

Design and Use of Portable and Compact Sampling Systems for Mass Spectrometers

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Residual gas analyzers (RGA's) are most commonly installed on vacuum systems to monitor system performance and to be use as a diagnostic tool when problems arise. While the original purpose of RGA's was residual gas analysis their role has evolved and their utilization for process monitoring and gas analysis has increased. Since many applications requiring gas analysis take place at pressures higher than optimal for linear quadrupoles, the most common type of RGA, it became necessary to incorporate RGA's into compact sampling systems with integrated vacuum pumps.

Operational theory and design choices for compact sampling systems will be discussed. Ion source choice ("closed" versus "open"), mass range, vacuum pumps, sampling configurations, and detector choices (EM versus Faraday) will all be presented. Also, relevant specifications commonly used to describe RGA performance: minimum detectable partial pressure (MDPP), resolution, sensitive, linearity, zero blast, abundance sensitivity, measurement speed and peak stability will be defined while highlighting the analytical figures of merit that are most relevant for compact sampling systems. Products from INFICON Inc and Pfeiffer Vacuum including the Transpector CPM, Ecotec E3000, HAPSITE ER, PV Star/ThermoStar, and related products will be used as examples to highlight a variety of applications that include: semiconductor process monitoring, leak detection, CWA (TIC's & TIM's) detection, thermobalance monitoring, and oil/gas exploration.