Altium

Získejte více od vašeho GCMS – nový zlatý standard s kolonami DB-5Q a HP-5Q Agilent Technologies

Altium

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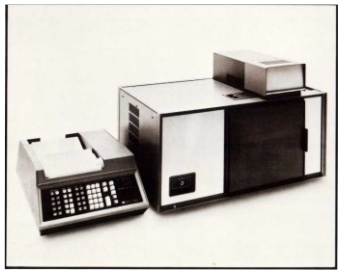
Vývoj v plynové chromatografii



1950 → 1960 → 1970 → 1980

Náplňové kolony

Skleněné náplňovky

5830 GC

5890 GC

Založení J&W Scientific (1974)

„Fused-silica“ kapilární kolony potažené polyimidem

Agilent Technologies

1990 → 2000 → 2010

DB-624

DB-5ms

Agilent převzal J&W Scientific

6890 GC

7890 GC

DB-Wax Ultra Inert

DB-5ms Ultra Inert

Intuvo GC

DB-HeavyWax

2020 → 2024

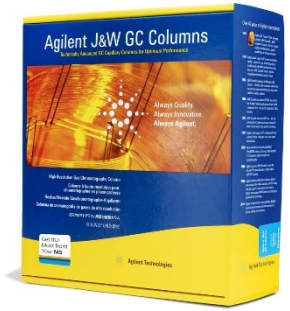
8890 GC

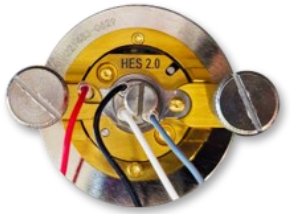
HydroInert ion source

GC/TQ 7010D HES 2.0

HP-5Q

a DB-5Q





Aplikovatelný teplotní rozsah kolony izotermní vs programovatelný teplotní limit

„Maximum Allowable Operating Temperature“ (MAOT)

- horní teplotní limit – izotermní a programovatelný

Kdo je definuje?

- R&D

Čím jsou podmíněny?

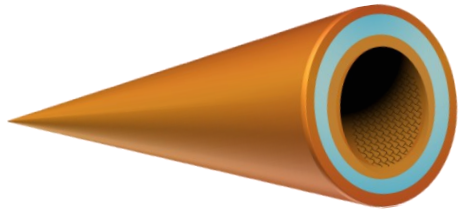
$$k = \frac{t_{compound} - t_{methane}}{t_{methane}}$$

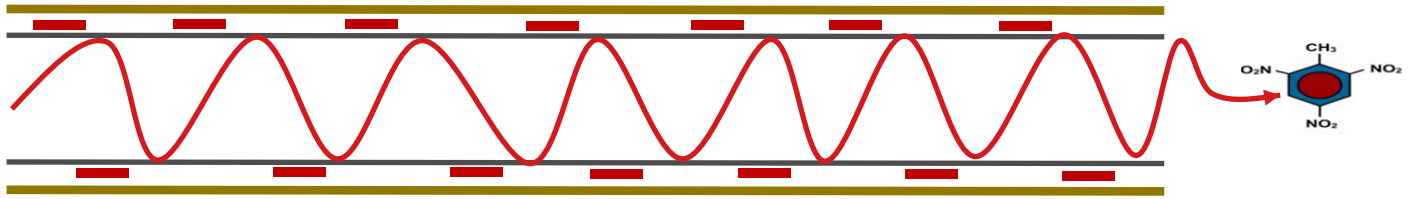
- Bleeding
- stabilita k, RI, počet teoretických pater

Proč se liší?

$$RI = 100 \times \left[n + \frac{\log(t'_{r(unknown)}) - \log(t'_{r(n)})}{\log(t'_{r(N)}) - \log(t'_{r(n)})} \right]$$

