

# MaxPeak PREMIER komplexní řešení

**Jak minimalizovat nežádoucí adsorpci analytů  
v kapalinové chromatografii**

23. 11. 2021, Vize 2021

Libuše Matulková

# Ztráta analytů v chromatografii

## vazba analytů na povrchy

### Nespecifická adsorpce, nespecifické vazebné interakce

- Nežádoucí interakce nebo adsorpce analytů
- Molekuly mají tendenci ulpívat na površích
- Nejčastěji příčinou jsou hydrofobní a elektrostatické interakce

### Potlačení ztrát ze známých interakcí

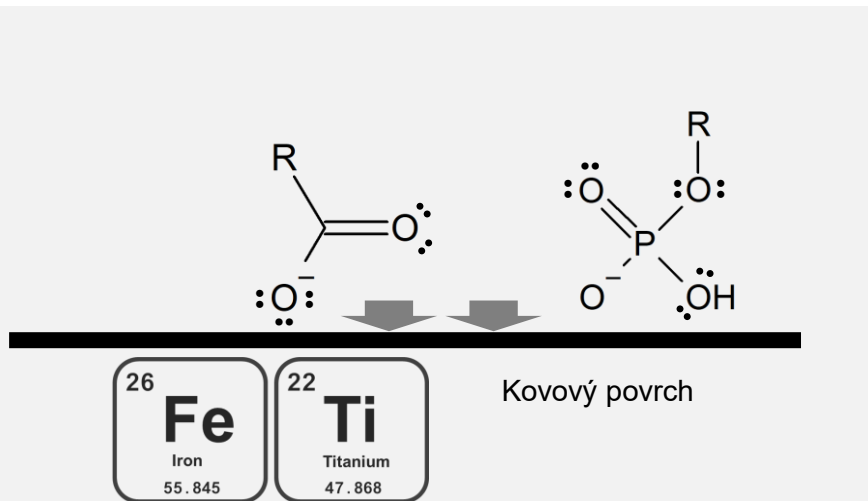
- Zamezení interakcí analytů s povrchy
- Ovlivnění prostředí tak, aby k interakcím nedocházelo

# Nejčastější postupy pro potlačení nežádoucích interakcí

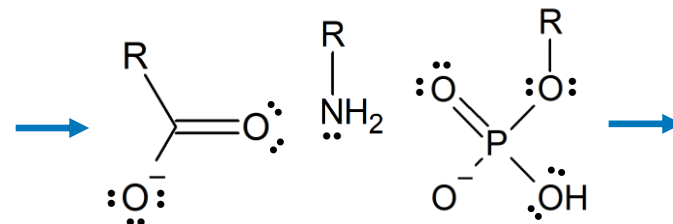
Řešení	Jak to funguje?	Důsledky?
Pasivace povrchu kyselinami	Odstraňuje volné ionty kovů z povrchů	<ul style="list-style-type: none"> <li>▪ Časově náročné</li> <li>▪ Silné kyseliny</li> <li>▪ Nestabilní, nutno opakovat</li> </ul>
Pasivace povrchu vzorkem nebo maticí	Analyt nebo matrice pokryje reaktivní povrch	<ul style="list-style-type: none"> <li>▪ Časově náročné</li> <li>▪ Nestabilní, nutno opakovat</li> </ul>
Kolony PEEKové nebo nerezové s PEEKovým povrchem	Nahrazení kovového materiálu inertním materiálem	<ul style="list-style-type: none"> <li>▪ PEEK sám o sobě neodolá vysokým tlakům</li> <li>▪ PEEKové výrobky mají vyšší rozměrovou variabilitu, nižší propustnost a nejsou kompatibilní s některými rozpouštědly</li> </ul>
Ti v kolonách nebo v některých součástkách	Nefunguje. Ti je kov..	<ul style="list-style-type: none"> <li>▪ Ztráta analytu</li> </ul>
Pokrytí povrchu	Pokrytí povrchu kovu např. vrstvou silikátu apod.	<ul style="list-style-type: none"> <li>▪ MS bleeding a další problémy</li> <li>▪ Tento postup ani nebyl designován pro LC a LC/MS aplikace</li> </ul>
Aditiva v mobilní fázi	Zamezení adsorpce tvorbou chelátů s přítomnými kovy	<ul style="list-style-type: none"> <li>▪ Ionizační suprese a další neznámé efekty</li> <li>▪ Trvalé používání</li> <li>▪ Možné problémy s rozpustností</li> </ul>

# Interakce s kovy?

- řešení: MaxPeak™ High Performance Surfaces (HPS)



U standardních LC systémů dochází k adsorpci analytů citlivých na kovy na vnitřní kovové povrchy



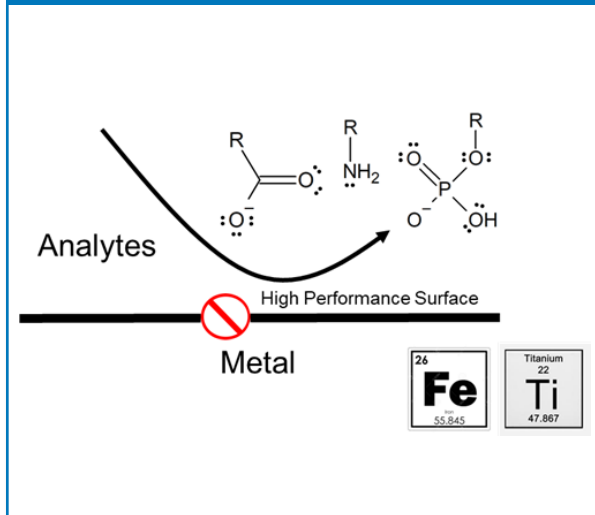
**MAXPEAK™**  
HIGH PERFORMANCE SURFACES

Waters MAXPEAK High Performance Surface (HPS) je navržen tak, aby interakce s těmito povrchy byly co nejmenší

# Analyty interagující s kovy

MaxPeak™ High Performance Surfaces jako řešení

## MaxPeak HPS



## Analyty

- Organické kyseliny
- Organofosfáty
- Oligonukleotidy
- Fosfopeptidy
- Kyselé glykany
- Fosfolipidy
- .....

