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GC-UV APPLICATION NOTE

INSCAN

Integrated GC-UV injector system for liquid-sample qual + quant

STANDARDIZED WAVELENGTH ENVELOPE

<155 nm → 330 nm

Vacuum-UV to near-UV continuous full-spectrum acquisition

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GC-UV Product Brochure · Rev. 01

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ABSTRACT

This application note demonstrates the use of the INSCAN integrated GC-UV injector system for vapor-phase deep-UV detection coupled to gas chromatography. The platform delivers continuous full-spectrum acquisition across a sub-155 nm vacuum-UV to 330 nm envelope, enabling unambiguous discrimination of structural and positional isomers that conventional GC-MS cannot resolve. Quantification follows the Lambert-Beer law using simultaneous multi-wavelength acquisition.

WHY GC-UV?

Vapor-phase electronic spectra are fine, fixed, solvent- and matrix-interference free. Combined with multi-wavelength quantification, this yields isomer-resolved identification and trace-level quant in a single run.

The INSCAN integrated GC-UV instrument.

APPLICATION: LIQUID-SAMPLE QUALITATIVE & QUANTITATIVE ANALYSIS

The INSCAN integrated configuration targets routine liquid-sample workflows where the analyst needs both compound identification and concentration in a single chromatographic run. Typical deployments include flavor and fragrance QC, residual solvents in pharmaceuticals, and aromatic content in fine chemicals.

MATERIALS AND METHODS

Instrument: Sample introduction by split/splitless injection onto a non-polar 5% phenyl-polysiloxane capillary column (30 m × 0.25 mm i.d., 0.25 µm film). Carrier gas: high-purity nitrogen (99.9999%) at 1.2 mL · min^{-1}. Effluent transferred via heated transfer line to a temperature-controlled deep-UV flow cell. Spectra acquired continuously across the wavelength envelope at 5 Hz.

WAVELENGTH RATIONALE

The lower bound of the detection envelope is reported as **<155 nm** rather than a single fixed value. Achievable lower bound depends on flow-cell window materials (MgF_2, LiF or synthetic silica), carrier-gas purity (trace O_2/H_2O absorb strongly in the vacuum-UV), and optical path length. The <155 nm envelope communicates capability without implying a guaranteed limit across all configurations.

RESULTS AND DISCUSSION

Figure 1 shows a representative chromatogram of a six-component aromatic test mixture with simultaneous UV spectra at three diagnostic wavelengths. Positional isomers *o*-, *m*- and *p*-xylene are baseline-resolved spectroscopically, even where chromatographic co-elution occurs.

Figure 1. GC-UV chromatogram of a six-component aromatic test mix

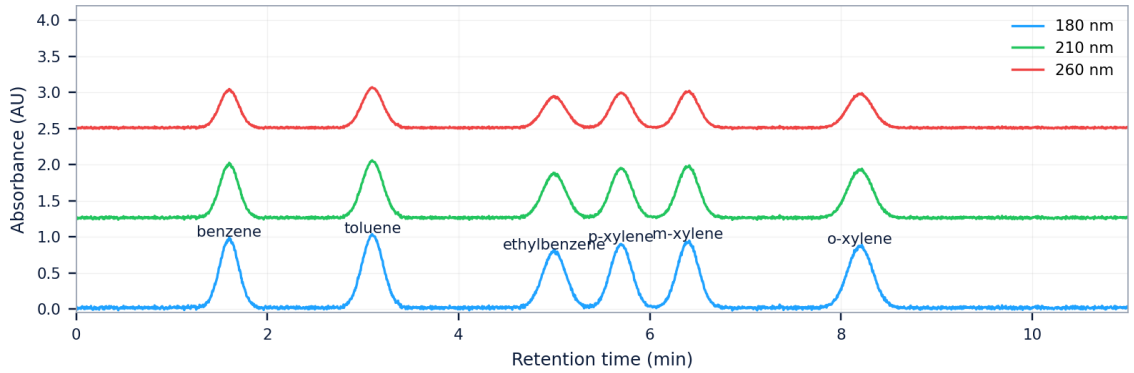

Figure 1. Simultaneous GC-UV chromatograms with overlaid spectra at three diagnostic wavelengths.

Quantitative performance (illustrative)

Parameter	Specification
Linear range	0.5 – 500 mg · L^{-1}
Limit of detection	≈ 0.05 mg · L^{-1} (toluene, 260 nm)
Repeatability (RSD, n=6)	< 2 % peak area
Spectral acquisition rate	5 Hz (full envelope)

METHOD NOTE
Multi-wavelength quantification (Lambert-Beer) at three diagnostic wavelengths per analyte improves robustness against spectral overlap and co-elution compared to single-wavelength UV detection.