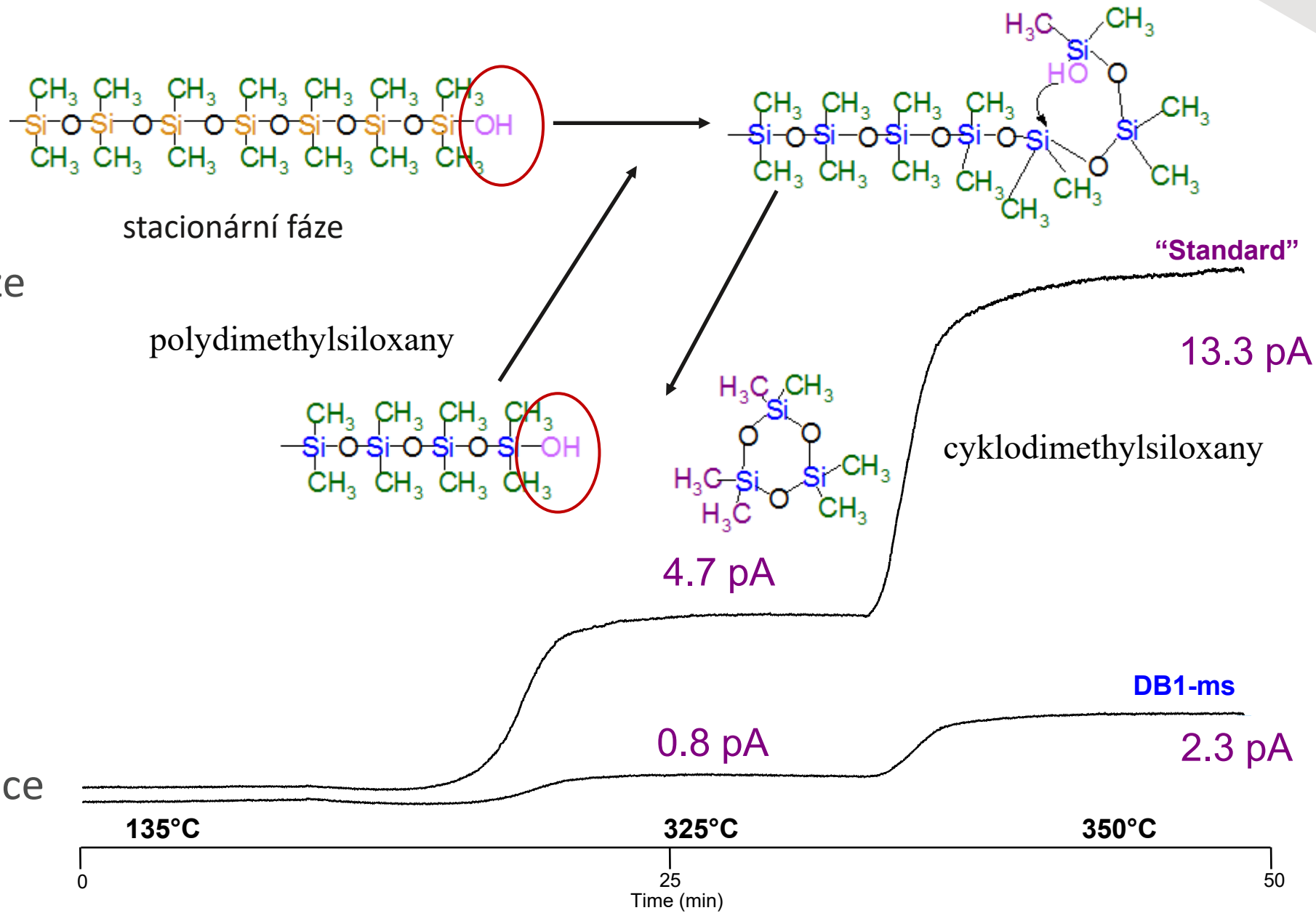
- kratší nebo delší časový úsek





Degradace stacionární fáze kolony – „column bleed“

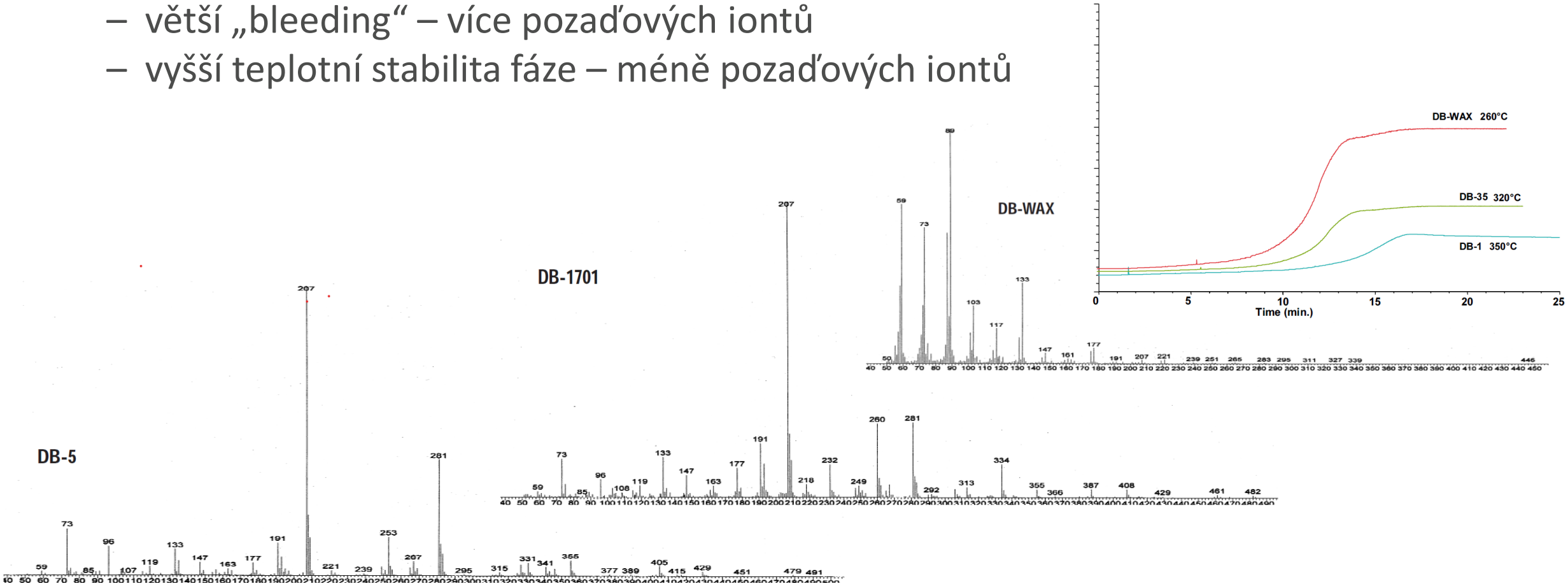
- typ stacionární fáze
- rozměry kolony
  tloušťka filmu
- teplota v peci
- kyslík
- chemická degradace



Jaký vliv má „column bleed“ na MSD

Spektrální interference

- větší „bleeding“ – více pozaďových iontů
- vyšší teplotní stabilita fáze – méně pozaďových iontů