## Aplikace



Biofarmaceutické



Farmaceutické



Potraviny/ ŽP



Biomedicínský  
výzkum



Chemické materiály

Řešení pro analýzy analytů citlivých na kovy  
RP a HILIC aplikace

# Waters PREMIER řešení

**MAXPEAK™**  
HIGH PERFORMANCE SURFACES



Vials & Plates

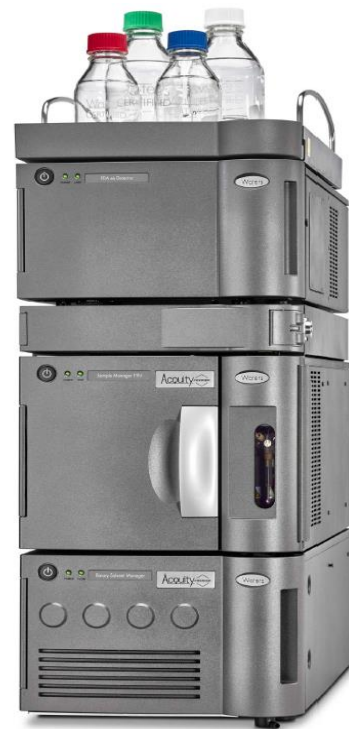
**QuanRecovery™**  
WITH MAXPEAK<sup>HPS</sup>

**Acquity™ PREMIER**

**Arc™ PREMIER**

COLUMNS AND SYSTEMS  
with

**MAXPEAK™**  
HIGH PERFORMANCE SURFACES



# Nejuniverzálnější platforma pro chromatografii



- ✓ Bez úprav ihned k použití
- ✓ Není potřeba provádět pasivaci
- ✓ Lepší citlivost a opakovatelnost



# ACQUITY PREMIER řešení, příklady analýz

Waters  
THE SCIENCE OF WHAT'S POSSIBLE.™



MAXPEAK™  
HIGH PERFORMANCE SURFACES



Acquity™ PREMIER

QuanRecovery™  
MAXPEAK™





# Jeden den v životě analytika při vývoji metody

## projekt

Mám molekulu, pro kterou potřebuji vyvinout analytickou metodu...

**1. krok**  
Začnu s oblíbenou kombinací metoda / kolona / mobilní fáze



### Perfektní den!

Metoda funguje perfektně a nepotřebuje žádnou modifikaci



### Dobrý den

Metoda dává slibné výsledky, ale je potřeba ji trochu doupravit



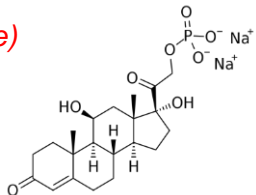
### Den jako zlý sen

Nevidím analyty, dokonce i když bych je určitě měl vidět

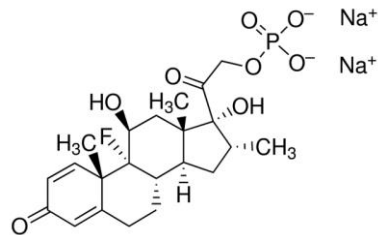
# Mix analytů (malé molekuly)

## Acids

(Metal-sensitive)

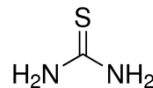


Hydrocortisone sodium phosphate  
 $pK_a$  (strongest acid) 1.2,  $\log P$  1.15

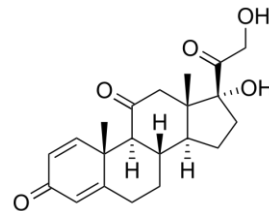


Dexamethasone sodium phosphate  
 $pK_a$  (strongest acid) 1.2,  $\log P$  1.56

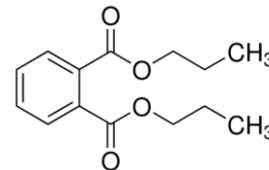
## Neutrals



Thiourea  
 $\log P$  -1.08

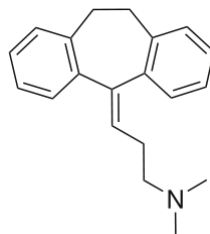


Prednisone  
 $\log P$  1.46

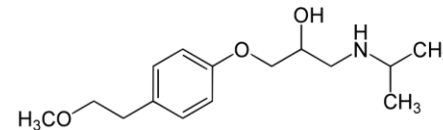


Dipropyl phthalate  
 $\log P$  3.27

## Bases



Amitriptyline  
 $pK_a$  9.4,  $\log P$  4.92

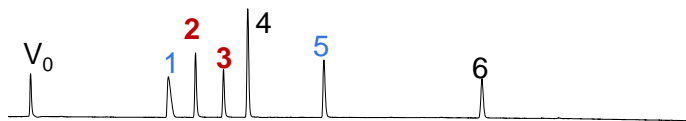


Metoprolol  
 $pK_a$  9.7,  $\log P$  2.15

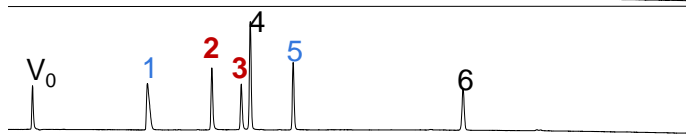
# Mix analytů (malé molekuly)

- standardní vs. PREMIER kolony

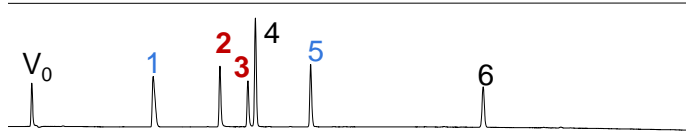
## ACQUITY PREMIER Columns



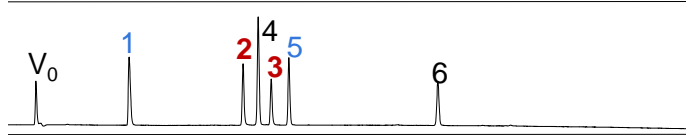
ACQUITY BEH 130 A  
C<sub>18</sub> 1.7 μm



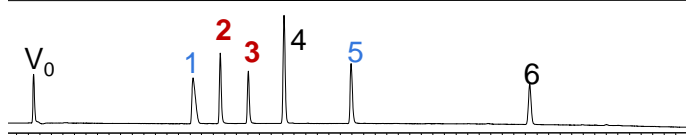
ACQUITY BEH 130 A  
Shield RP<sub>18</sub> 1.7 μm



