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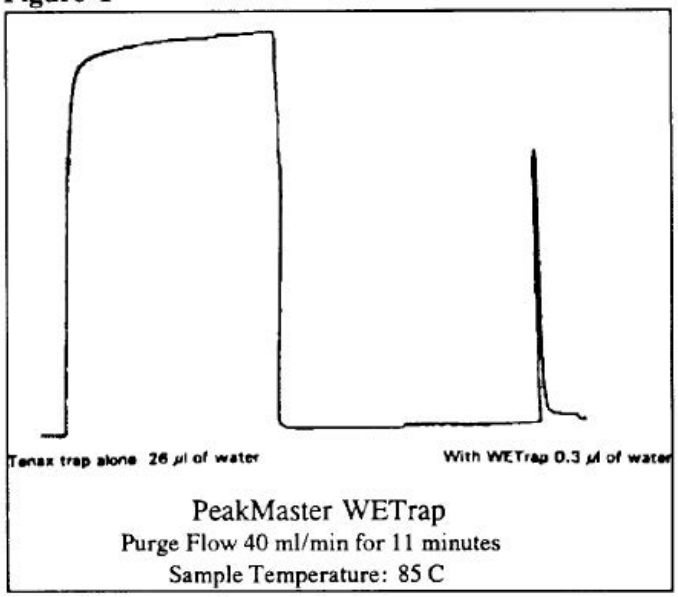
Water Management in Purge & Trap/GC

One of the most crucial features of purge and trap/GC instrumentation is the water management system. The *CDS Analytical PeakMaster* is a purge and trap system specifically designed to minimize water management problems.

There are two components to the system. The first is a WETrap that consists of 3/8 inch stainless steel tubing between the purge bottle and the absorbent trap inside a temperature-controlled insulator. During the purge time, the WETrap remains at ambient temperature so that water condenses inside the tubing, and doesn't enter the absorbent trap. The advantages of the WETrap are shown in Figure 1. 5 ml of water was purged with helium at 40 ml/min for a purge time of 11 minutes, with the sample at 85 C. The amount of water that entered the GC column with no WETrap present was measured and compared to the amount that entered the GC column with a WEfrap. 98.9% of the water that was carried by the helium sweep gas was removed with the WETrap.

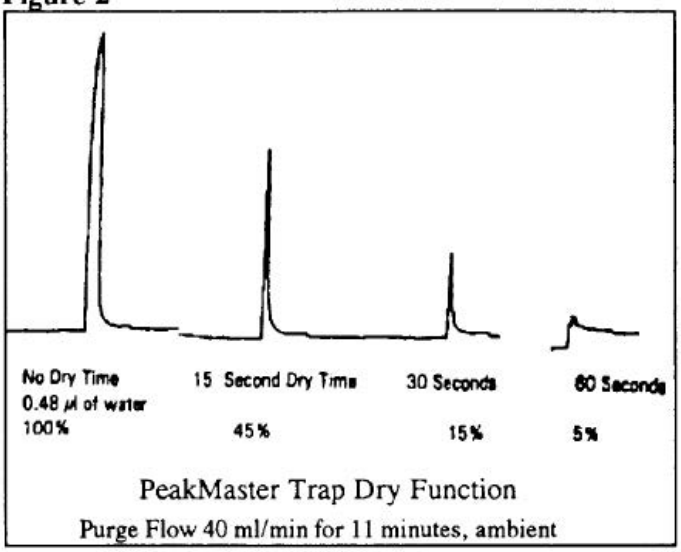
The second component of the water management system consists of the trap dry function, during which the absorbent trap is vented at ambient temperature to allow the water to be flushed through. The trap is then rapidly heated during the desorb function to sweep the analytes onto the GC column. As shown in Figure 2, after as little as a 1 minute trap dry period, only 5 % of the water that entered a Tenax absorbent trap remained to enter the GC column. This means that with the combined use of the WETrap and trap dry func-