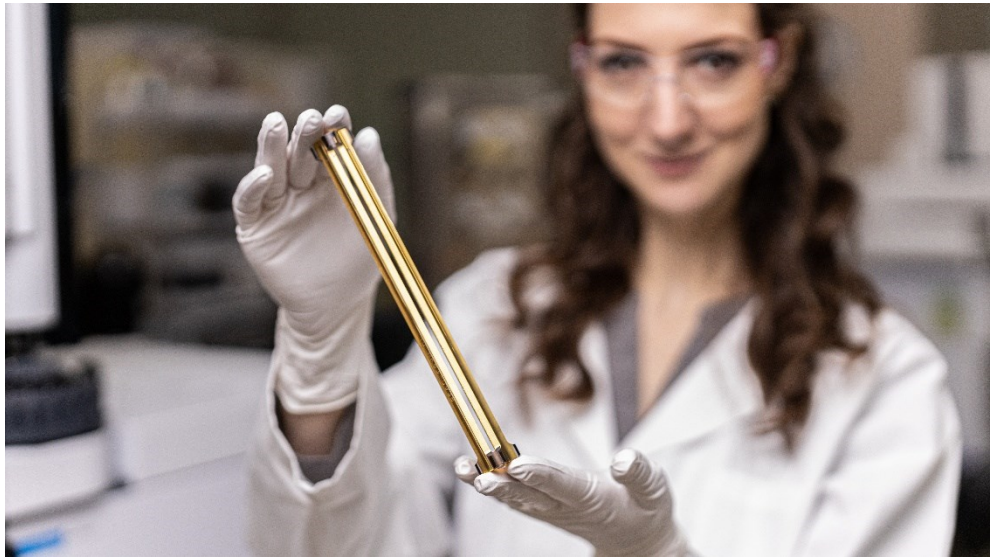


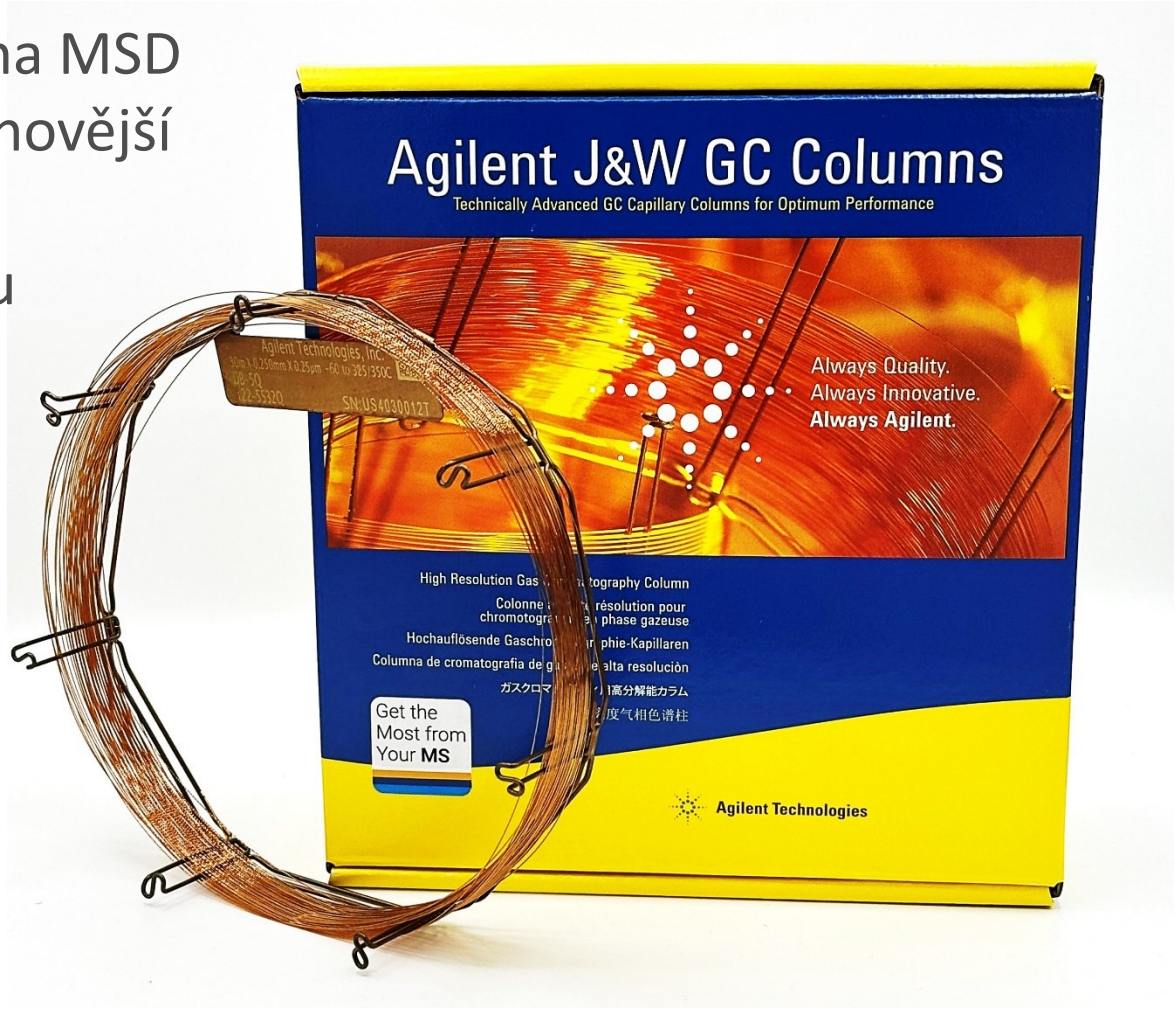
nižší polarita

vyšší polarita

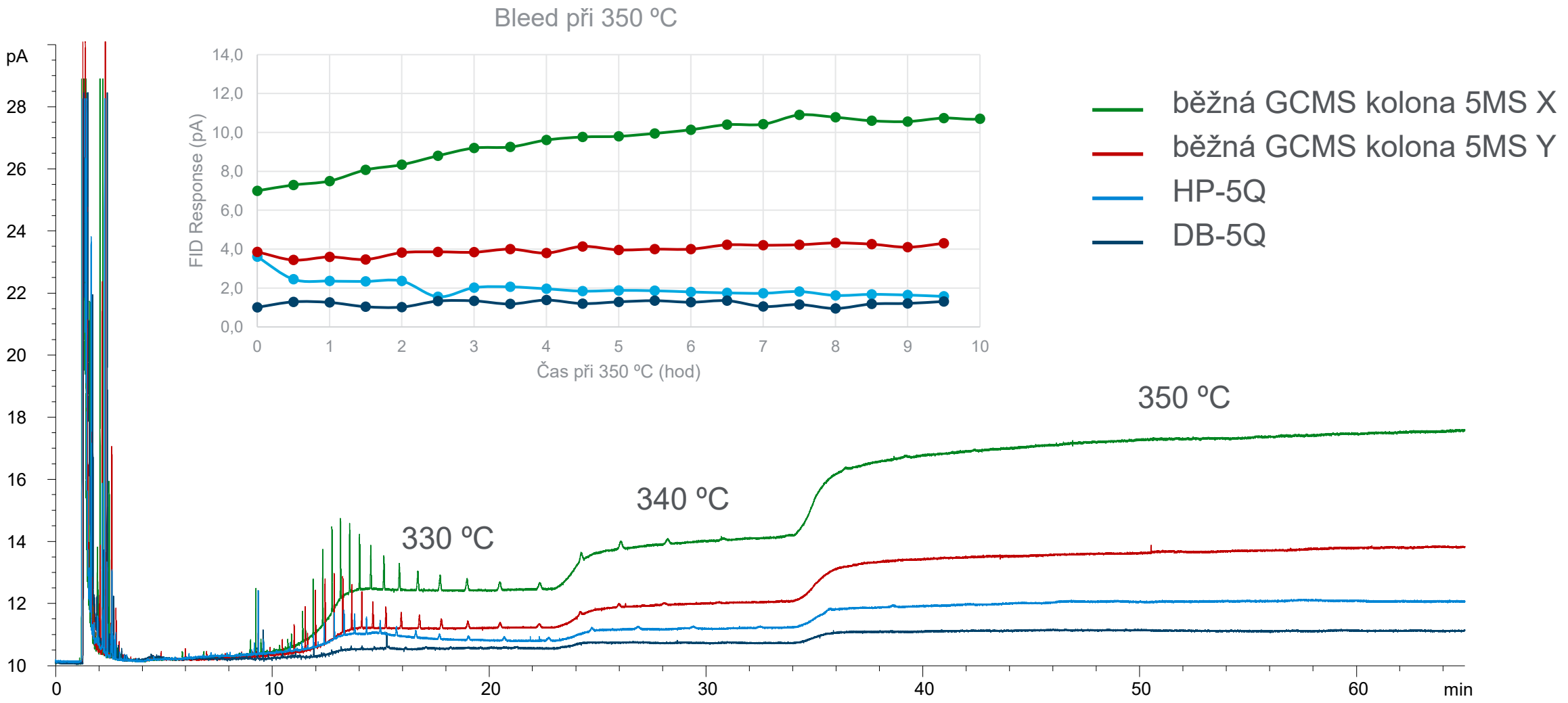
Nové „ultra-low bleed“ kolony série 5Q

- navržené v souladu s nejvyššími požadavky na MSD
