Corona™ Charged Aerosol Detector

Application note

Contaminants and Degradants

The need for universal HPLC detection in analytical laboratories is widespread. While several detection technologies (e.g., low wavelength UV, refractive index, evaporative light scattering, chemiluminescent nitrogen detectors) are currently being used, there is significant room for improvement in performance characteristics such as sensitivity, dynamic range, consistency of response factors and gradient or solvent compatibility.

To help address the many challenges of universal detection, ESA has developed the Corona CAD™ detector. This novel technology offers many benefits to analytical scientists including:

- High Sensitivity - Low ng limits of detection.

- More Consistent Response Factors - Response magnitude does not significantly depend on analyte properties (e.g. molar absorbtivity, proton affinity).

- Broad and Useful Dynamic Range - 4 orders of magnitude (ng - µg quantities).

- Excellent Reproducibility - Typically less than 2% RSD.

- Broad Applicability - Can be used with a wide variety of HPLC conditions to measure virtually any nonvolatile analyte including proteins, lipids, carbohydrates and small molecules.

- Ease of Use - Easy setup. Uses minimal bench space and requires only gas input pressure and signal output range to be set.

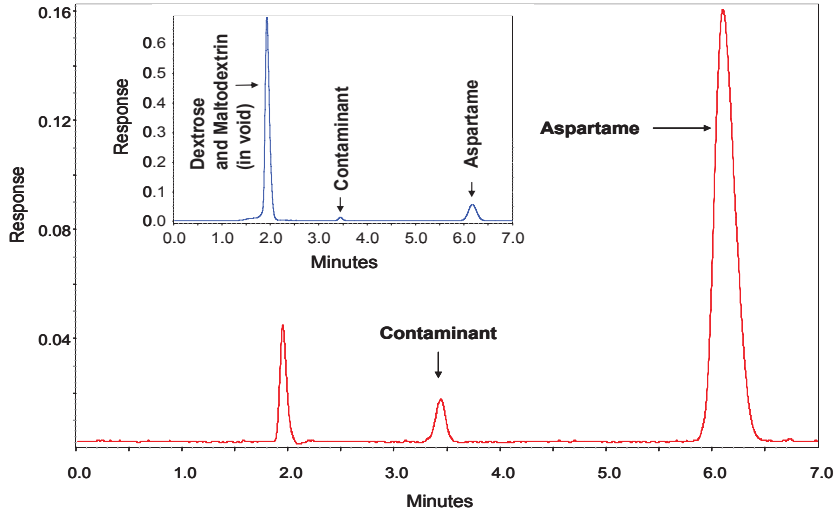

Figure 1. Detection of a Contaminant in Both the Aspartame Standard (red) and Equal® (inset).

This application note describes the use of the Corona CAD for measuring contaminants and degradants using aspartame (as both the standard and as part of the artificial sweetener, Equal®) as an example. Greater details regarding the analysis can be found in Artificial Sweeteners - 3, Equal® (70-6955).

A contaminant (eluting at ~3.5 minutes) could be found in both the aspartame standard and Equal® (Figure 1). The contaminant did not correspond to any of the known and commercially available precursors or breakdown products (Figure 2). Spiking experiments verified that the contaminant was not aspartyl-phenylalanine. After prolonged storage (2 months; freezer) a degradant formed (eluting at ~5.0 minutes) (Figure 3) but this too did not correspond to any of the analytes measured in Figure 2. This may be the diketopiperazine degradant that is known to be formed during storage, but is not commercially available.

Corona parameters

Gas: 35psi via nitrogen generator
Filter: none
Range: 100pA

HPLC Parameters:
Mobile Phase: Aqeuous acetonitrile (15% v/v) with 0.05% TFA
Flow Rate: 1.0mL/min
Column: Shiseido C18 SG300; 4.6 x 150mm; 5µm
Column Temperature: 30°C
Injection Volume: 10µL

