode in which the ions to be analyzed are not sent into orbit around the infiTOF's ion optical system, but are detected over the shortest flight distance and scanned over the entire m/z range.

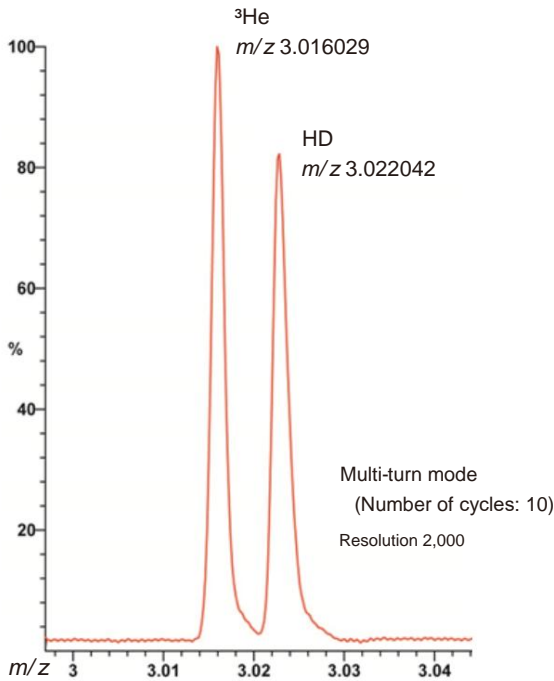
- The ions with m/z 3 are estimated to be ^3He and HD (hydrogen-deuterium). To confirm that the special helium gas is ^3He , we conducted a comparative analysis with hydrogen gas (containing HD)



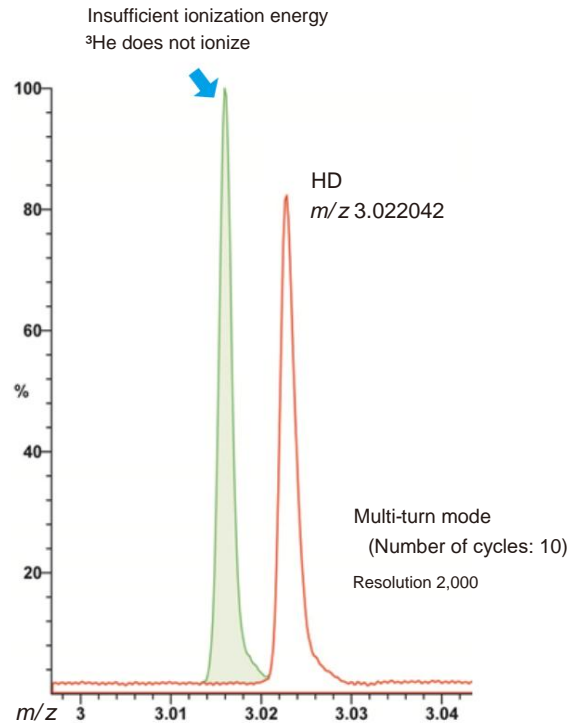
Special helium gas and hydrogen gas (containing HD) were mixed and analyzed in multi-turn mode. In multiturn mode, the analyte ions make multiple infinity-shaped orbits along the infiTOF's ion optics. This mode provides analysis with high mass resolution by increasing the flight distance of ions.

Mixed gas of special helium gas and hydrogen gas (containing HD)

- Introduce the target gas to the EI ion source
- Ionization voltage 70 eV and 20 eV



EI ionization voltage 70 eV



EI ionization voltage 20 eV

In high mass resolution analysis of a mixed gas of special helium gas and hydrogen gas (containing HD), two accurate mass peaks of a component with m/z 3 were detected. Based on its accurate mass and the fact that by setting the ionization voltage of the ion source to 20 eV, ionization did not occur and it was no longer detected, it was confirmed that the m/z 3 component in the special helium gas was helium-3. The high mass resolution of infiTOF's multiturn method enabled the separation of ^3He and HD.

infiTOF exhibits excellent sensitivity and mass resolution even in the low molecular weight range such as m/z 3.

*Product specifications may change without notice for improvement.



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