

To JM Science



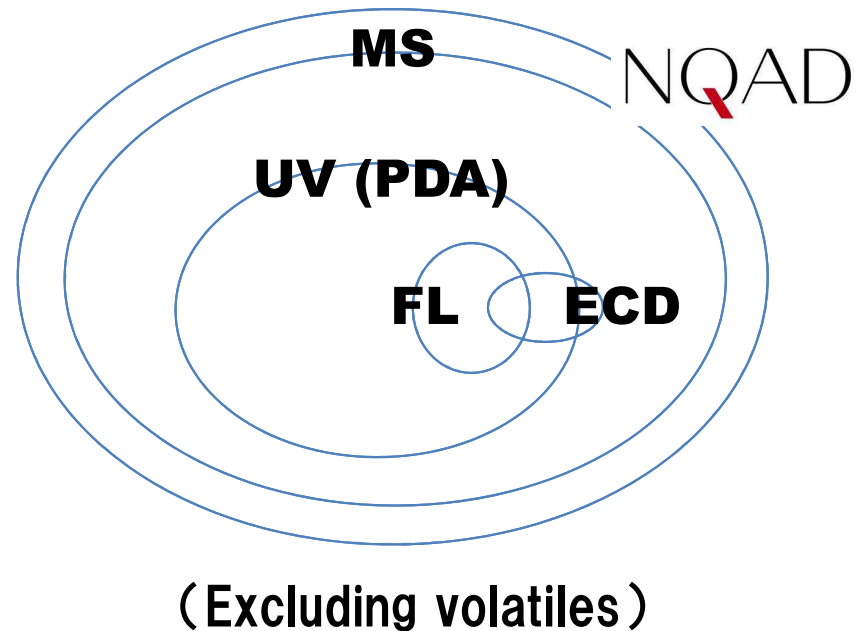
Introduction of Novel Aerosol-based detector NQAD

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Aerosol-based detector NQAD “Universal” detector



~What can be detected by NQAD?~

- 1) Substances that do not absorb UV
- 2) Substances that are difficult to ionize
- 3) Substances that do not have electrochemical activity
- 4) Substances with unknown properties, etc.

| What is WCPC?

Water-based Condensation Particle Counter

The Water-based Condensation Particle Counter (WCPC) technology condenses supersaturated water vapor onto the aerosol particles of analytes to form large droplets with increased density of the scattered light, which are counted as number of pulse signal when passing through the laser beam of an optical detector.

Therefore, compared with that to count the density of scattered light, WCPC technology achieves improved sensitivity and wider dynamic range.

Since it is detected as a droplet, it is not affected by the physical properties of the substance to be measured.

Principle of the detector



Spray

Spray with a nebulizer that uses dry air (or nitrogen).

Vaporization

The remaining non-volatile, and semi-volatile substances are introduced into the WCPC.

