

CHARACTERIZATION OF AN IMPROVED DETECTOR FOR THE AGILENT 5973 GC-MS SYSTEM

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Introduction

The HP/Agilent 5973 MSD is an extremely sensitive analyzer. However, due to the high mass spectrometer sensitivity, many users have experienced severe limitations in system linearity. In applications where high concentration samples are routinely analyzed, the original electron multiplier supplied with the MSD has been shown to have a limited range of linearity. A new detector has been developed which incorporates sophisticated ion optics (see **Figure 1**) as well as variable dynode materials to produce a detector which significantly enhances 5973 system linearity. This paper presents design details of the new ETP detector (SGE Part No. 14617) as well as “head to head” performance comparisons with the original equipment.

Figure 1. Ion Optics design of the new 14617 detector.

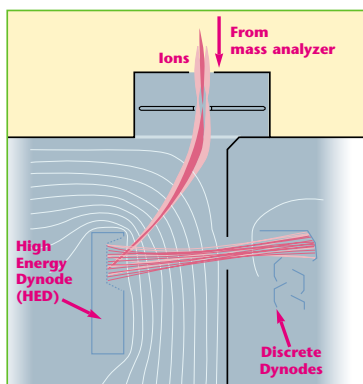


Figure 2. ETP 14617 detector.

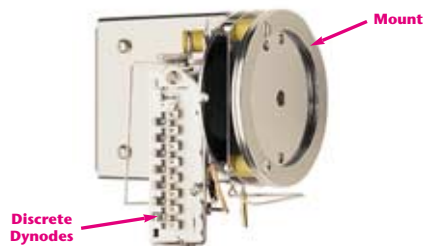


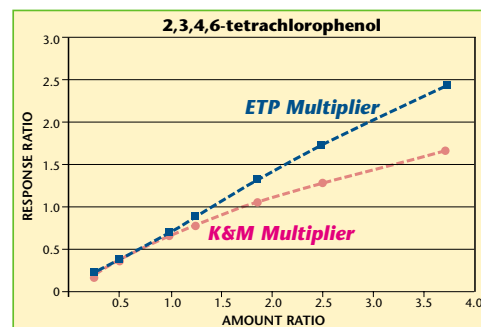
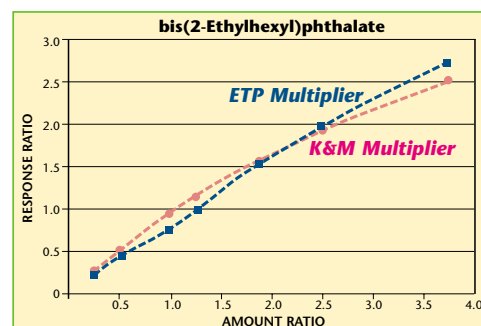
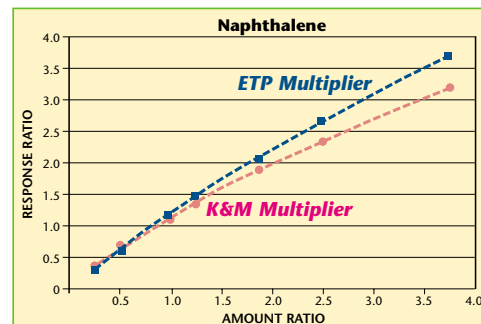
Figure 3. 14617 detector installed in an Agilent 5973 MSD



Detector Evaluation and Comparison

For purposes of comparing the original electron multiplier supplied with the HP 5973 and the ETP detector, two sets of calibration data were acquired. Utilizing MS tuning criteria specified by Method 8270 and three representative compounds, a seven-point calibration was produced first on the standard K&M electron multiplier. The ETP multiplier was then installed and the instrument tuned to the same MS tuning criteria. An identical set of seven-point calibration data was generated. The calibration levels selected for this comparison were 10, 20, 40, 50, 75, 100 & 150 µg/mL (ppm). The six deuterated internal standards were held constant in each level at 40ppm.

Results



Conclusions

A new electron multiplier detector has been designed for the HP/Agilent 5973 MSD that significantly improves system performance for high concentration samples. The new ETP detector incorporates a focused HED and multiple dynode materials to improve both efficiency and operational lifetime. Direct comparison with the detector supplied as original equipment shows that the new ETP detector can improve HP5973 system linearity by more than 250%.

Compounds and internal standards used in quantitation analyses.

Method 8270 Compound	Internal Standard for Quantitation
Naphthalene	Naphthalene-d ₈
bis(2-Ethylhexyl)phthalate	Acenaphthene-d ₁₀
2,3,4,6-Tetrachlorophenol	Chrysene-d ₁₀



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TP-0096-C