

New Technologies for a Portable Mass Spectrometer Helium Leak Detector

Ken Sabo and Wayne Cole, *MKS Instruments, Metheun, MA.*

Mass spectrometer based helium leak detectors offer the highest performance with regard to leak rate sensitivity, response time, and selectivity of gas sample measurement. They typically consist of a mass spectrometer, a turbomolecular pump, at least one roughing pump, and a series of valves.

New developments in pumping technologies enable miniaturization of such mass spectrometer based systems to the point that the instrument can weigh 16 lb and be hand carryable. A small turbomolecular pump and a small scroll roughing pump can achieve the required performance of high vacuum at modest pumping speeds, while also allowing continuous operation during physical movements.

A small ion trap mass spectrometer enables very good sensitivity in a small volume package, while a high performance microprocessor controls the precise and complex sequencing of states. A cylindrical ion trap with a radius of 0.5 cm can be manufactured with conventional techniques, and achieve system leak rate sensitivities of 1×10^{-10} atm*cc/sec.