Figure 1



PeakMaster WETrap
Purge Flow 40 ml/min for 11 minutes
Sample Temperature: 85 C

Figure 2



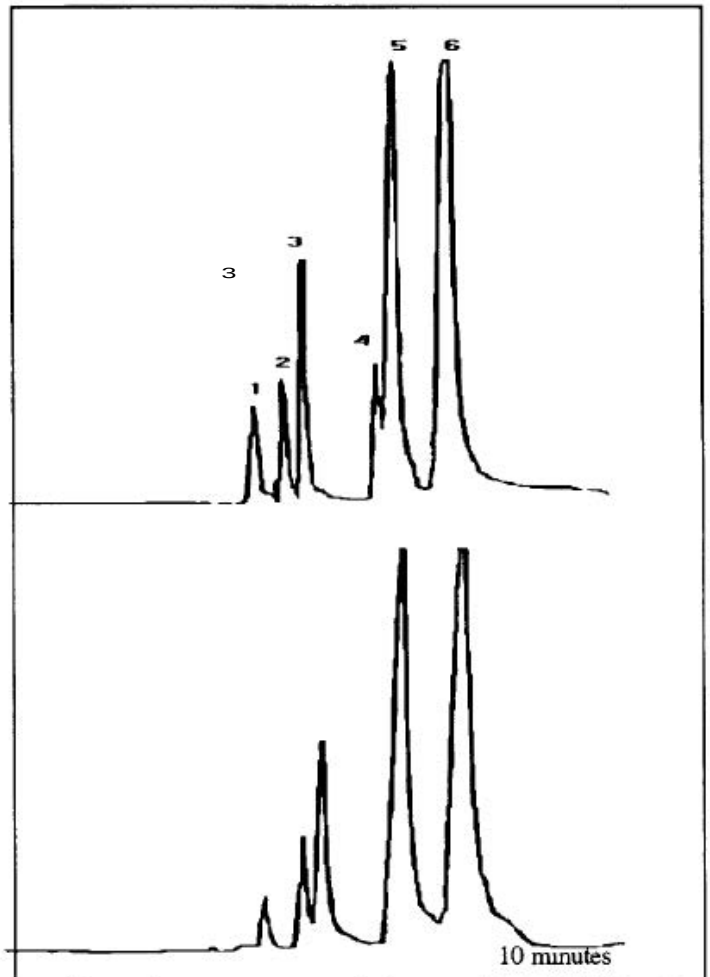
PeakMaster Trap Dry Function
Purge Flow 40 ml/min for 11 minutes, ambient

tions, 99.95 % of the water is removed before the sample enters the GC column.

With the use of the PeakMaster WETrap and trap dry functions, water problems are virtually eliminated during applications requiring a Tenax trap. However, the silica gel required by the EPA to trap gases during EPA 502.2 and EPA 601 analyses poses a particular problem. Figure 3 shows the effect of water retention on the EPA 502.2 gases separation. The first chromatogram was obtained at the beginning of the day after long bake period for the trap, and the second chromatogram shows the same sample under the same conditions after a 24-hour period of analyses using an autosampler. Note that peak 4, bromomethane, is no longer detected in the second chromatogram. The deterioration of the separation is due to a gradual build up of water in the system.

To ensure that water accumulation doesn't cause a problem when using an absorbent trap containing silica gel, we recommend that the trap dry function last 5 minutes during each analysis, and that the trap bake function last 5 to 10 minutes. Once a day, the trap should be baked at 200 C for 30 minutes to an hour. This will ensure that no gradual accumulation of water occurs.

Figure 3



Effect of Water Accumulation on EPA 502.2 and 601 Gases Detected by an ELCD

Conditions: A 20 ppb standard solution of EPA 502.2 gases was purged from 5 ml water for 10 minutes in a *CDS Analytical EA-600* equipped with a *Tremetrics HALL ELCD*. A Restek 105 m 502.2 column was used with the following temperature program: start 35 C, hold 10 minutes, ramp at 6 C/min.

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