

Theory of Operation

The Thermal Desorption Unit sits directly on top of the injection port of most GC's (Fig.2), where it provides direct desorption of both volatile and semi-volatile samples into the GC injection port and column. The system delivers samples into the GC along an optimal "short path," thereby eliminating transfer lines and cross-sample contamination issues found in previous systems.

Samples to be analyzed are collected into stainless steel desorption tubes (either glass lined GLT or silco-treated)(Fig.1). A solid sample of interest may be packed directly into the tube and subjected to direct thermal desorption. Alternately, the tube may be packed with adsorbent resin such as Tenax™ TA or activated carbon for indirectly trapping analytes from liquid or air samples.

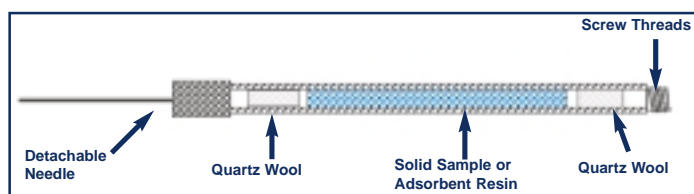


Figure 1 - Desorption (sample) tube

To analyze a prepared desorption tube (Fig.4), a syringe needle is first attached to the desorption tube, which is then attached to the connector tube on the Desorption Unit (#1). The desorption blocks heat to initial temperature (#2). Carrier gas is sent through the desorption tube for an initial purge time (#3). The system then injects the desorption tube into the GC injection port (#4) where flows are readjusted as required by the method of analysis, i.e. split/splitless, etc. The hinged heating blocks close around the desorption tube (#5) to ballistically heat the sample tube, optionally with a temperature ramp. The combination of the heat applied and the carrier gas flow through the desorption tube will purge the desired components into the GC injection port and onto the front of the GC column. To obtain sharp chromatographic peaks when desorption typically lasts 5 to 15 minutes, it can be desirable to focus desorbed components at the head of the GC column. This focusing can be improved by installing a Cryo-Trap, which cryogenically cools the head of the GC column (with liquid CO₂ or LN₂) during desorption to trap desorbed analytes. After desorption, the Cryo-Trap rapidly heats to volatilize the trapped analytes and quickly release them through the GC column for separation (#6).



Figure 2 - Desorption Unit mounted on an Agilent 6890 GC

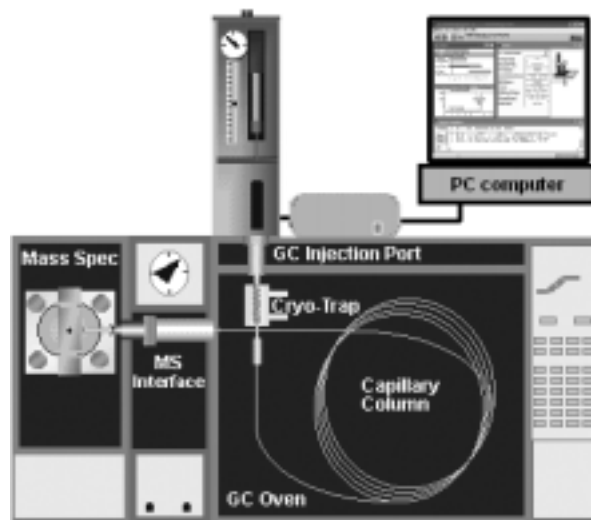


Figure 3 - Schematic of TD-5 System Connected to GC