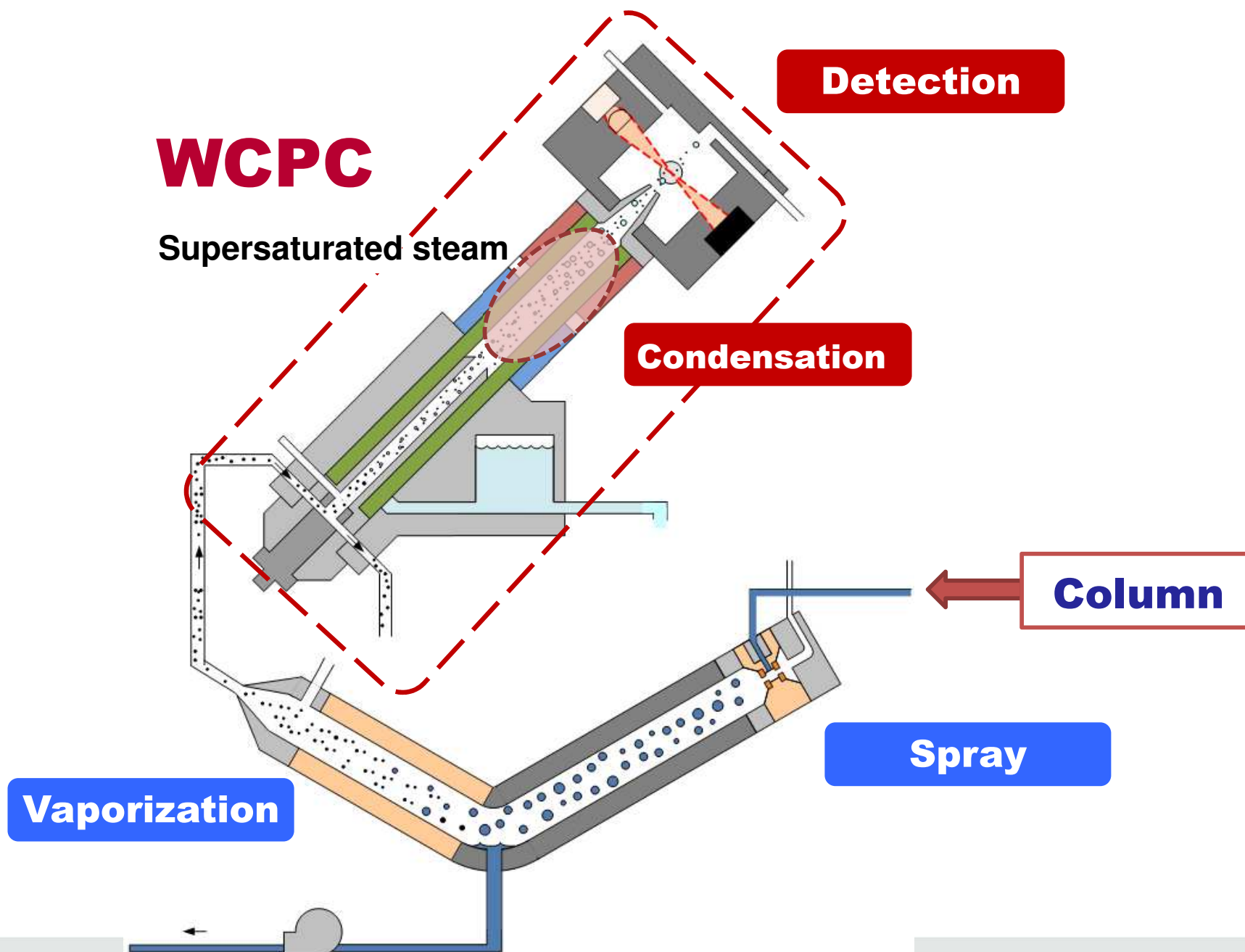
Condensation

In supersaturated water vapor, water aggregates are formed with non-volatile, and semi-volatile substances as nuclei, and the droplets grow until they reach μm order.

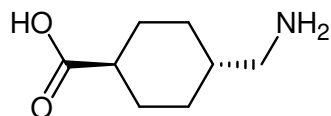
Detection

The droplets are counted with a particle counter (laser).

The internal structure of NQAD



Tranexamic acid analysis



Tranexamic acid

C₈H₁₅NO₂
MW: 157.21

Column	: CAPCELL CORE AQ S2.7 ; 4.6 mm i.d. x 100 mm
Mobile phase	: A) 0.1 vol% HCOOH, 10 mmol/L HCOONH ₄ B) CH ₃ CN B% 0% (0 min) → 0% (1 min) → 50% (15 min) → 0% (15.1 min) Gradient
Flow rate	: 1 mL/min
Temp.	: 40 °C
Detector	: NQAD 5600 (Evaporation 35 °C, Filter 1.3 s)
Inj.vol.	: 2 µL
Sample dissolved in	: H ₂ O