esa
MAGELLAN BIOSCIENCES

The Corona™ Charged Aerosol Detector

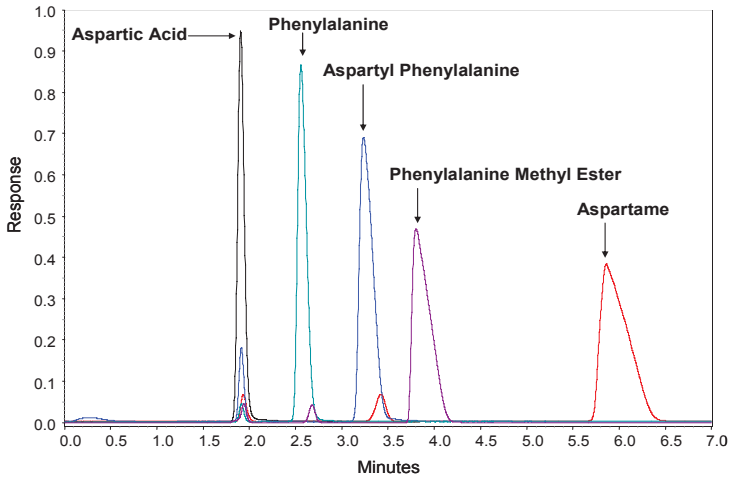

Figure 2. Aspartame and Several Possible Precursors and Degradants (10µg each, on column). Note That Many of the Standards Showed Some Degree of Contamination.

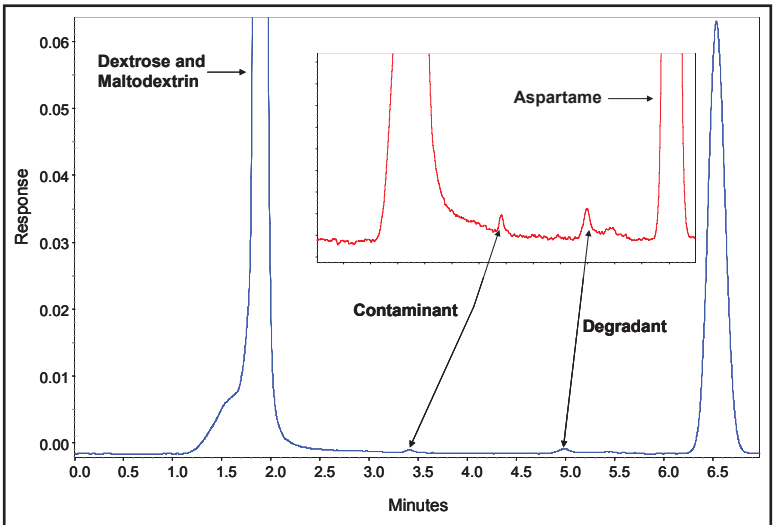

Figure 3. Detection of Contaminants and Degradants (10µg Equal® on column). Inset - at ~20X Sensitivity.

Sample preparation

Equal® (one packet) or standards (from Supelco, Sigma and Aldrich) were dissolved in water (1mg/mL). Further dilutions were made with water.

Conclusions

The Corona CAD provides universal detection of nonvolatile analytes with response independent of chemical properties, a wide dynamic response range, high sensitivity and good precision. These characteristics, along with reliability and simple operation, make this a superior detector for a wide range of HPLC analyses.

For more information about this application, the Corona CAD, or charged aerosol detection visit www.coronacad.com. We are interested in your opinions and are available to answer any questions you may have: please contact a technical representative at 978.250.7082, or if e-mail is more convenient, send your questions to coronacad@esainc.com.

Ordering information

Description	Part Number
Corona	70-6350 (100/120V) 70-6351 (230/240V)
Thermal Organizer Module	70-5499TA
Nitrogen generator	70-6003
Pump, model 582	70-4050
Autosampler, model 542	70-4152
Elite software including PC	70-5073
Column, Shiseido C18 SG300	88-12522

esa
MAGELLAN BIOSCIENCES

ESA Biosciences Inc. • 22 Alpha Road
Chelmsford, MA 01824-4171
U.S.A.
Tel: (978) 250-7000
Fax: (978) 250-7090
www.esainc.com
www.coronacad.com

ESA Analytical • Brook Farm
Dorton, Aylesbury
Buckinghamshire
HP18 9NH
England
Tel: 44 (0)1844 239381
www.esainc.com