- „ultra inert“ technologie kombinovaná s nejnovější „ultra low bleed“ technologií
- nevyšší teplotní stabilita GCMS kolon na trhu





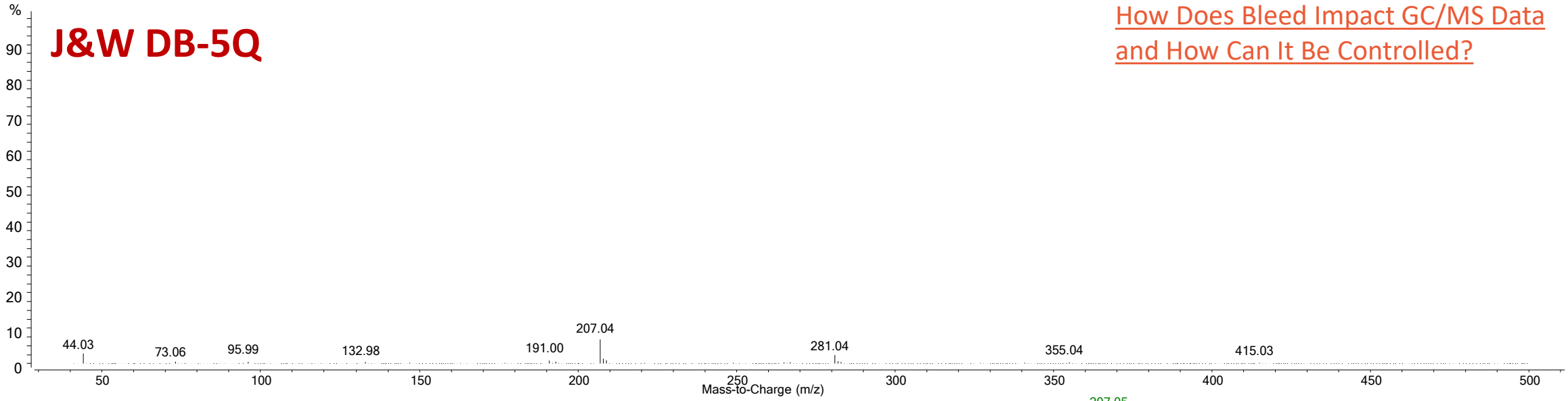
„ultra-low bleed“
dokonce i při maximálním teplotním limitu



How Does Bleed Impact GC/MS Data and How Can It Be Controlled?