200 ng on column

**Highly sensitive detection of
compounds with almost no UV
absorption**

NQAD

PDA 210 nm

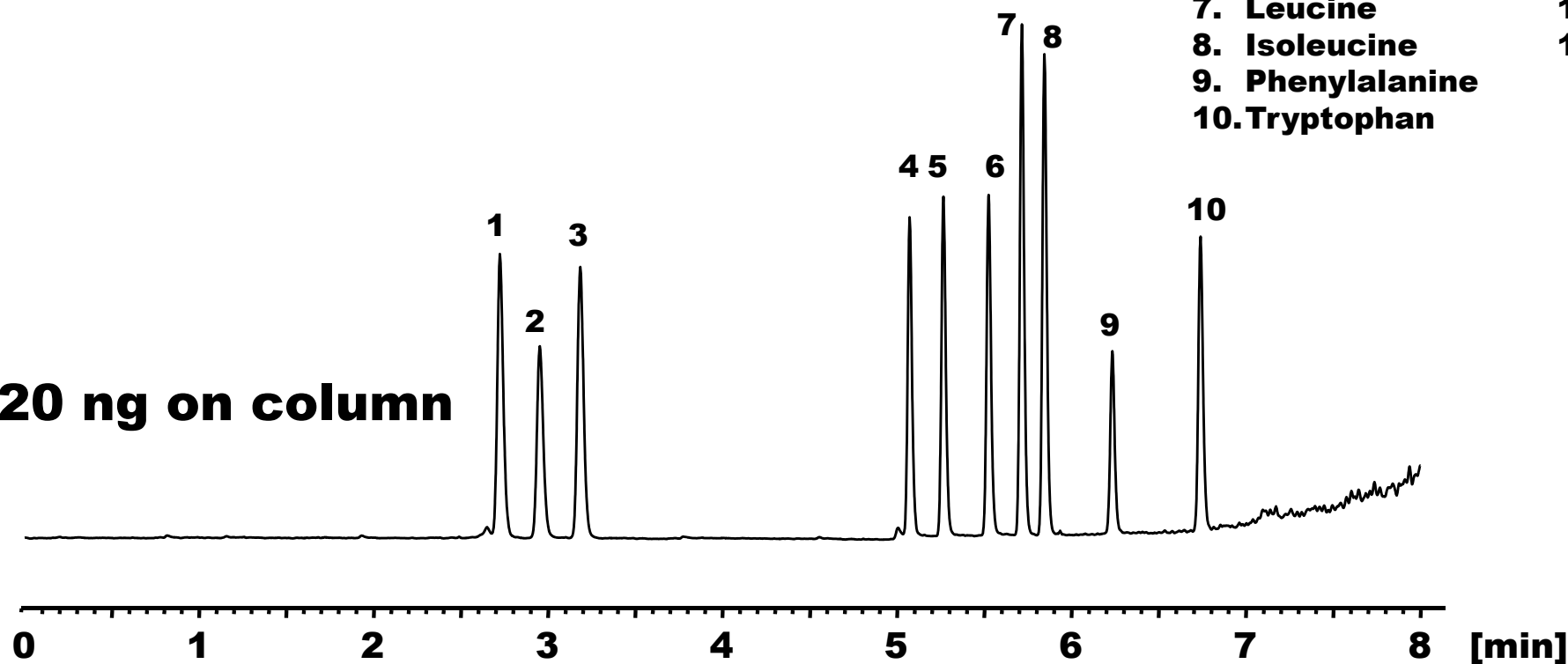


Amino acid analysis

Column : CAPCELL PAK C₁₈ AQ S3 ; 4.6 mm i.d. x 250 mm
Mobile Phase : A) 0.1 % TFA, B) CH₃CN
B 0%(0 min)→60%(8 min)→0%(8.1 min) Gradient
Flow rate : 1 mL/min
Temp. : 40 °C
Inj.vol. : 2 µL
Detector : NQAD 5600 (Evaporation 35 °C, Filter 1.3 s)

1. Arginine	20 ng
2. Glutamine	20 ng
3. Glycine	20 ng
4. Valine	10 ng
5. Methionine	10 ng
6. Tyrosine	10 ng
7. Leucine	10 ng
8. Isoleucine	10 ng
9. Phenylalanine	5 ng
10. Tryptophan	5 ng