ACQUITY CSH 130 A  
C<sub>18</sub> 1.7 μm

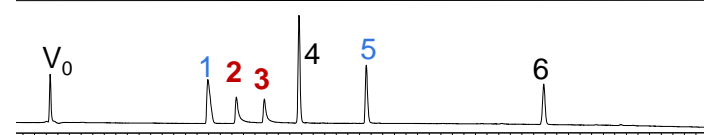
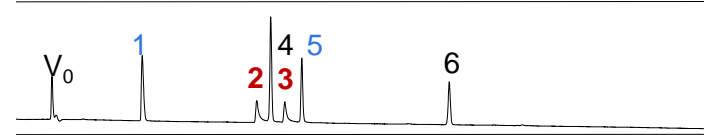
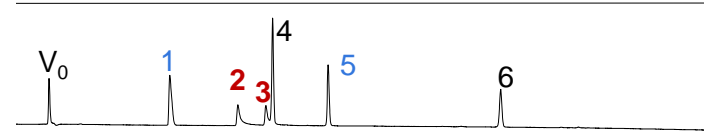
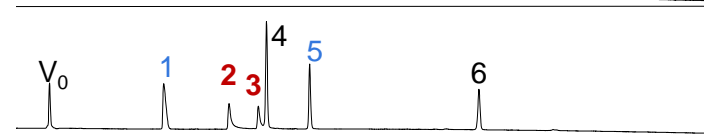
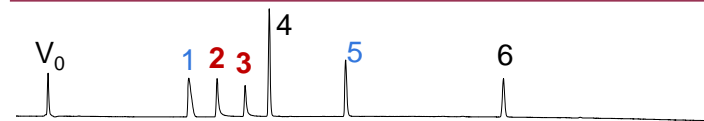


ACQUITY CSH 130 A  
Phenyl Hexyl 1.7 μm



ACQUITY HSS 100 A  
T3 1.8 μm

## Standard Columns



Time (min)