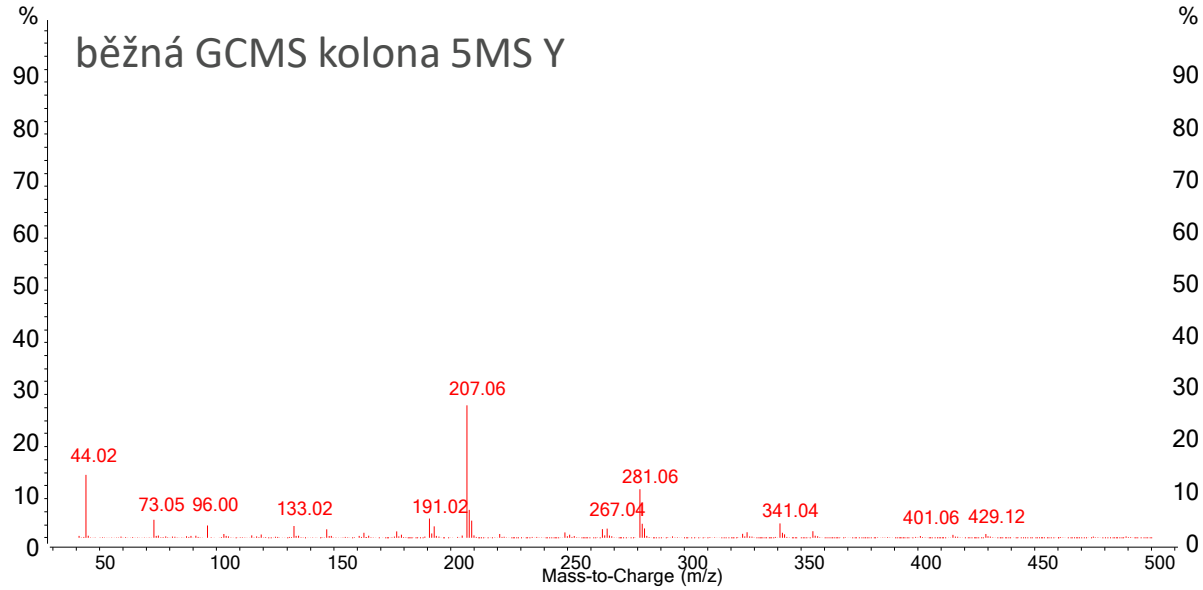
Nižší spektrální interference při 330°C

J&W DB-5Q

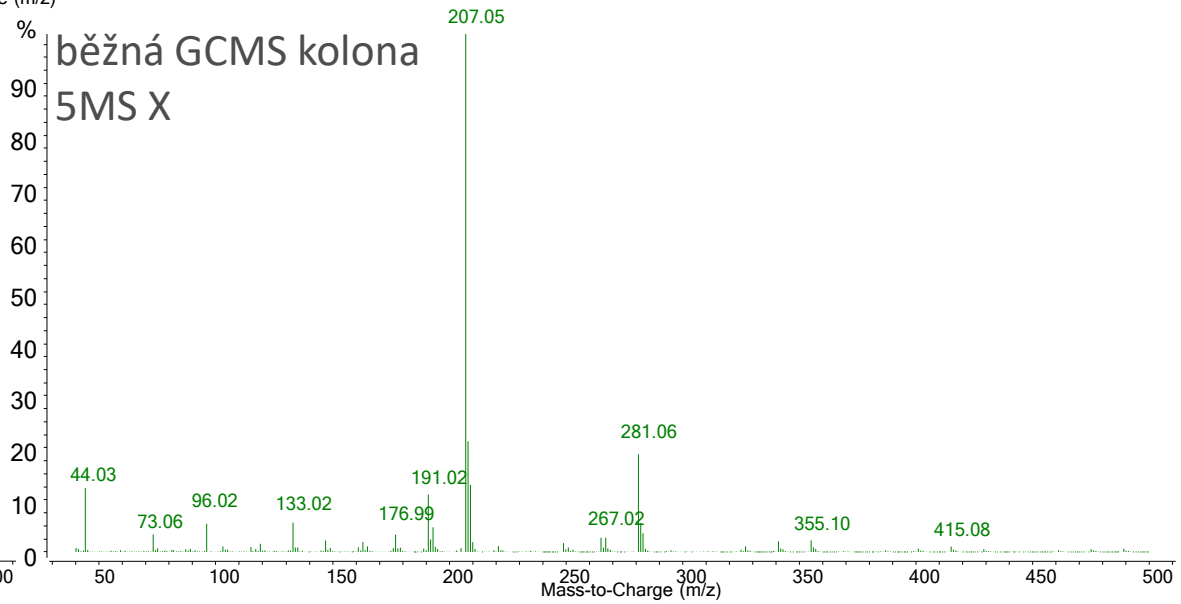


[How Does Bleed Impact GC/MS Data and How Can It Be Controlled?]