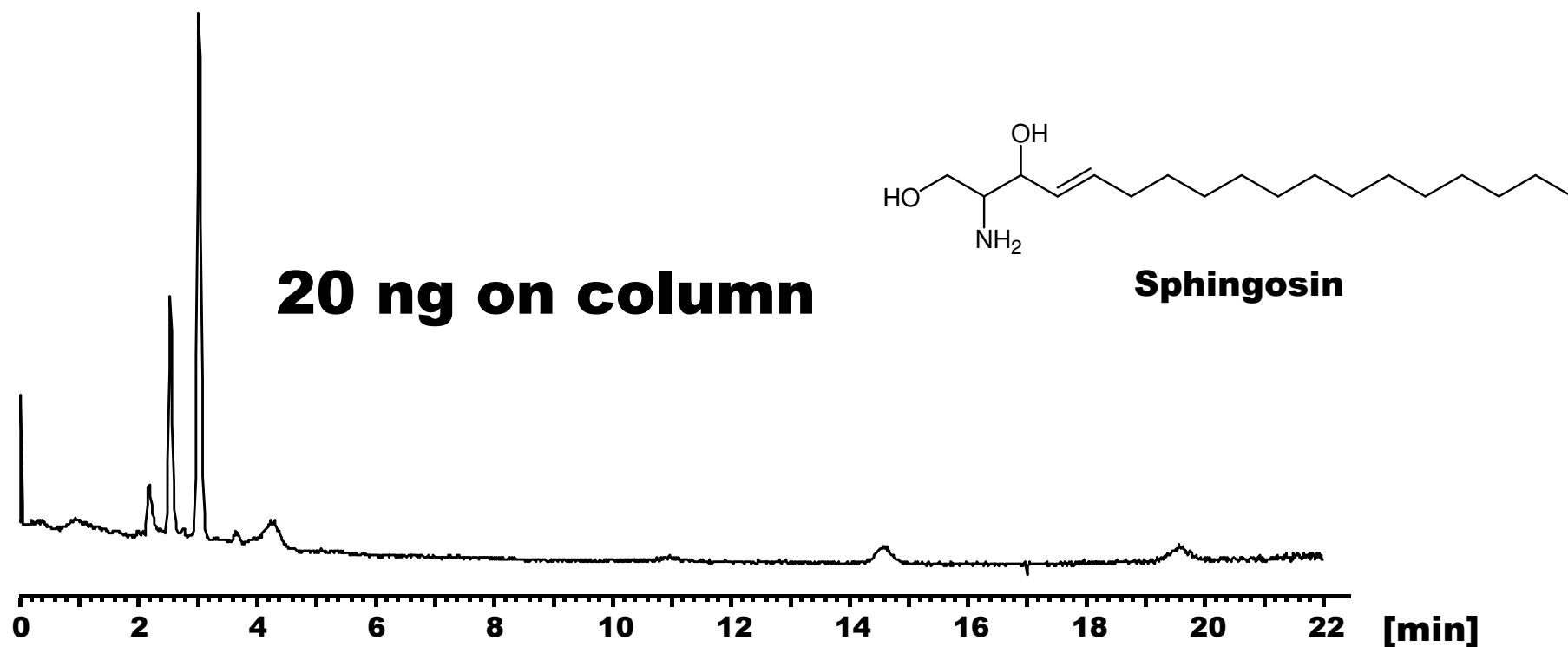
5~20 ng on column



Highly sensitive detection of amino acids without derivatization

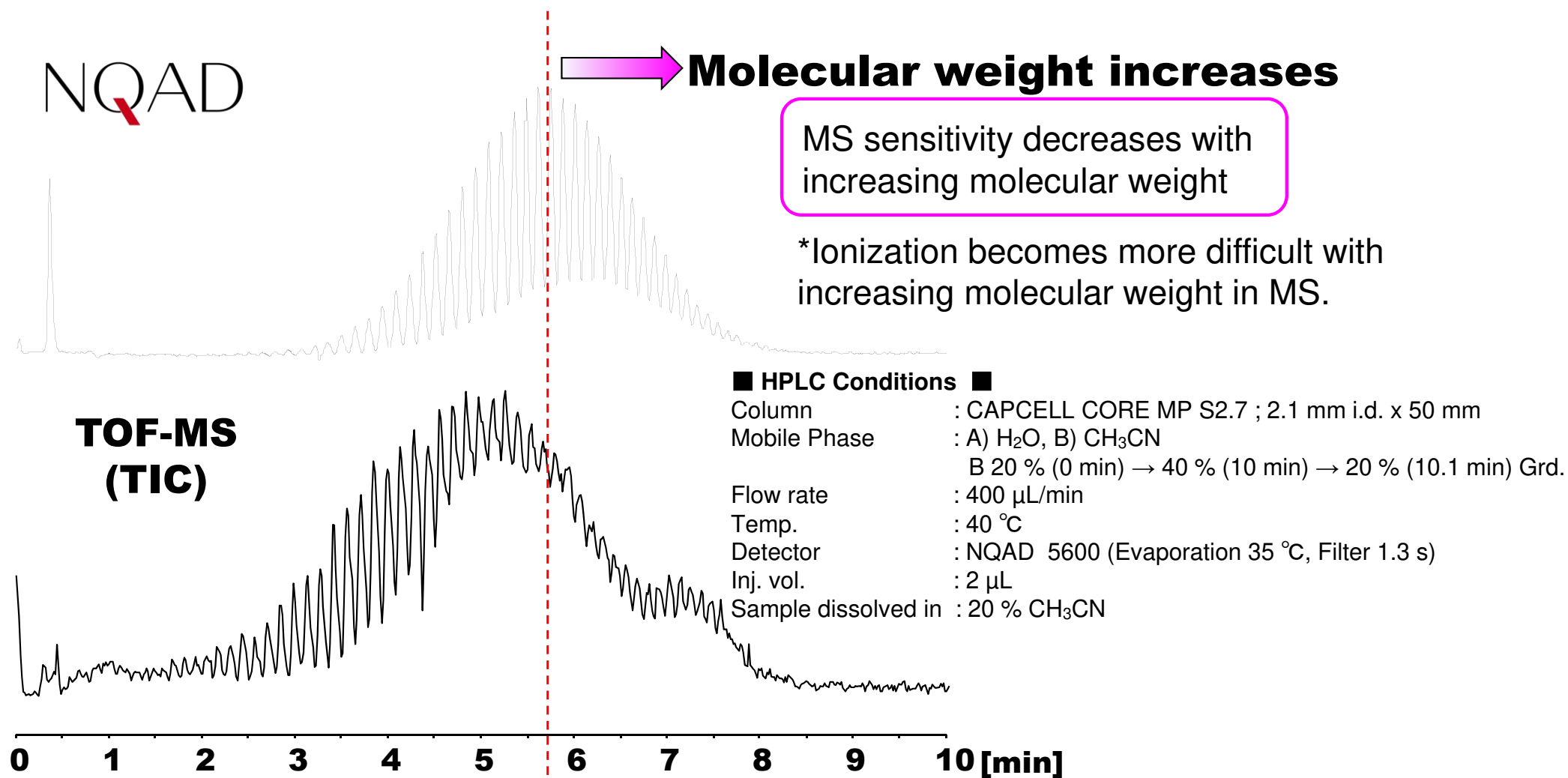
Sphingosine analysis

Column : CAPCELL PAK C₁₈ MGII S5 ; 4.6 mm i.d. x 150 mm
Mobile Phase : CH₃OH
Flow rate : 1 mL/min
Temp. : 40 °C
Detector : NQAD 5600 (Evaporation 35 °C, Filter 1.3 s)
Inj.vol. : 2 µL
Sample dissolved in : CH₃OH