V<sub>0</sub>: thiourea,  
1: metoprolol

2: hydrocortisone  
phosphate

3: dexamethasone  
phosphate

4: prednisone

5: amitriptyline

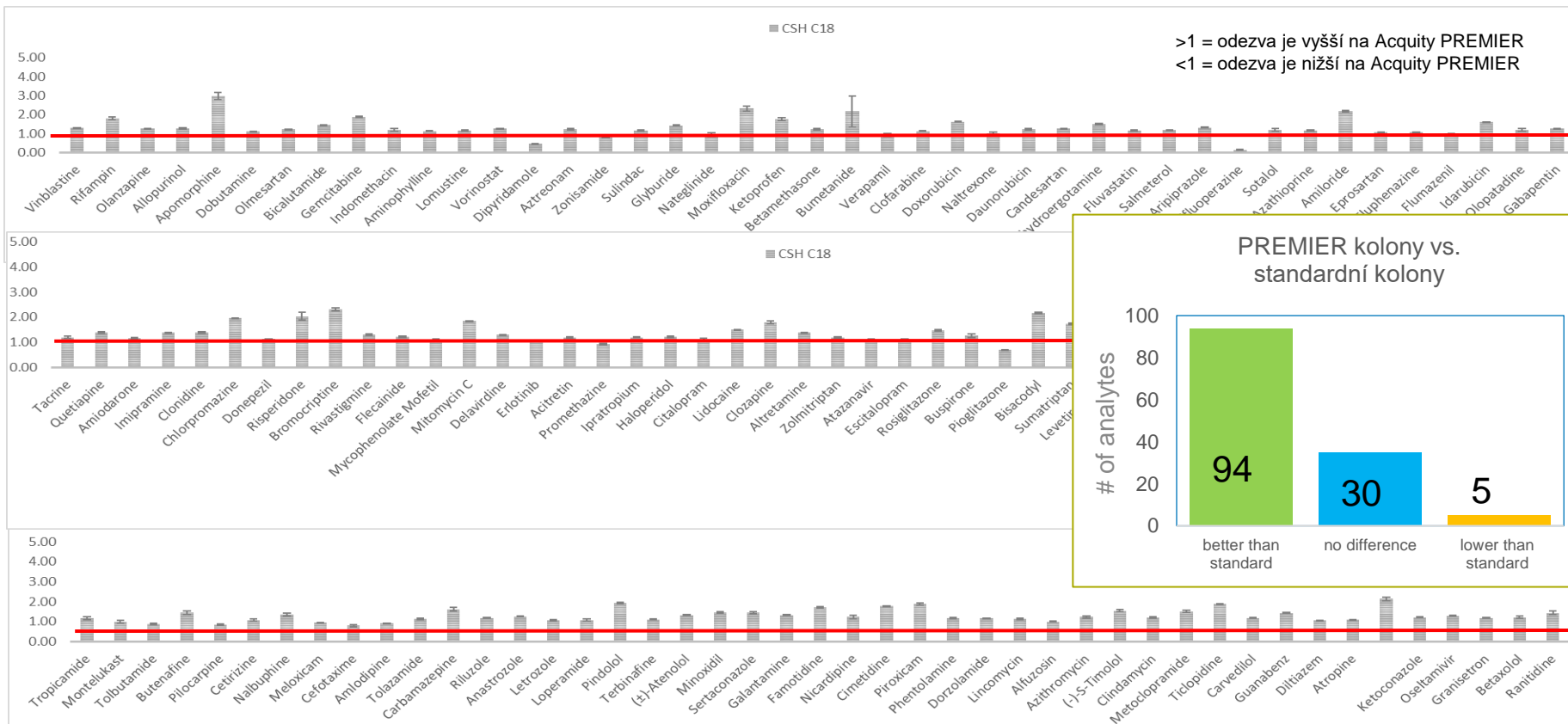
6: dipropyl  
phthalate

Lepší tvar píků: užší píky & menší chvostování

# Příklady plochy píku malých molekul (n=134)

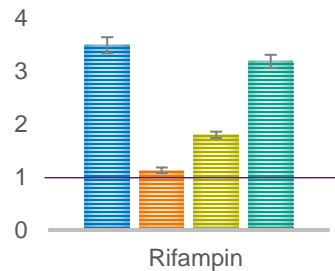
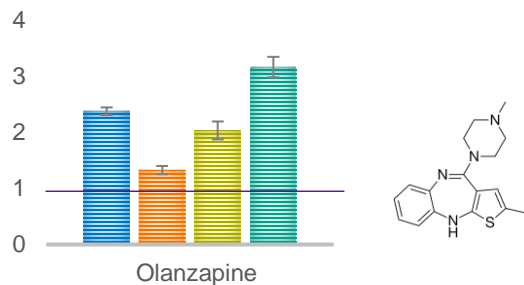
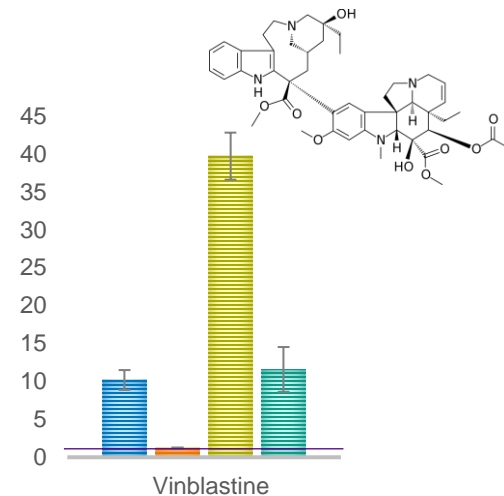
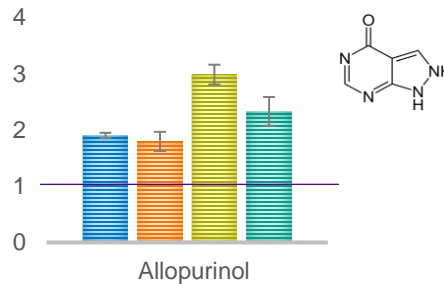
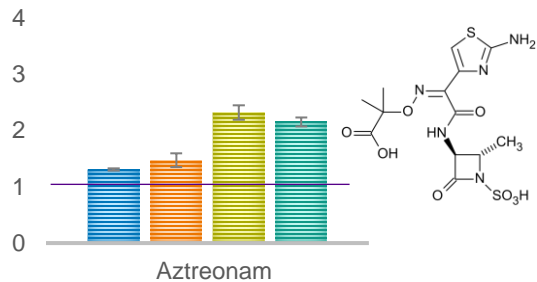
## -PREMIER kolony vs. standardní kolony

Fold improvement (PREMIER column vs Standard column)



# Vybrané malé molekuly

- plochy píkù



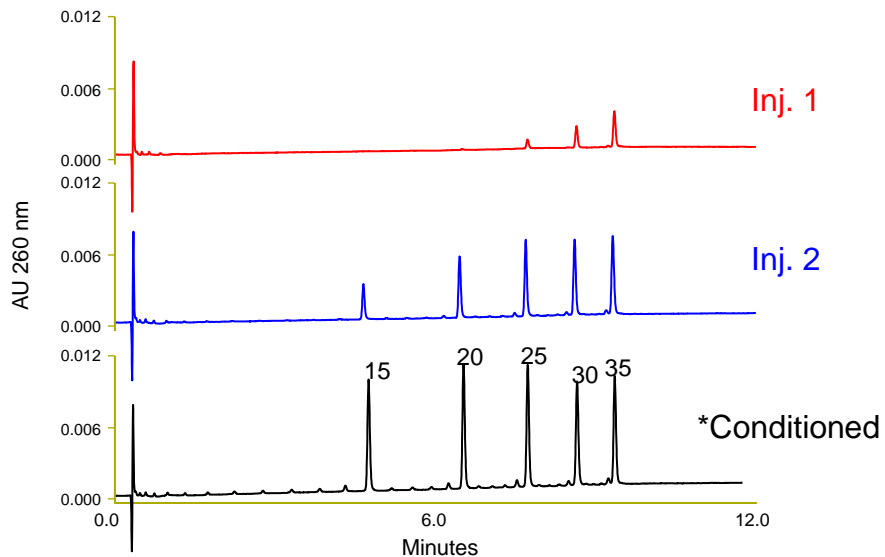
- BEH C18
- HSS T3
- CSH C18
- CSH PhenylHexyl

>1 = odezva je vyšší na Acquity PREMIER  
<1 = odezva je nižší na Acquity PREMIER

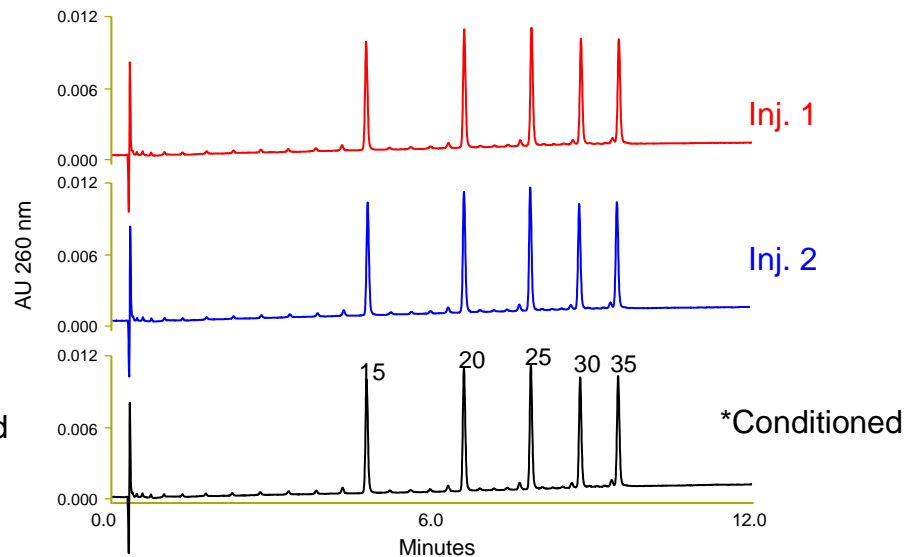
# ACQUITY PREMIER kolona vs. standardní kolona

*Separace oligonukleotidů bez kondicionace*

## Standardní kolona



## ACQUITY PREMIER kolona



15-35mer Oligonucleotide Standard



# Vylepšení chromatografie

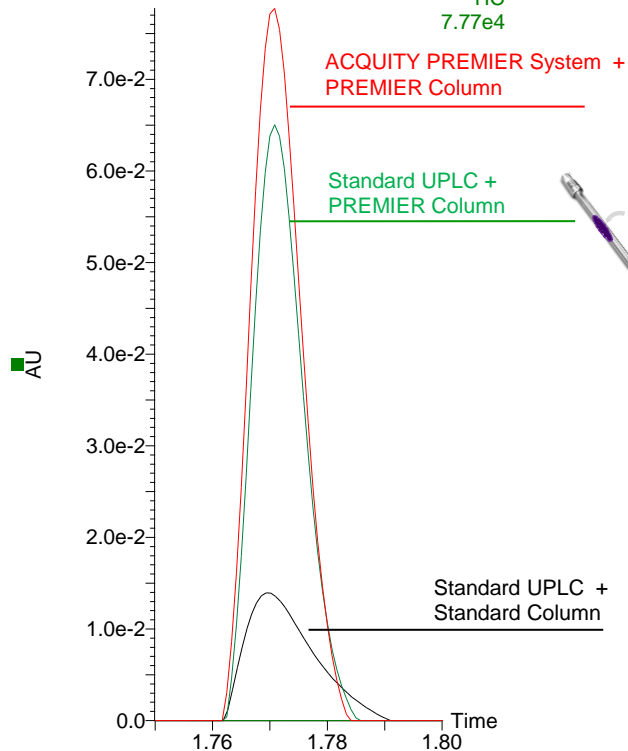
- *Kde je zřetelný benefit?*

- Analyty citlivé na kovy, např. fosforylované sloučeniny a slabé kyseliny
- Molekuly náchylné k interakcím s povrchy
  - Ztráty vzorku / špatné recovery / tailing píků
  - Často vyžadující přidání aditiv do mobilní fáze
- Metody vyžadující pasivaci systému / kondicionaci
- Někdy se problém nedá předvídat ! **Může se stát, že ani nevíme, že něco nevidíme...**