běžná GCMS kolona 5MS Y

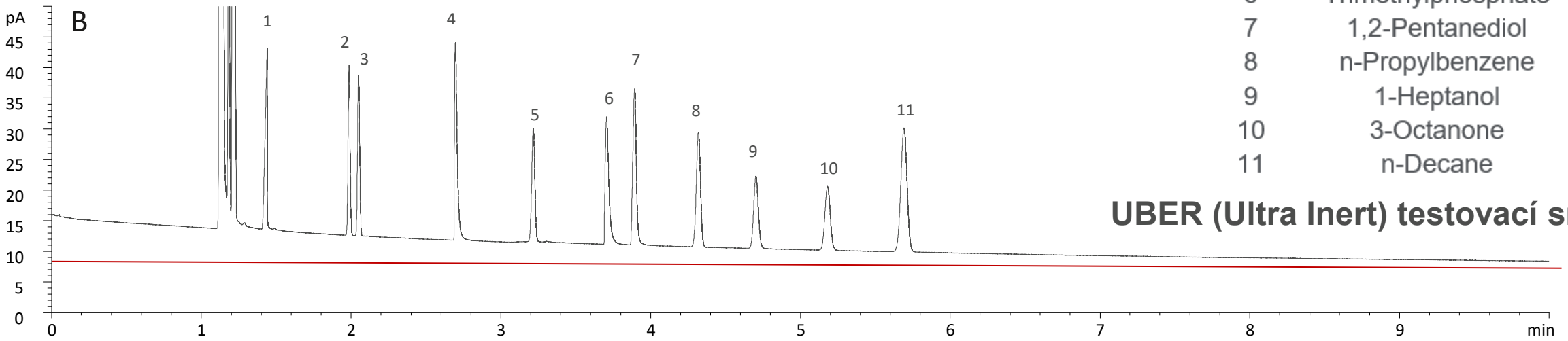


běžná GCMS kolona 5MS X

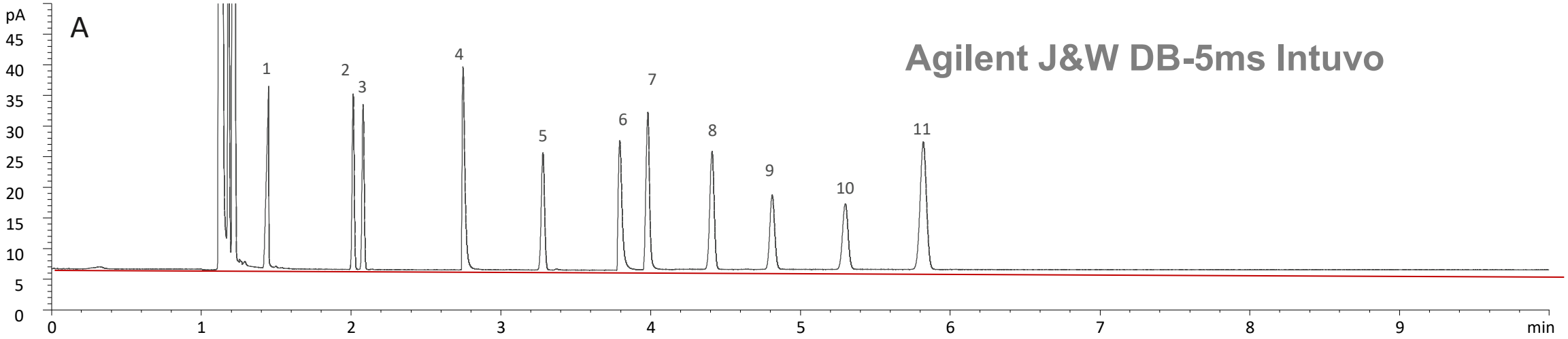


Když je GC připraven měřit, neznamená, že i kolona je připravená…

Peak	Compound
1	Propionic acid
2	1-Octene
3	n-Octane
4	4-Methylpyridine
5	n-Nonane
6	Trimethylphosphate
7	1,2-Pentanediol
8	n-Propylbenzene
9	1-Heptanol
10	3-Octanone
11	n-Decane



UBER (Ultra Inert) testovací směs

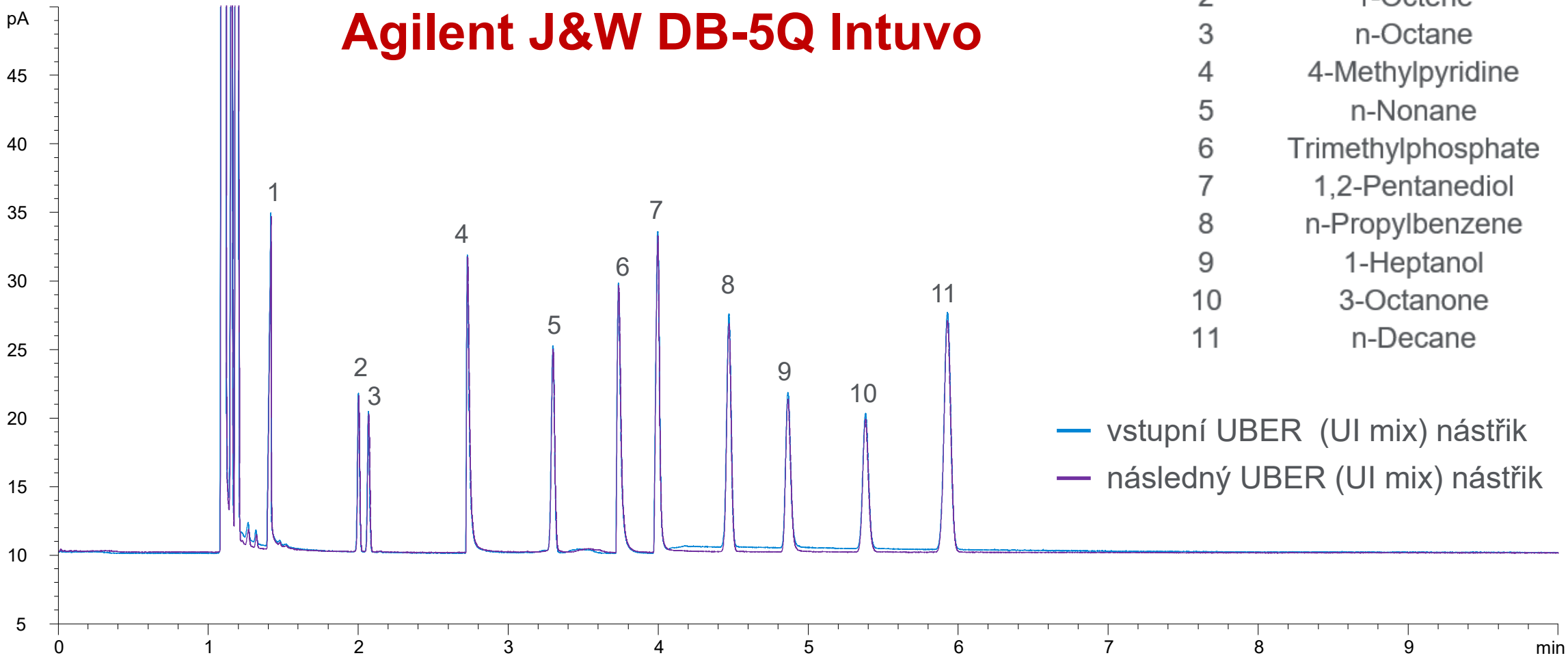


Agilent J&W DB-5ms Intuvo

How Does Bleed Impact GC/MS Data and How Can It Be Controlled?

