

Chronos - Single Faraday, Single Ion Counter High Performance Noble Gas MS

The Chronos is a versatile mass spectrometer that meets the need of the noble gas community for an instrument which is simple to operate, yet provides high performance. The instrument incorporates the proven ion optics, electronics and software developed for the Noblesse NG-MS but in a smaller volume, lower cost instrument.

A key feature is the high resolving power. This enables not only true resolution of ^3He from HD and H_3 , but also routine removal of carbon based interferences at all argon masses.

Features

True Resolution:

- Narrow multiplier slit permits true separation of ^3He from HD and H_3 and an optional micro filter further reduces the scattered background.

High efficiency Nier source:

- Shares the same retractable source assembly as Noblesse, allowing easy exchange of the filament, and providing easy access to the internal source components. Filament emission, beam steering and focussing are fully computer controlled.

Collector system:

- The collector system incorporates a single Faraday collector and single multiplier. Ion beams can be quickly deflected into either the Faraday or multiplier detector for measurement.
- A full size discrete dynode ion-counting multiplier has been selected for high efficiency, excellent stability and linearity, with dark noise < 0.1 cps.

Minimal internal volumes:

- Chronos mass spectrometer volume is 1300 cc excluding source and collector getters.

Unique electrostatic beam focusing optics:

- This electrostatic lens focuses the ion beams precisely at the collector defining slits, thus eliminating any requirement for moving the magnet when tuning for optimum peak shapes.

Laminated magnet:

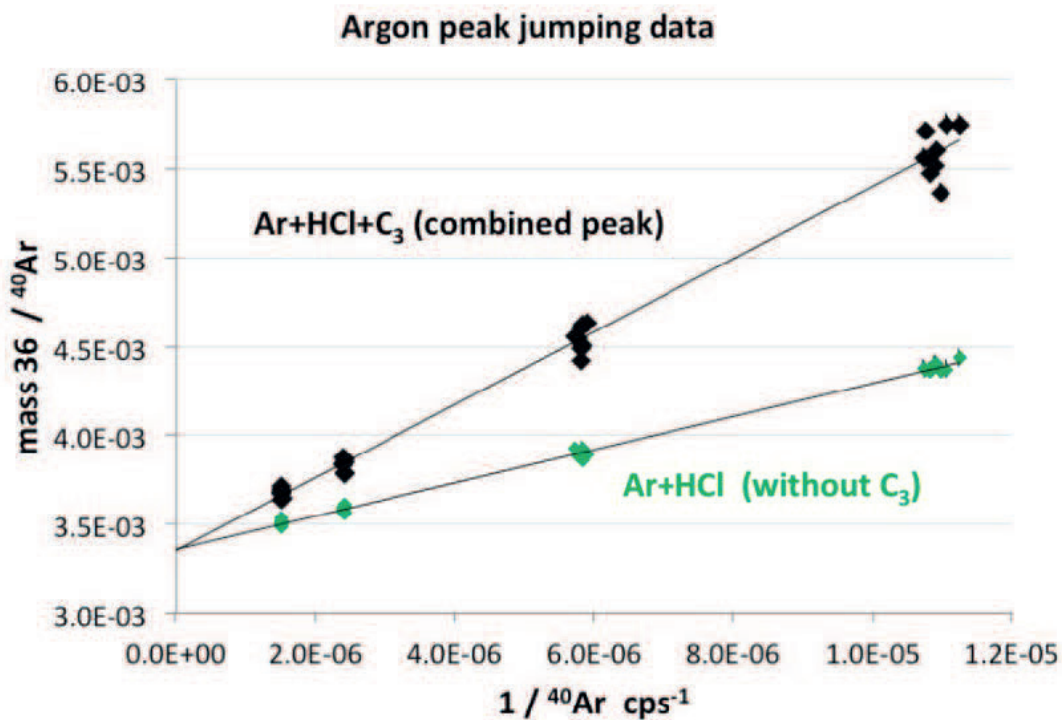
- Located on roller bearings (for easy movement when baking), no adjustment of the magnet poles is required due to the unique electrostatic focusing optics

Total 'dry' pumping technology:

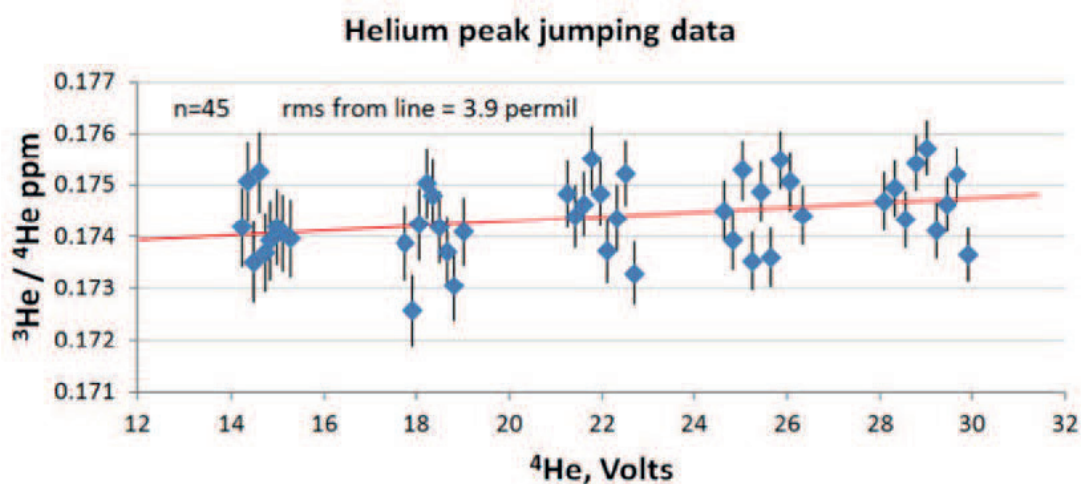
- Comprising of one turbo-molecular pump (75 l/s) backed by a 'dry' (hydrocarbon free) pump, and an ion pump (20 l/s).
- Two getters are provided – one at the source and one at the collector. Either getter may be isolated from the instrument and activated without contaminating the mass spectrometer.
- Fully bakeable to 300 °C +
- Full bake-out ovens and heaters are supplied



Enhanced Ar accuracy due to interference removal



Argon peak jumping data, for different sized air shots, presented as mixing diagram. Straight lines represent mixing between fixed blank and varying amounts of air. Note the lower dispersion of measurements with C₃ removed — for these, $n=32$, $\chi^2=30$, rms from line = 0.5%. This is consistent with feedback from users, who report that removal of C₃ produces better quality Ar-Ar data.



Ultimate He precision, with low volume

Example of helium peak jumping data, using commercial He ('balloon gas') which has $^3\text{He}/^4\text{He}$ considerably less than air. Analysis shows that the dispersion of the measurements is excellent agreement with counting statistics, i.e. is at the theoretical limit and so cannot be bettered.