HPLC & UHPLC

# List of compendial methods

## Thermo Scientific Charged Aerosol Detectors

Charged aerosol detection is a reliable technology that will change the way you view every sample. The Charged Aerosol Detector (CAD) can detect all non-volatile, and many semi-volatile analytes, with uniform response. Charged aerosol detection can be used for the analysis of pharmaceuticals (large and small molecule), biomolecules, foods and beverages, specialty chemicals, and polymers.

In the following tables are examples of standardized methods—for example, American Society for Testing and Materials (ASTM International), Chinese Pharmacopeia (CP), European Pharmacopeia (EP), International Organization for Standardization (ISO), and United States Pharmacopeia (USP)—using charged aerosol detection technology.

### General chapter information on Charged Aerosol Detectors

**Chinese Pharmacopoeia**

"*The latest HPLC developments and application progress are fully detailed. Information about multidimensional HPLC, charged aerosol detection, adjusted chromatographic conditions, and common qualitative analysis methods was added.*" 2020 edition.

**European Pharmacopoeia**

*"Ultraviolet/visible (UV/Vis) spectrophotometers (including diode array detectors) (2.2.25), are the most commonly employed detectors. Fluorescence spectrophotometers, differential refractometers (RI), electrochemical detectors (ECD), light scattering detectors, charged aerosol detectors (CAD), mass spectrometers (MS) (2.2.43), radioactivity detectors, multi-angle light scattering (MALS) detectors or other detectors may be used."*

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## Specific monographs using Charged Aerosol Detector

| Organ-ization | Analytes | Method Reference | Matrix | Column | Mobile Phase | Gradient or Isocratic | Status<br>Additional Information |
|---|---|---|---|---|---|---|---|
| **ASTM** | **Lipids** | ASTM E3297-21 Standard Test Method for Lipid Quantitation in Liposomal Formulations | Liposomal Formulation | RP C18 | Aqueous acetonitrile/ methanol | Gradient | Active<br>**Additional info:** AppsLab Library |
| **EP** | **API and counterions** | Validation and application of an HPLC-CAD-TOF/ MS method for identification and quantification of pharmaceutical counterions. Pharmeuropa bio & scientific notes 2014, 81-91 | None | Mixed mode Thermo Scientific™ Acclaim™ Trinity P1, 3.0 × 50 mm, 3 µm (P/N 071388) | A) 0.2 M ammonium formate in water (pH 4.0)<br>B) water<br>C) acetonitrile | Gradient | Published for consideration<br>**Additional info:** AppsLab Library<br>Mixed-mode HPLC columns |
| **EP** | **Aspartic acid** | Aspartic acid Pharmeuropa 22.4, October 2010 | None | RP C18, 4.6 × 150 mm, 5 µm | 4% 0.36 g/L perfluoroheptanoic acid (PFHPA) in methanol 96% 0.36 g/L (PFHPA) in water (%/% v/v) | Isocratic | In process/under consideration<br>**Additional info:** AppsLab Library |
| **EP** | **Gadobutrol monohydrate** | Gadobutrol Monohydrate–Ph. Eur. 9.0 07/2016:1215 | None | RP end-capped phenylhexylsilyl silica gel, 4.6 × 250 mm, 3 µm | A) 0.5% acetonitrile and 99.5% water pH 3.6 adjusted with formic acid<br>B) acetonitrile | Gradient | In official text |
| **EP** | **Ibandronate sodium monohydrate** | Ibandronate Pharmeuropa 22.4, October 2010 | None | RP octadecylsilyl silica gel with embedded strong anion exchange groups, 4.6 × 150 mm, 2.7 µm | A) water<br>B) 150 mL acetonitrile plus 150 mL of 11.4 g/L trifluoroacetic acid, filled to 1 L with water | Gradient | In process/under consideration |
| **EP** | **Topiramate** | Topiramate Pharmeuropa 27.4, October 2015 | None | RP solid core pentafluorophenylsilyl silica gel, 4.6 × 100 mm, 2.6 µm | A) 1.93 g/L ammonium acetate, pH 3.5<br>B) acetonitrile | Gradient | Adopted for next version |
| **EP** | **Valine and impurities** | Determination of the purity of valine by isocratic liquid chromatography coupled with charged aerosol detection Pharmeuropa bio & scientific notes. 2015; 2015, 11-18 | None | RP C18, 4.0 × 150 mm, 3 µm | 20 mM Perfluorobutyric acid in acetonitrile/ water (10:90 v/v) | Isocratic | Published for consideration<br>**Additional info:** AppsLab Library |
| **EP** | **Vigabatrin** | Vigabatrin Pharmeuropa 30.2, April 2018. | None | RP end-capped solid core phenylhexylsilyl silica gel, 4.6 × 100 mm, 2.7 µm | 19.5% methanol, 80.5% water (v/v) with 2.1 g/L perfluoroheptanoic acid (PFHPA) | Isocratic | Adopted for next version |

| Organ-ization | Analytes | Method Reference | Matrix | Column | Mobile Phase | Gradient or Isocratic | Status<br>Additional Information |
|---|---|---|---|---|---|---|---|
| ISO | PEG with molecular mass greater than 400 g/mol | ISO 16560:2015(en) Surface active agents—Determination of polyethylene glycol content in nonionic ethoxylated surfactants—HPLC method | Nonionic ethoxylated surfactants that are soluble in methanol or methanol/water/$H_2O$ and have [PEG]>0.1% | Reversed phase (RP) C18, 4.6 × 250 mm, 5 µm | A) water<br>B) methanol | Gradient | In official text<br>**Additional info:** Surfactants Application Notebook |
| ISO | Triton X-100, octylphenol ethoxylates (CAS 9002-93-1) IGEPAL CO-630, nonylphenol ethoxylates (CAS 68412-54-4) | ISO 18254-2:2018 Method for the detection and determination of alkylphenol ethoxylates (APEO)—Part 2: Method using NPLC | Textiles | Normal phase (NP) applying two columns:<br>1) C18 column, 4.6 × 50 mm, 1.7 µm<br>2) hydrogen bond adsorption, 4.6 × 150 mm, 3 µm | A) acetonitrile with 0.1% formic acid<br>B) methanol with 0.1% formic acid and 0.01% ammonium formate | Gradient | In official text<br>**Additional info:** AppsLab Library |
| USP | Deoxycholic acid powder | Deoxycholic (desoxycholic) acid—since USP 40 NF 35 S1 | None | Type L1, Thermo Scientific™ Acclaim™ 120 C18, 4.6 × 150 mm, 3 µm (P/N 059133) | A) 0.1% formic acid in water<br>B) 0.1% formic acid in acetonitrile | Gradient | In official text<br>**Additional info:** AppsLab Library<br>Application Note<br>Poster |
| USP | Metoprolol succinate powder | Content of metoprolol related compound H and metoprolol related compound I, USP 41(3) In-Process Revision: Metoprolol succinate. Proposed change to United States Pharmacopeia and National Formulary USP 38-NF33; | None | Hydrophilic interaction liquid chromatography (HILIC) solid core silica gel with five hydroxyl bonded ligands, 4.6 × 150 mm, 5 µm | 85% acetonitrile 15% 0.1 M ammonium formate in water, pH 3.2 | Isocratic | In process/under consideration<br>**Additional info:** AppsLab Library<br>Application Note<br>Poster |

For more references download the Charged Aerosol Detection bibliography highlighting the breadth and scope of different analytical methods found in the literature, click **here**.

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