„Bleeding“ již nemusí být rychlost limitujícím faktorem analýzy

Agilent J&W DB-5Q Intuvo



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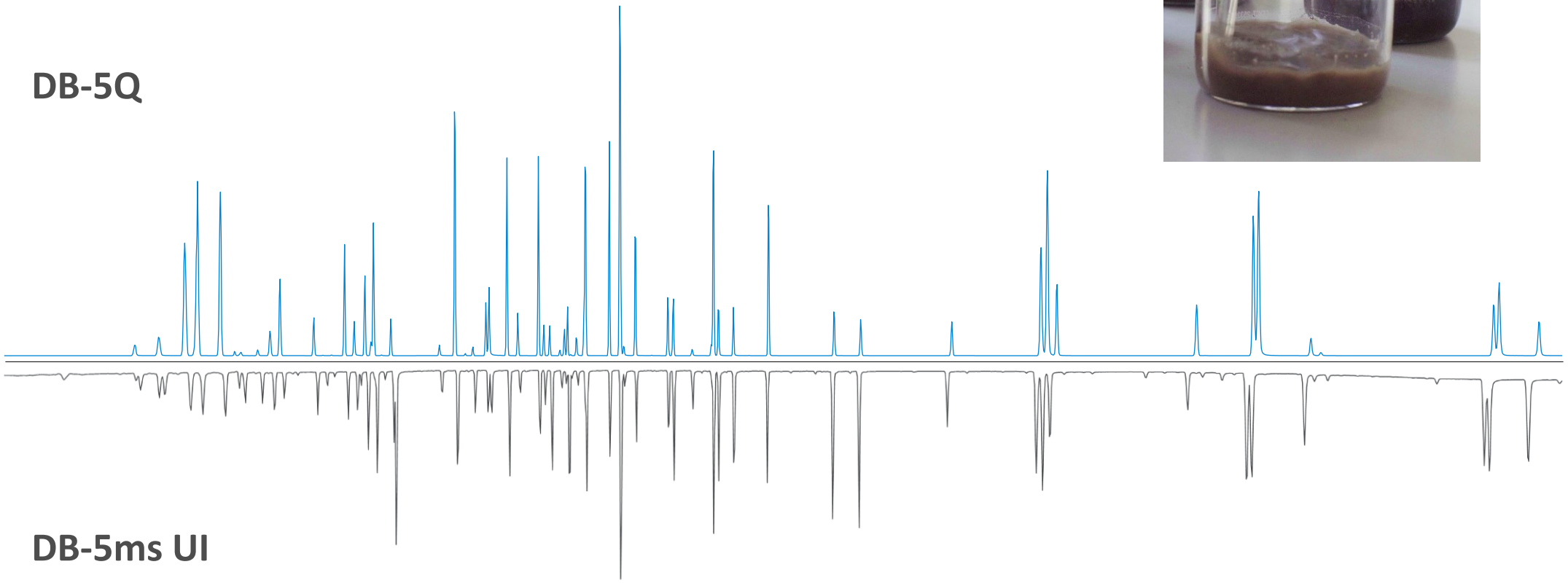
10	3-Octanone
11	n-Decane

How Does Bleed Impact GC/MS Data and How Can It Be Controlled?

