

Pesticide Analysis of Fruits and Vegetables

Application Note

Environment

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The globalization of trade has made food production and distribution international in scope. What is on our plate at home or at a restaurant could come from many parts of the world. It is assumed that the fruits and vegetables that we eat are safe. The use of pesticides has made production of high yields of fruits and vegetables possible. Organochlorine and organophosphorus based pesticides make up the majority used on fruits and vegetables. Due to the fact that high concentrations of these pesticides could be injurious to health, regulatory limits have been established.

Thermal desorption is one technique to qualitate and quantitate residual pesticides. A sample is heated in a sealed vessel through which there is a flow of a carrier gas. The volatiles are swept on to a selected sorbent trap, which is then thermally desorbed to an appropriate analyzer.

For the example shown in Figure 1, a potato skin (~16 mg) was moistened and placed in an empty 6 mm thermal desorption tube. The tube was placed into a desorption station on a CDS Autosampler, interfaced to a GC/MS. The tube was heated to 250°C for 10 minutes with trap desorption at 325°C for 10 minutes. Figure 1 shows a large peak of the growth inhibitor chlorpropham, a chlorinated pesticide. The EPA limit for this pesticide is 40 µg/g. Observed abundance of the chlorpropham peak suggests a significantly greater concentration. Figure 2 is a chromatogram of an eighteen standard organochlorine pesticide (10 ng/µl) profile thermally desorbed from a 6 mm Tenax packed thermal desorption tube. Figure 3 is a chromatogram of ten standard organophosphorus pesticides (10 ng/µl) in a hydrocarbon matrix and thermally desorbed under the same conditions.

These pesticide sample standards were also analyzed using the CDS Autosampler interfaced to a GC/MS.

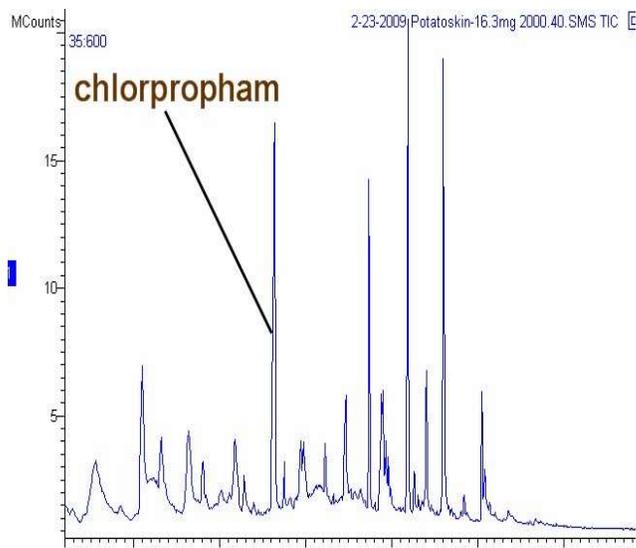


Figure 1. Chlorpropham from potato skin.

CDS Autosampler Dynatherm 9300

Valve Oven: 300°C
Transfer Line: 325°C
Tube Heat: 250°C 10.00 minutes
Trap Heat: 325°C 5.00 minutes

GC/MS

Column: 5% Phenyl methyl silicone
30m x 0.25 mm
Carrier: Helium, 50:1 split
Injector: 350°C
Program: 40°C for 2 min
10°C/min to 280°C hold 2 min

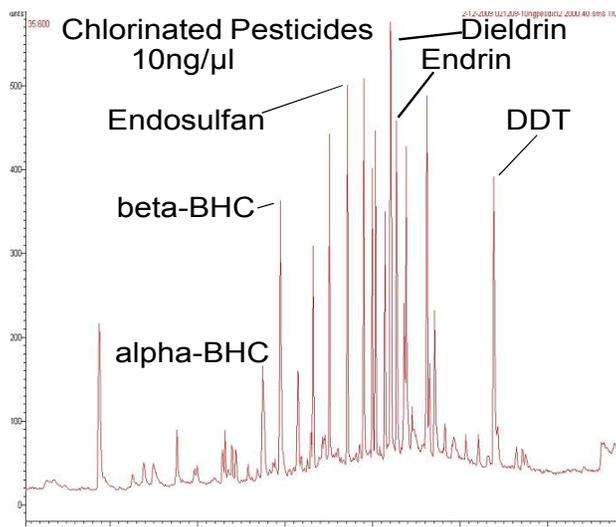


Figure 2. Organochlorine pesticide profile.

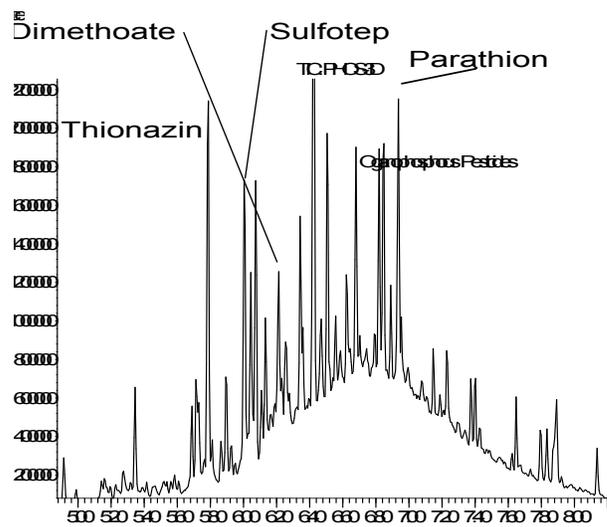


Figure 3. Organophosphorus pesticides (10 ng/μl)