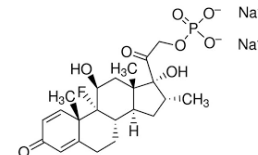
# Dexametazon fosforečnan sodný syntetický glukokortikoid

06-Aug-2020

06\_Aug\_2020 5\_95\_ACN\_10 mM AF Blank\_Equil\_02  
TIC  
7.77e4



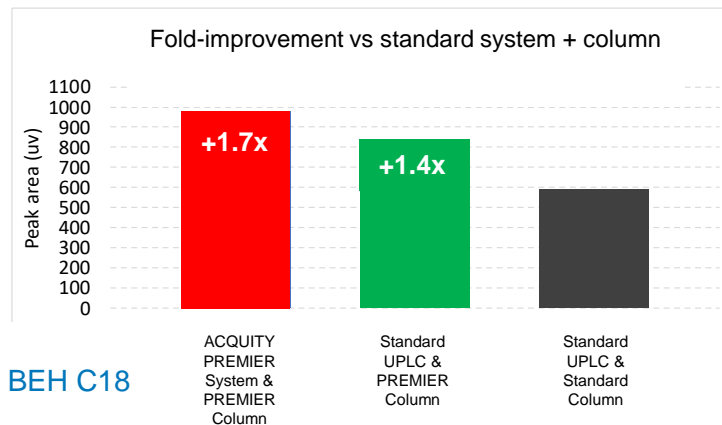
Acquity PREMIER



USA TODAY

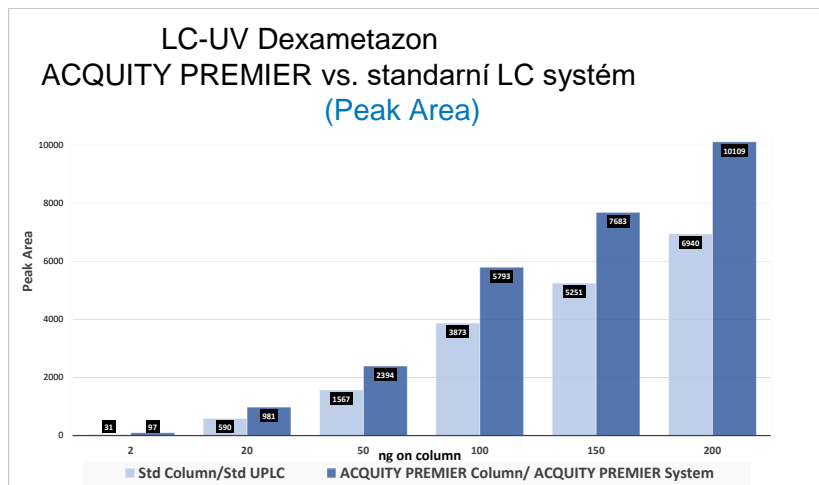
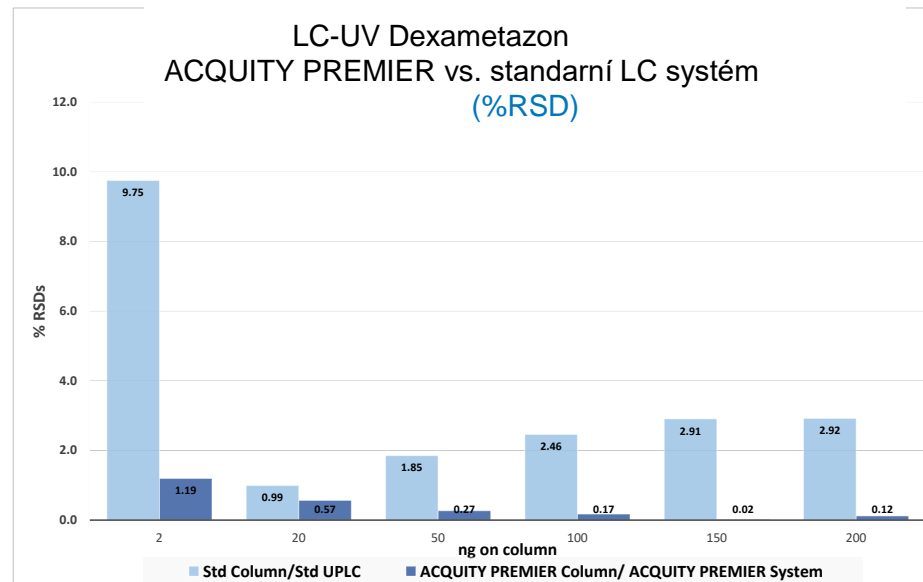
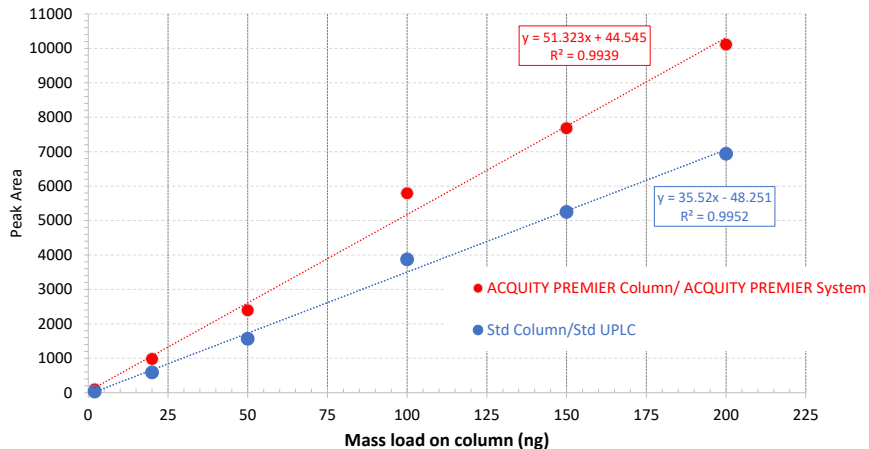
Demand for dexamethasone rises after study finds COVID-19 benefits, FDA data shows

