

Emission Suppression Technology: revolutionizing noble gas isotope analysis

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Static vacuum mass spectrometry suffers from the problem that sample ionization starts immediately after introduction to the source and before isotopic equilibrium is reached. As ionization efficiencies of different isotopes vary, the isotopic composition of the sample being measured evolves with time. This presents a challenge when attempting to derive the isotopic ratio of the original gas sample, particularly in small volume, high sensitivity mass spectrometers with a high rate of sample consumption. The noble gas community have overcome this challenge by extrapolating the isotope ratios back to t_0 , to determine what the original isotopic composition of the gas would have been if it had entered the source fully equilibrated. However, this extrapolation comes at the cost of accuracy and precision, with decreasing precision the longer the time between sample introduction and first measurement. Furthermore, it has been demonstrated that changing the equilibration time can have an effect on the accuracy of the isotope ratio.

The novel, patented, Emission Suppression Technology (EST) of the Thermo Scientific noble gas mass spectrometry portfolio completely eradicates this problem, transforming noble gas isotope ratio mass spectrometry. With EST, it is possible to switch off ionization until the sample gas is fully equilibrated in the source. This means that when ionization is triggered, the sample being measured will be unfractionated, enabling the first measurement to be made at T_0 . This has a dramatic effect on the precision and accuracy of isotope ratio measurements, particularly for isotope systems with long equilibration times. For the first time, Thermo Scientific is able to offer a guaranteed precision specification, which is independent of sample equilibration time and gives the user maximum flexibility and confidence when designing their measurement protocol. It also empowers users to miniaturize their prep systems, thereby dramatically increasing the sensitivity of the system, with no compromise to the precision of the isotope ratio measurement.