

Capillary GC Analyses of Triazine Pesticides in Apples

Based on federal and state regulations for identifying and quantifying low levels of pesticides in food and environmental samples, we selected three capillary columns to screen for triazine pesticides. A nonpolar and two low/intermediate polar phases were chosen to evaluate differences in component elution order and retention times. Low level screening analyses were performed effectively by using split/splitless injection and a thermal specific detector (TSD). Each column separated the triazines in less than 30 minutes. Example chromatograms are shown.

Key Words:

- triazines • atrazine • simazine • fruit

Federal and state regulations require that pesticides in food and environmental samples be identified and quantified at low levels. Based on these regulations, we selected three capillary GC columns to screen for pesticides at low levels. We chose a nonpolar phase, PTE™-5, and two low/intermediate polarity phases, SPB™-608 and SPB-1701, to illustrate the differences in component elution order and retention times for triazine pesticides.

Table 1. Triazine Pesticide Standards Mixture (1000µg/mL each component in methanol)

Atrazine
Prometon
Prometryn
Simazine
Simetryn
Terbutryn

Triazine pesticides (Table 1) were spiked into, then extracted from, apples purchased at a local grocery store. Extracts were prepared by weighing out 50 grams of fruit, blending it, and adding 100mL of acetonitrile. The fruit extract was reextracted in hexane, using a partitioning process (1). *The untreated extracts contained no pesticides.*

Samples of the spiked and unspiked extracts were injected onto each capillary column under the conditions listed in Figure A. Figure A shows chromatograms of the extracted pesticides from each column. The low/intermediate polarity SPB-608 and SPB-1701 columns selectively eluted the analytes, based on dipole-dipole and hydrogen bonding interactions between the solute and the stationary phase. Each column at least partially separated all of the analytes (prometon and simazine were incompletely separated by the SPB-1701 column). The nonpolar PTE-5 column eluted the analytes by boiling point. One pair of analytes (simazine and atrazine) coeluted from the nonpolar column. Analysis time for each column was approximately 28 minutes.

Table 2 lists the recovery values for the triazine pesticides, determined using the SPB-608 column. Recovery of the spiked analytes ranged from 103% to 122%. Limits of detection for the standards ranged from 0.1 ppm to 10.0 ppm.

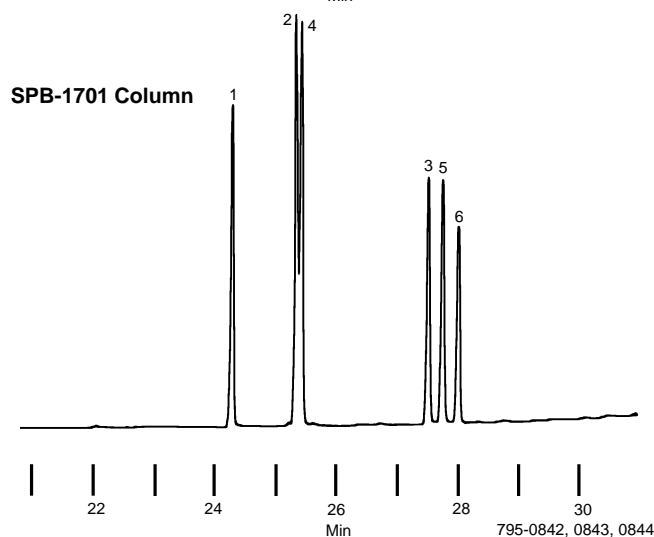
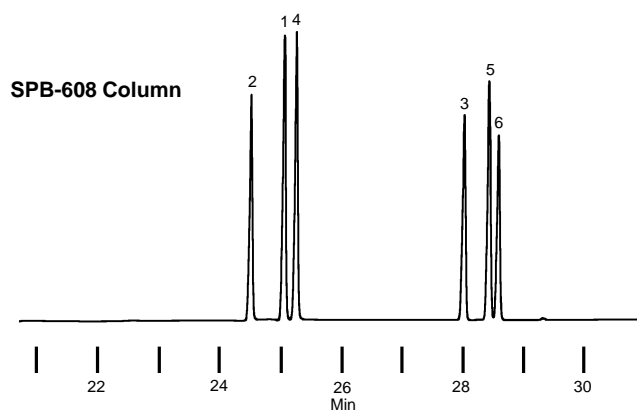
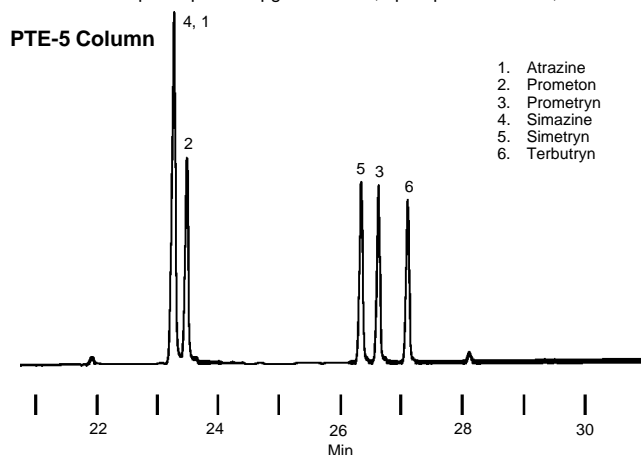
Based on these evaluations, we determined that the three stationary phases, PTE-5, SPB-608, and SPB-1701, exhibited differences in retention times, resolution, and elution order for six common triazine pesticides. Using these columns, screening analyses for low levels of triazine pesticides can be performed effectively, in less than 30 minutes, with split/splitless injection and a thermal specific detector (TSD).

Table 2. Recovery of Triazine Pesticides from Apples (SPB-608 Column)

Pesticide	Recovery (%)
Prometon	110
Atrazine	120
Simazine	103
Prometryn	113
Simetryn	122
Terbutryn	109

Figure A. Triazine Pesticides from Apples

Stationary Phases: PTE-5, SPB-608, SPB-1701
 Column Dimensions: 30m x 0.25mm ID, 0.25µm phase film
 Catalog Nos.: 24135-U (PTE-5), 24103-U (SPB-608), 24113 (SPB-1701)
 Oven: 80°C (1 min) to 280°C at 6°C/min
 Carrier: helium, 40cm/sec.
 Det.: thermal specific, 250°C
 Sample: 1µL of 10µg/mL extract, split/splitless 45 sec, 200°C



Ordering Information:

Description	Cat. No.
Fused Silica Capillary Columns	
all 30m x 0.25mm ID, 0.25µm phase film	
PTE-5	24135-U
SPB-608	24103-U
SPB-1701	24113
Triazine Pesticide Standards	
neat, 100mg	
Atrazine	49085
Prometon	49086
Prometryn	49087
Simazine	49089
Simetryn	49090-U
Terbutryn	49091

Reference

1. Kaphalia, B.S. *Assoc. Official Analytical Chemists* **73** (4) 1990.

Note: For a suitable extraction procedure, refer to AOAC Methods, 16th edition. (Order from AOAC International, 481 North Frederick Avenue, Suite 500, Gaithersburg, Maryland 20877-2504 USA. Tel.: +1-301-924-7077; FAX: +1-301-924-7089.)

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