Dian Zhang, USA TODAY · 7/2/2020





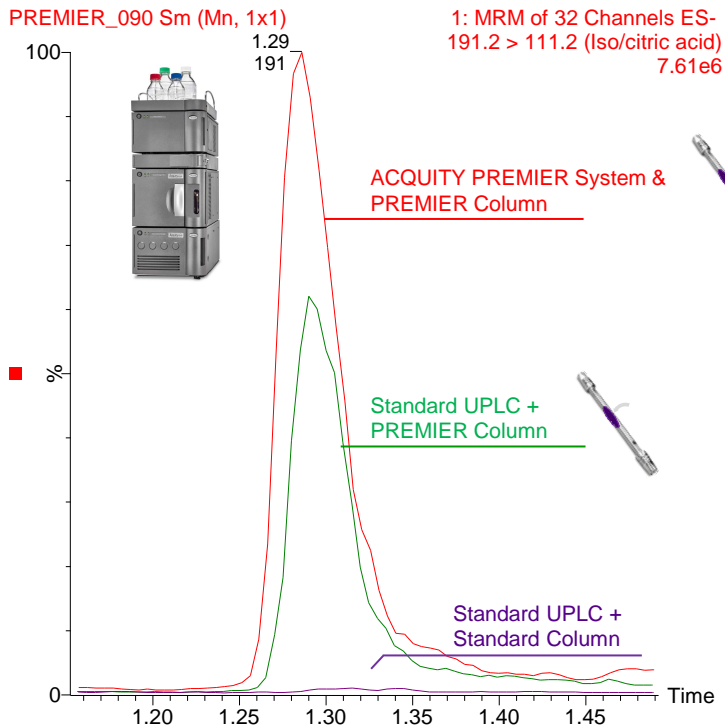
# LC-UV Dexametazon ACQUITY PREMIER vs. standardní LC systém



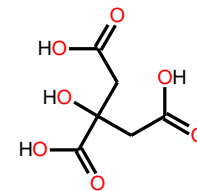
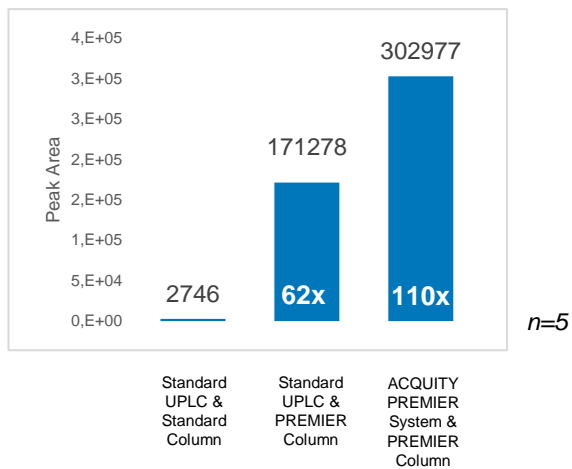
- Zvýšení odezvy & %RSDs

# Plocha píku, organické kyseliny

## - kyselina citronová

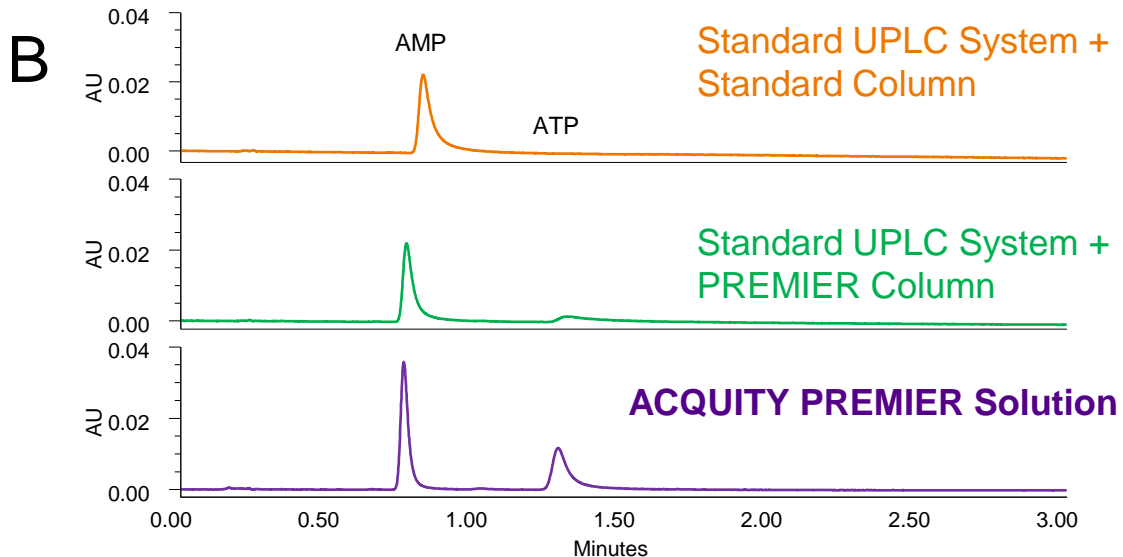
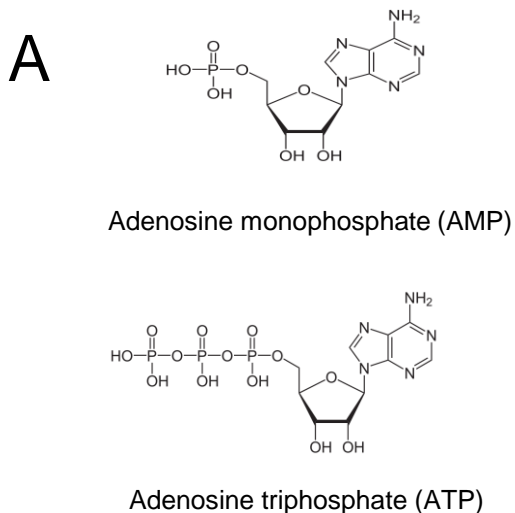


Fold-improvement vs standard system + column



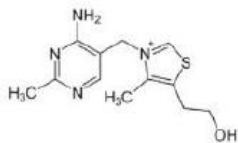
Citric Acid (10 μM)

# Plocha píku AMP/ATP

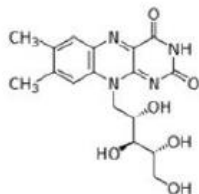


**Figure 3.** A) Chemical structures of AMP and ATP. B) Chromatograms obtained using a standard UPLC system and column vs the same system with a PREMIER column and the ACQUITY PREMIER Solution. A mixture of ATP and AMP was separated at 20 ng mass loads on ACQUITY UPLC BEH Amide 2.1 x 50 mm columns using a 65/35 (v/v) acetonitrile/ aqueous 60 mM ammonium acetate (pH 6.8) mobile phase, 30°C column temperature and a 0.5 mL/min flow rate. The peaks were detected by absorbance at 260 nm.