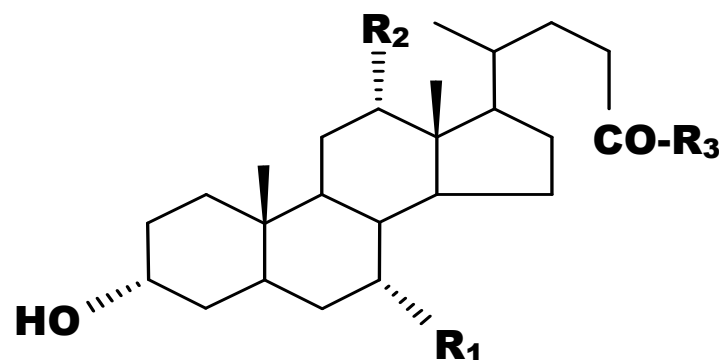
Analysis of PEG4000 in NQAD, and MS

Median weight distribution



Analysis of bile acid-spiked urine samples in NQAD, and MS

Bile acid

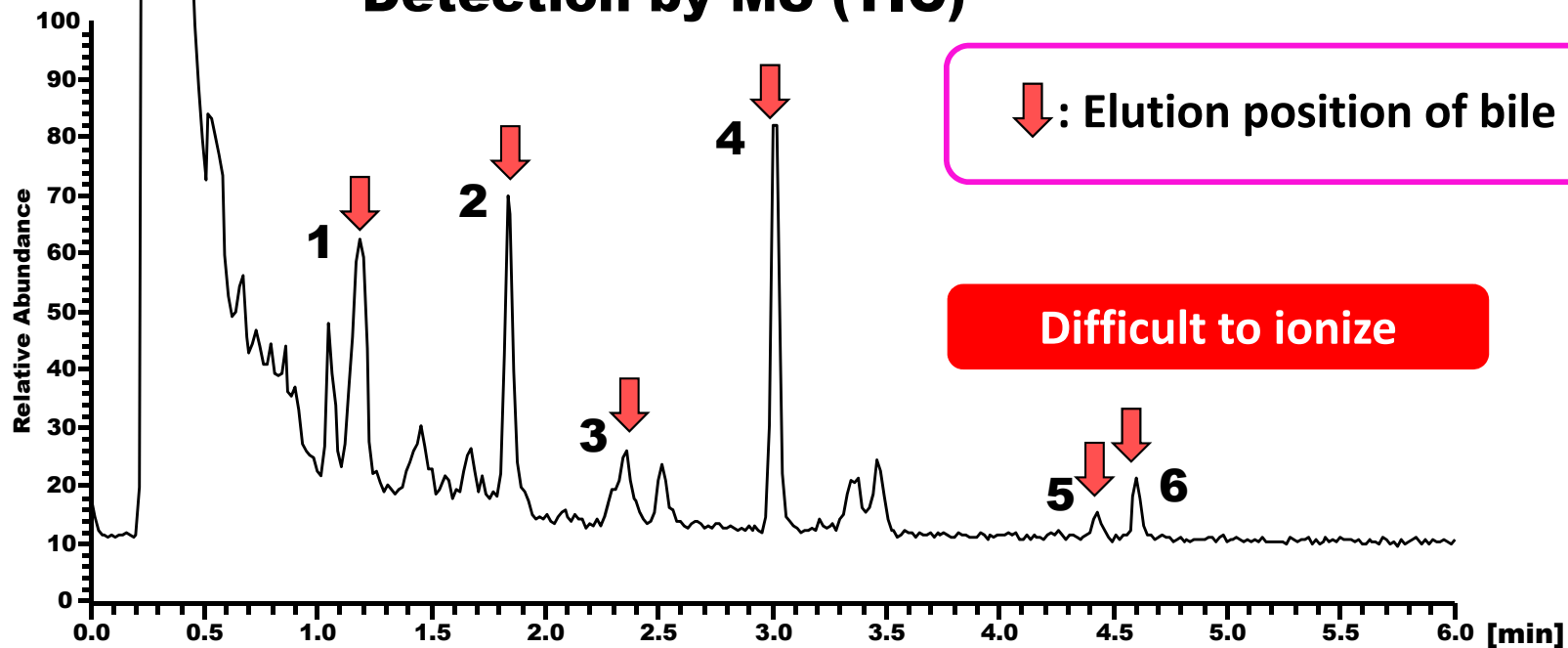


1. Taurocholic acid
2. Glycocholic acid
3. Taurochenodeoxycholic acid
4. Cholic acid
5. Deoxycholic acid
6. Chenodeoxycholic acid