Podobná selektivita, kratší čas na revalidaci metod

DB-5Q



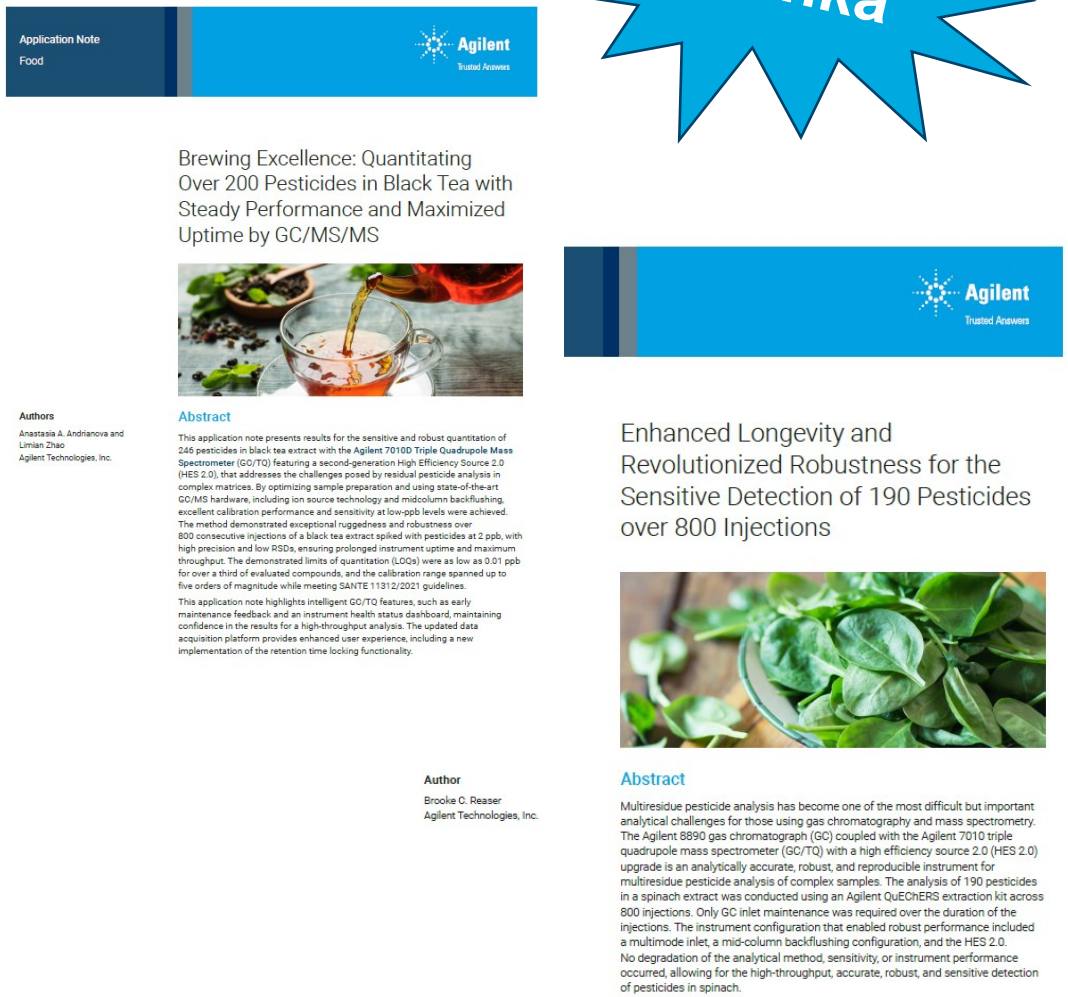
DB-5ms UI

SVM-8270-1

Peak	Compound
1	N-Nitrosodimethylamine
2	Phenol
3	2-Chlorophenol
4	1,3-Dichlorobenzene
5	1,4-Dichlorobenzene
6	1,2-Dichlorobenzene
7	N-Nitrosodi-n-propylamine
8	o-Cresol
9	Bis(2-chloroisopropyl) ether
10	p-Cresol
11	Hexachloroethane
12	Nitrobenzene
13	Isophorone
14	2-Nitrophenol
15	2,4-Dimethylphenol
16	Bis(2-chloroethoxy)methane
17	2,4-Dichlorophenol
18	1,2,4-Trichlorobenzene
19	Naphthalene
20	4-Chloroaniline
21	Hexachlorobutadiene
22	4-Chloro-3-methylphenol
23	2-Methylnaphthalene
24	Hexachlorocyclopentadiene
25	2,4,6-Trichlorophenol
26	2,4,5-Trichlorophenol
27	2-Chloronaphthalene
28	2-Nitroaniline
29	Dimethyl phthalate
30	2,6-Dinitrotoluene
31	Acenaphthylene
32	3-Nitroaniline
33	Acenaphthene
34	2,4-Dinitrophenol
35	4-Nitrophenol
36	Dibenzofuran
37	2,4-Dinitrotoluene
38	Diethyl phthalate
39	Fluorene
40	4-Chlorophenyl phenyl ether
41	4-Nitroaniline
42	2-Methyl-4,6-dinitrophenol
43	Azobenzene
44	4-Bromophenyl phenyl ether
45	Hexachlorobenzene
46	Pentachlorophenol
47	Phenanthrene
48	Anthracene
49	Carbazole
50	Di-n-butyl phthalate
51	Fluoranthene
52	Pyrene
53	Butyl benzyl phthalate
54	Benz[a]anthracene
55	Chrysene
56	Bis(2-ethylhexyl) phthalate
57	Di-n-octyl phthalate
58	Benzo[b]fluoranthene
59	Benzo[k]fluoranthene
60	Benzo[a]pyrene
61	Indeno(1,2,3-cd)pyrene
62	Dibenz[a,h]anthracene
63	Benzo[ghi]perylene

7010D GC/TQ a nová generace High-efficiency Source 2.0 (HES 2.0)

- vysoká citlivost (0.3 fg OFN na kolonu)
- dynamický rozsah (5 řádů)
- vysoká robustnost i při komplikovaných matricích (černý čaj, špenát)
- využití chytrých funkcí



Application Note
Food

Agilent
Trusted Answers

Brewing Excellence: Quantitating Over 200 Pesticides in Black Tea with Steady Performance and Maximized Uptime by GC/MS/MS

Authors
Anastasia A. Andrianova and Limian Zhao
Agilent Technologies, Inc.

Abstract

This application note presents results for the sensitive and robust quantitation of 246 pesticides in black tea extract with the Agilent 7010D Triple Quadrupole Mass Spectrometer (GC/TQ) featuring a second-generation High Efficiency Source 2.0 (HES 2.0), that addresses the challenges posed by residual pesticide analysis in complex matrices. By optimizing sample preparation and using state-of-the-art GC/MS hardware, including ion source technology and midcolumn backflushing, excellent calibration performance and sensitivity at low-ppb levels were achieved. The method demonstrated exceptional ruggedness and robustness over 800 consecutive injections of a black tea extract spiked with pesticides at 2 ppb, with high precision and low RSDs, ensuring prolonged instrument uptime and maximum throughput. The demonstrated limits of quantitation (LOQs) were as low as 0.01 ppb for over a third of evaluated compounds, and the calibration range spanned up to five orders of magnitude while meeting SANTE 11312/2021 guidelines.

This application note highlights intelligent GC/TQ features, such as early maintenance feedback and an instrument health status dashboard, maintaining confidence in the results for a high-throughput analysis. The updated data acquisition platform provides enhanced user experience, including a new implementation of the retention time locking functionality.

Agilent
Trusted Answers

Enhanced Longevity and Revolutionized Robustness for the Sensitive Detection of 190 Pesticides over 800 Injections

Author
Brooke C. Reaser
Agilent Technologies, Inc.

Abstract

Multiresidue pesticide analysis has become one of the most difficult but important analytical challenges for those using gas chromatography and mass spectrometry. The Agilent 8890 gas chromatograph (GC) coupled with the Agilent 7010 triple quadrupole mass spectrometer (GC/TQ) with a high efficiency source 2.0 (HES 2.0) upgrade is an analytically accurate, robust, and reproducible instrument for multiresidue pesticide analysis of complex samples. The analysis of 190 pesticides in a spinach extract was conducted using an Agilent QuEChERS extraction kit across 800 injections. Only GC inlet maintenance was required over the duration of the injections. The instrument configuration that enabled robust performance included a multimode inlet, a mid-column backflushing configuration, and the HES 2.0. No degradation of the analytical method, sensitivity, or instrument performance occurred, allowing for the high-throughput, accurate, robust, and sensitive detection of pesticides in spinach.

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