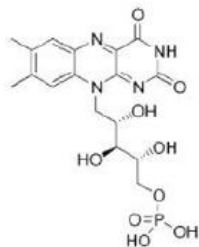
# Vitamíny skupiny B



Thiamine (B<sub>1</sub>)

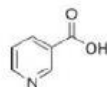


Riboflavin (B<sub>2</sub>)

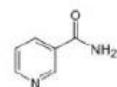


FMN

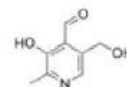
(Flavin mononucleotide)



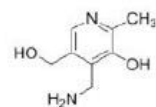
Nicotinic acid (B<sub>3</sub>)



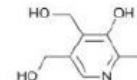
Nicotinamide (B<sub>3</sub>)



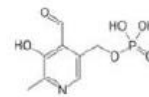
Pyridoxal (B<sub>6</sub>)



Pyridoxamine (B<sub>6</sub>)

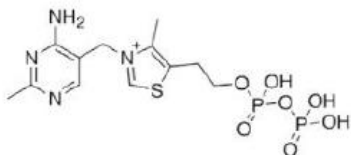


Pyridoxine (B<sub>6</sub>)



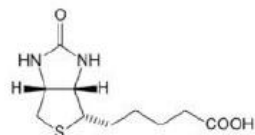
PLP

(Pyridoxal 5'-phosphate)

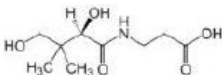


TPP

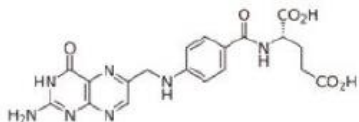
(Thiamine pyrophosphate)



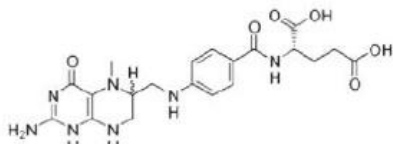
Biotin



Pantothenic acid (B<sub>5</sub>)

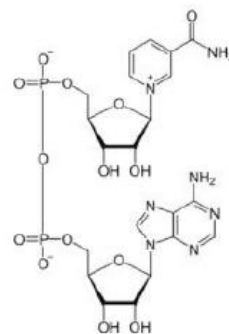


Folic acid (B<sub>9</sub>)



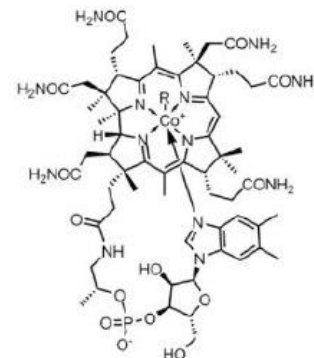
5MTHF

(5-methyl-tetrahydrofolate)



NAD

(Nicotinamide adenine dinucleotide)

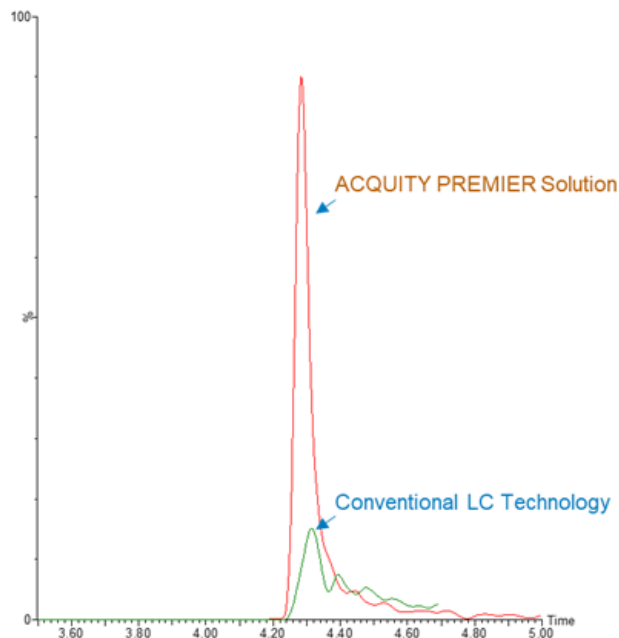


R = 5'-deoxyadenosyl, Me, OH, CN

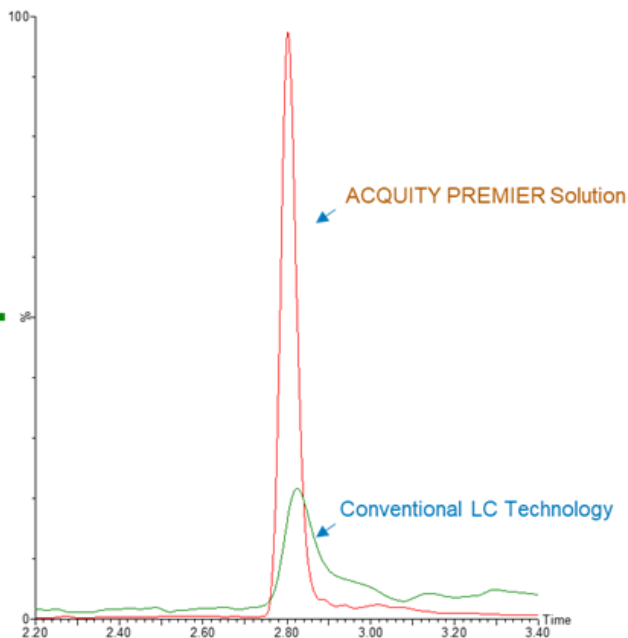
Vitamin (B<sub>12</sub>)