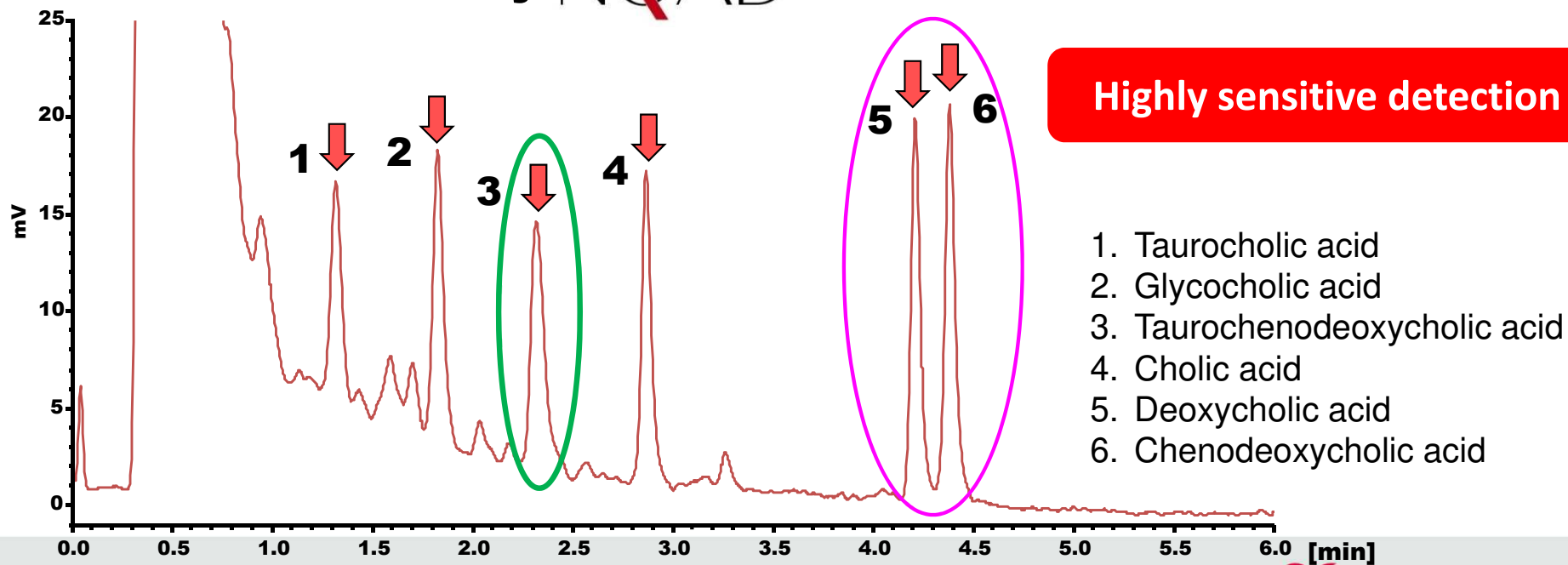
■ HPLC Conditions ■

Column	: CAPCELL CORE C ₁₈ S2.7 ; 2.1 mm i.d. x 50 mm
Mobile phase	: A) 0.1 vol% HCOOH B) CH ₃ CN B 30% (0 min) → 60% (5 min) → 60% (6 min) → 30% (6.1 min) Gradient
Flow rate	: 400 μL/min
Temperature	: 50 °C
Detector	: MS (ESI positive, LCQ DECA, Thermo Fisher Scientific) : NQAD (Evaporation 35 °C, Nebulizer 30 °C, Filter 2.5 sec)
Inj. Vol.	: 2 μL (10 μg/mL)
Sample dissolved in	: Six types of bile acids were added to urine (urine/6 types of bile acids mixed (100 ppm each) = 9/1), Samples are centrifuged, and the supernatant was filtered using a filter.

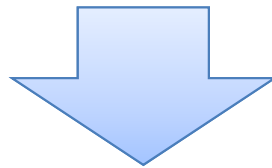
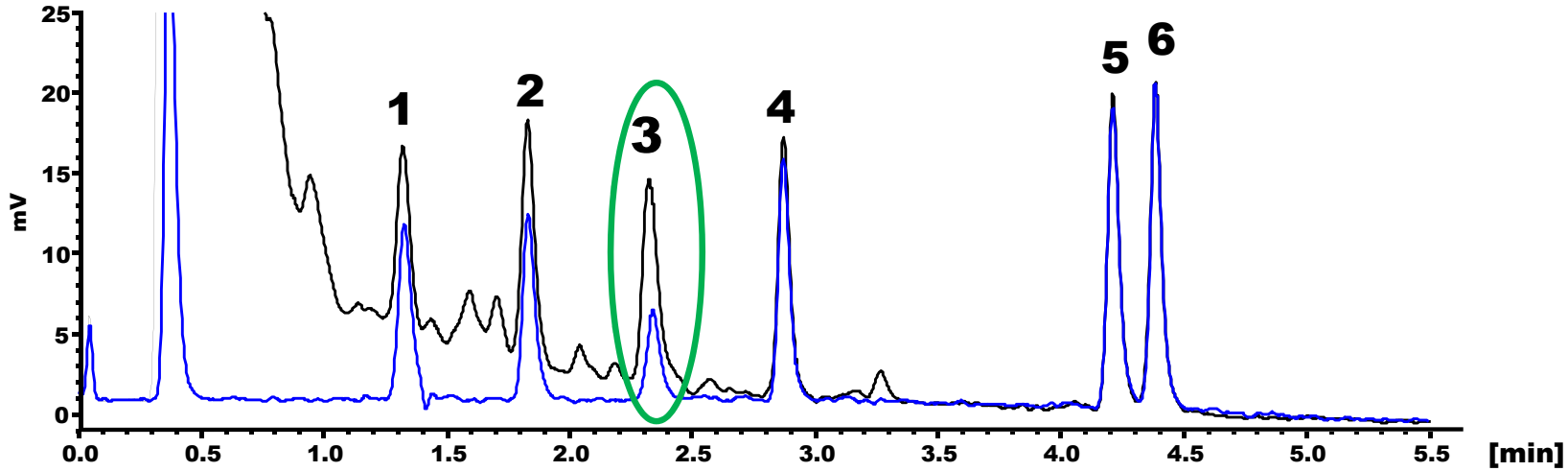
Detection by MS (TIC)



