CDSolutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

Quantitation of Residual Solvents in Pharmaceuticals using Dynamic Headspace

Headspace techniques are well suited to the determination of volatile organic compounds (VOC's) in complex matrices such as pharmaceuticals since the assay involves only the volatiles and adds no solvents. For dynamic headspace, the sample material is warmed and purged with an inert carrier gas, which removes the solvents and collects them onto a sorbent trap. The trapped VOC's are then backflushed from the trap to a gas chromatograph for analysis. Figure 1 shows the chromatogram resulting from a typical dynamic headspace analysis of a 100 mg pharmaceutical sample, heated to 75°C and purged for ten minutes with helium.

Quantitation is simplified by the addition of an internal standard just prior to thermal desorption of the sample. For the standard curve in Figure 2, chloroform was purged from pharmaceutical samples at concentrations from 20 to 200 ppm. Chlorobenzene at 100 ppm was added to each sample, and the area ratio of the chloroform peak to the chlorobenzene peak was plotted for each concentration.

Figure 1.

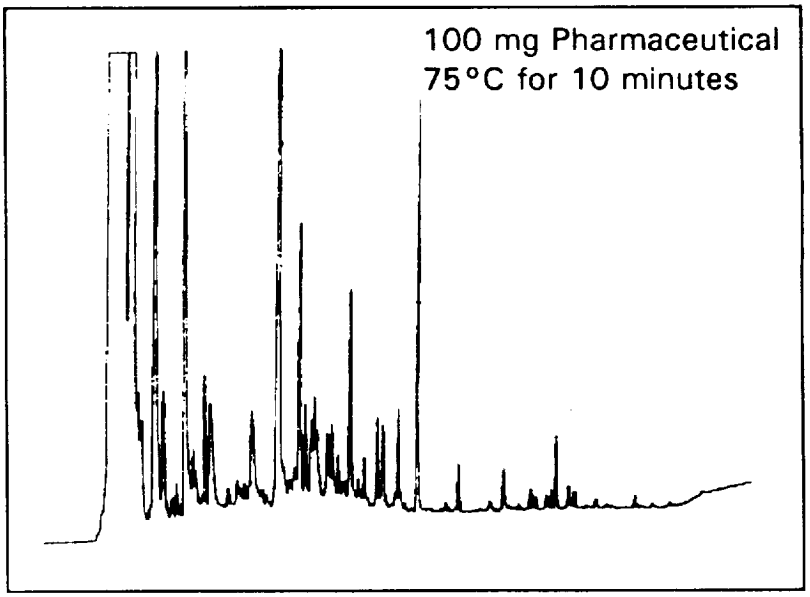
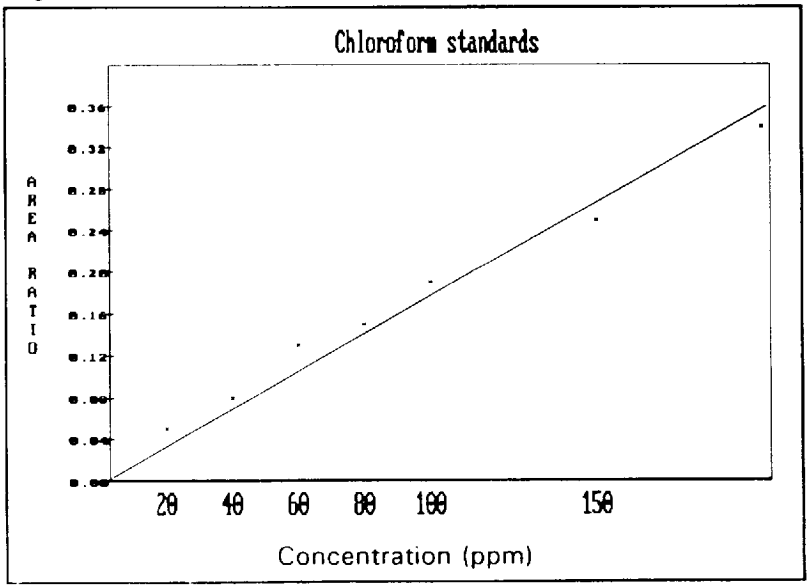


Figure 2.



Calculating the concentration of the volatile, based on the peak areas for the solvent and the internal standard, follows from the equation:

$$[v] = \frac{A_v}{A_{is}} \times \frac{A_{is}}{A_{std}} \times \frac{100}{\text{Wt. Sample}} \times [\text{Std}]$$

$$[v] = \frac{R_v}{R_s} \times \frac{100}{\text{Wt. Sample}} \times [\text{Std}]$$

In which:

- [v] is the concentration of the volatile
- [Std] is the concentration of the standard
- A_v is the area of the volatile peak
- A_{is} is the area of the internal standard
- A_{std} is the area of the standard
- R_v is the area ratio for the volatile
- R_s is the area ratio for the standard.

Equipment:

Dynamic headspace and chromatography were performed using the CDS Analytical EA 600 combination purge & trap/gas chromatograph.

Chromatography:

Column: 30 m x 0.53 mm SE-54 capillary
Detector: FID
Program: 40°C for 2 min., then 8°C/min. to 125°C
Trap: Tenax

FOR MORE INFORMATION CONCERNING THIS APPLICATION, WE RECOMMEND THE FOLLOWING READING:

Dynamic headspace analysis of residual volatiles in pharmaceuticals, T. P. Wampler, W. Bowe, J. Chrom. Sci, 23 (1985) 64-67

Systems approach to automated cryofocusing in purge and trap, headspace and pyrolytic analysis, T. P. Wampler, W. Bowe, J. Higgins, American Laboratory 17, 8 (1985) 82-87

Additional literature on this and related topics may be obtained by contacting your local CDS Analytical representative, or directly from CDS at the address below.

ABOUT CDS

CDS Analytical, Inc. is a leader in the design and manufacture of laboratory instruments for sample preparation and analysis. With 20 years experience in the field, CDS is dedicated to providing the best possible instruments for both research and routine analysis. Well known in the field of analytical pyrolysis, CDS manufactures the Pyroprobe 1000 and 2000 for the introduction and analysis or solid materials by GC, MS and FT-IR. CDS offers a complete line of purge and trap instruments for the analysis of volatile organic compounds in the environmental, food and pharmaceutical areas, as well as custom systems for complex, multicomponent materials investigation. Our customers, their requirements and applications are important to us. To help meet their needs, we offer a wide range of analytical information and the services of our applications laboratory. If you would like additional information, please contact us at the address below, or call us at 1 800 541 6593.

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