

Analysis of Organochlorine Pesticides in Drinking Water by Agilent 7820 Gas Chromatograph/Micro-Electron Capture Detector

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Application Brief

Environmental

The Agilent 7820 GC configured with a micro-electron capture detector (μ ECD) provides high sensitivity, good linearity, and stability for the analysis of organochlorine pesticides in drinking water. The results achieved are better than the requirements stated in the Chinese National Standard Method GB/T 5750.9-2006 [1,2].

Experiment

Analytical Conditions

Inlet	260 °C, Split/splitless, Liner (5062-3587)
Injection volume	1 μ L
Column	30 m \times 0.32 mm \times 0.25 μ m (Agilent J&W 123-0732)
Carrier gas	N ₂ , Constant flow: 1 mL/min
Oven	50 °C (3 min) 30 °C/min 210 °C (30 min)
Detector	ECD, 300 °C, Makeup flow (N ₂): 60 mL/min
Data analysis system	Agilent EZChrom Elite Compact

Results

The Agilent 7820 μ ECD's high sensitivity ensures reliable and rugged trace pesticide analysis in drinking water. The method can be easily transferred across geographies and labs. Figure 1 shows the chromatogram of 500 ng/L pesticides using the Agilent 7820 μ ECD with excellent signal to noise (S/N).

The design of the μ ECD ensures a wide linear dynamic range for the analytes. Table 1 shows linearity (R^2) for the pesticides.

Highlights

- The Agilent 7820 configured ECD provides high sensitivity for the analysis of organochlorine pesticides.
- ALS and EPC ensure good repeatability and ease of use.
- Using N₂ as the carrier gas significantly lowers analysis cost compared with the use of He.
- Agilent EZChrom Elite Compact software is designed for the Agilent 7820 is used for easy data acquisition and analysis.



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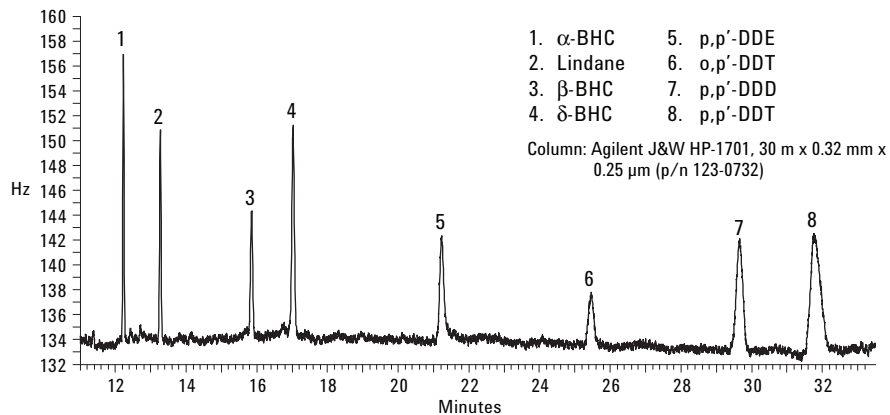


Figure 1. Chromatogram of organochlorine pesticides at 500 ng/L.

Table 1. Pesticide Linearity Data

Peak no.	Compounds	Linear range (ppb)	R ²
1	α-BHC	0.5–500	0.9998
2	β-BHC	0.5–500	0.9998
3	Lindane	0.5–500	1
4	σ-BHC	0.5–500	0.9996
5	p,p'-DDE	1–500	0.9998
6	o,p'-DDT	1–500	0.9998
7	p,p'-DDD	0.5–500	0.9999
8	p,p'-DDT	0.5–500	0.9993

The use of an automatic liquid sampler (ALS) and EPC ensure the ease of use of the 7820 and its good repeatability. The response factors (RFs) and their relative standard deviations (RSDs) ($n = 10$) are less than 20%, much better than the precision requirements for RFs in the contract laboratory program of the United States Environmental Protection Agency (USEPA).

Proven reduced susceptibility to contamination on the μ ECD improves the analysis of dirty matrix samples. Figure 2 shows the chromatograms of pesticide standards and spiked water sample (10 ppb). The recoveries of each analyte are shown in Table 2. The sample preparation method refers to standard GB/T 5750.9-2006.

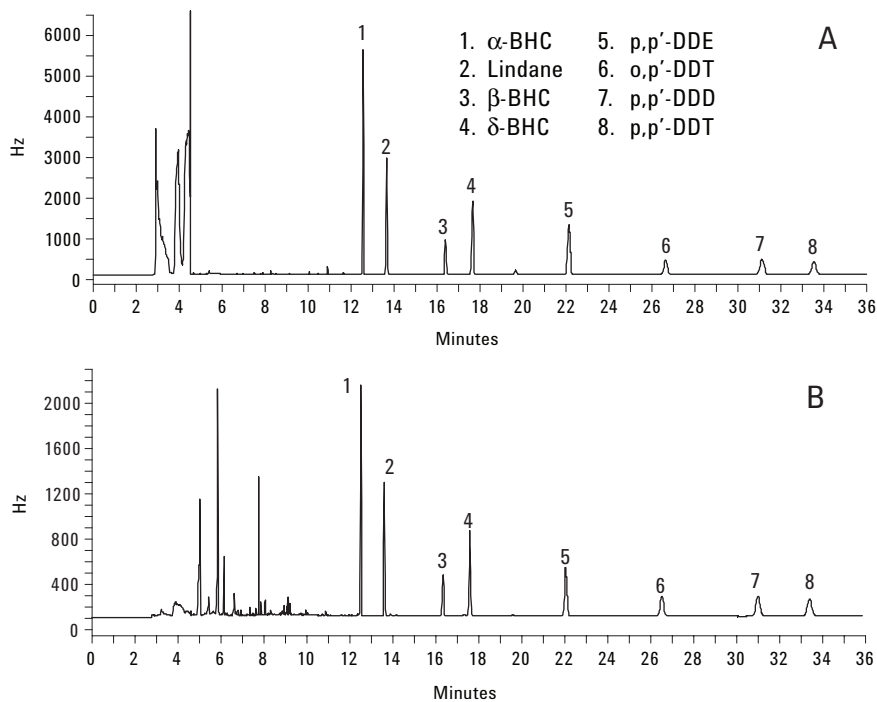


Figure 2. Chromatograms of organochlorine pesticides standard at 10 µg/L (A) and spiked drinking water (B).

Table 2. Recoveries of Analytes

Compounds	α-BHC	β-BHC	Lindane	σ-666	p,p'-DDE	o,p'-DDT	p,p'-DDD	p,p-DDT
Recovery (%)	101.5	96.6	85.7	99.2	92.7	92.2	86.3	97.9

References

1. Chinese National Standard Methods for Drinking Water – Pesticides Parameters, GB/T 5750.9-2006
2. Tu Chuanhong, "Analysis of Organochlorine and Pyrethroid Pesticides with Agilent 6820 Gas Chromatograph/Micro-Electron Capture Detector," Agilent Technologies publication 5989-1333EN

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