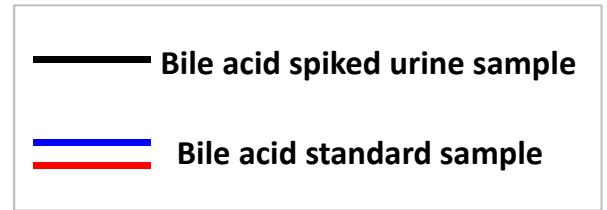
Detection by NQAD



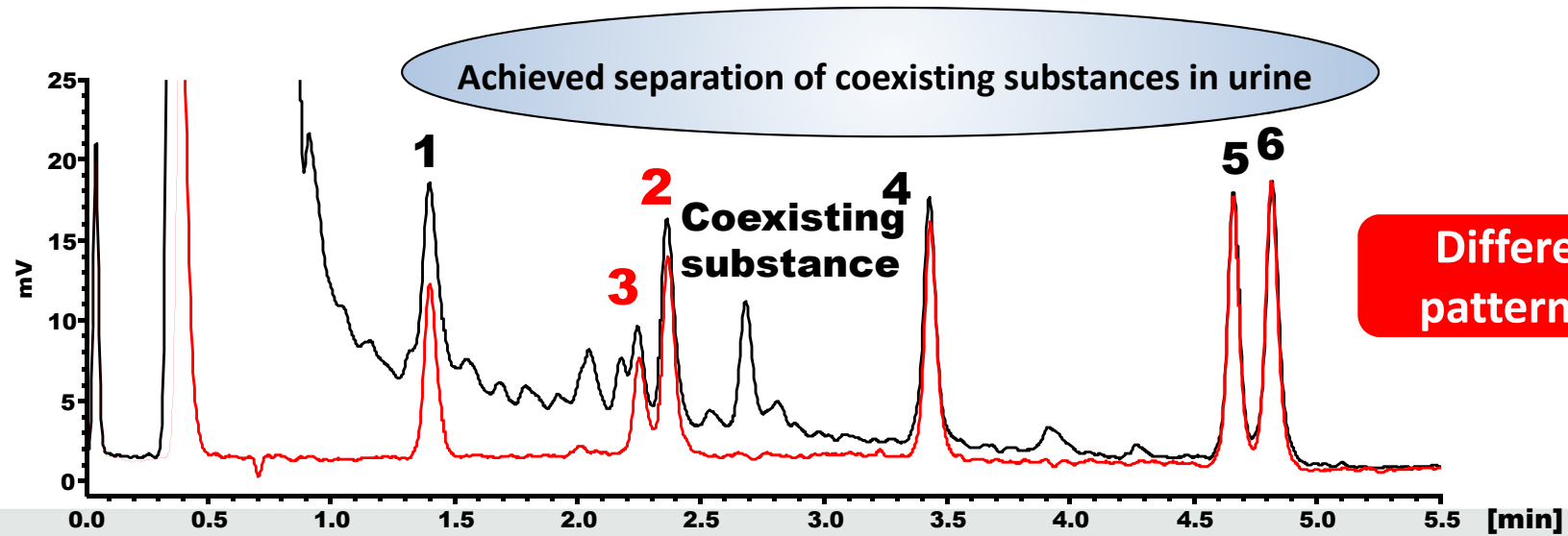
When using CAPCELL CORE C18 S2.7



Changed column



When using CAPCELL CORE ADME S2.7



- 1. Aerosol-based detectors (NQAD) have been useful for highly sensitive detection of compounds with no UV absorption.**
 - 2. It was possible to detect compounds that are difficult to ionize in MS.**
- ⇒ Universal detector with excellent versatility**