A Field-Portable Thermal Desorption Time-of-Flight Mass Spectrometer

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The Kore Technology MS200 is a dual membrane-inlet time-of-flight (TOF) mass spectrometer developed for *in-situ* analysis of volatile organic compounds (VOCs) in air. High sensitivity and parallel detection of all masses is achieved via the patented converging annular reflectron TOF geometry. This incorporates an annular shaped EI source filament and dual micro-channel-plate detector. The 'ring' of ions produced by the filament is reflected such that they all converge at the same point at the detector. The vacuum system is self-contained and pumping is accomplished by a combination of an ion pump and a non-evaporable getter pump to deal with all gases. The instrument is battery or mains operable. The battery has sufficient capacity to run the pumping for approximately two and half days; when analysing it provides capacity for a few hours' operation dependent upon intensity of use. If the battery runs flat the getter pump maintains the vacuum until power is re-applied.

Modifications are reported which improve the detection limits of the system for VOCs and extend its capability to detect semi-volatile organic compounds. The modifications include the addition of a tenax pre-concentration stage and thermal desorption inlet. This delivers sample across a single thin, mechanically supported membrane into the TOF analyser. The reduced membrane thickness significantly improves the instrument's response time. The addition of a scroll pump further reduces the analysis cycle time by rapidly pumping away very high volatile materials before thermal desorption from the trap. A high temperature valve has also been incorporated to enable the inlet region to be heated to 150 ˚C to enable analysis of lower volatility analytes. Instrument response times and limits of detection are reported for a range of compounds.