# Vyšší citlivost pro analýzu vitamínů ze skupiny B

3x lepší citlivost

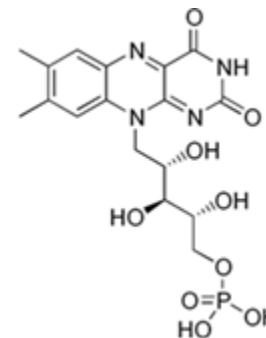


Riboflavin 5'- Phosphate

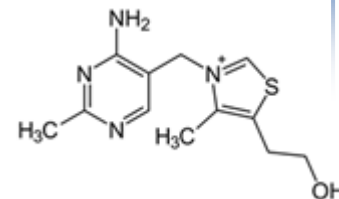


Thiamine

## Riboflavin 5'-Phosphate

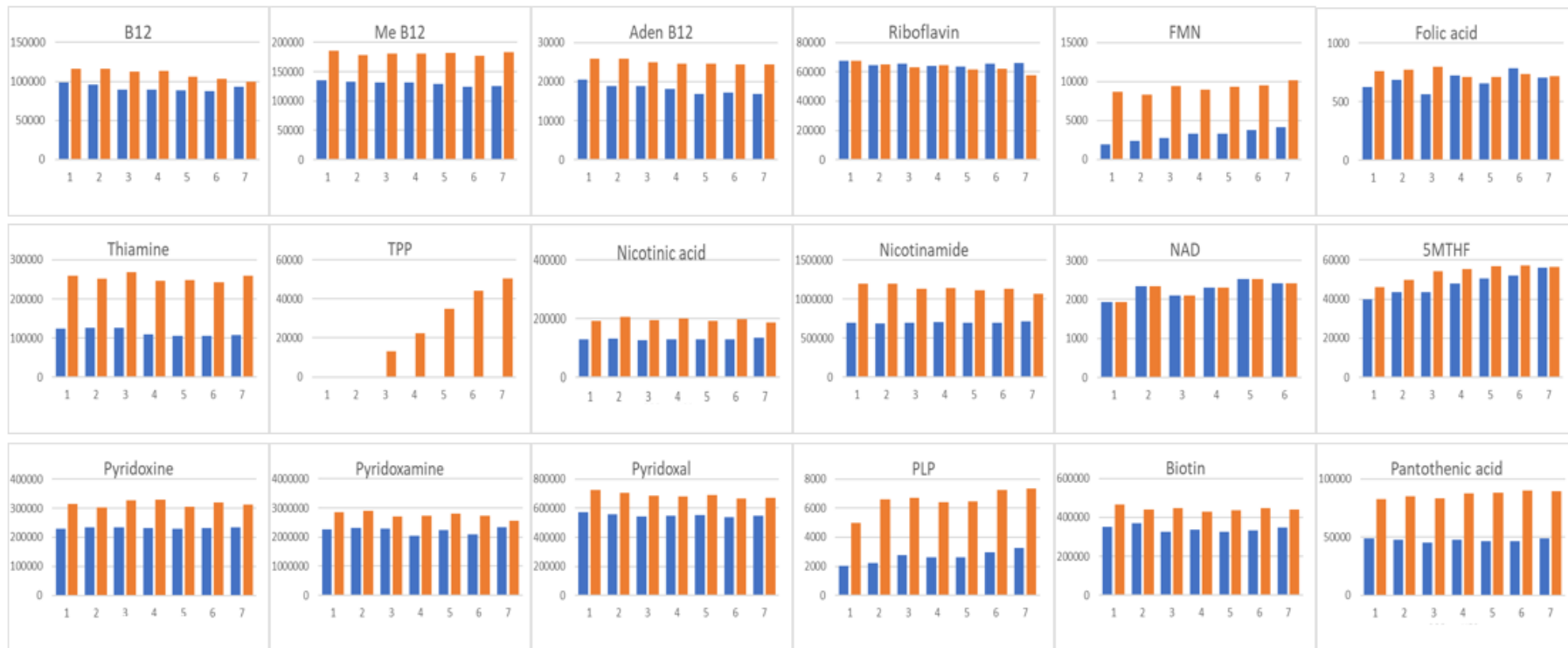


## Thiamine



# ACQUITY™ Premier řešení

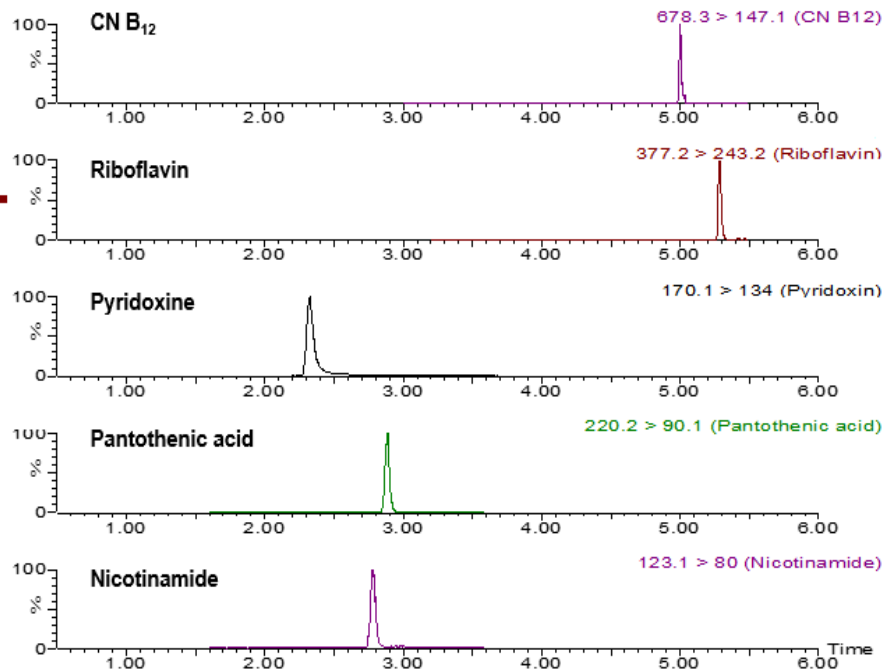
Plocha píků, vitamíny skupiny B



- **ACQUITY™ Premier řešení vs. tradiční LC technologie**

# ACQUITY™ Premier řešení vitamín B, energetické nápoje

Waters  
THE SCIENCE OF WHAT'S POSSIBLE.™



# Co zvýší efektivitu při vývoji metody?



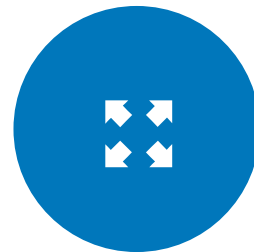
Jistota, že nemizí  
klíčové analyty



Postupy bez  
nutnosti pasivace a  
používání aditiv



Snížení variability  
vzorků a ztráty  
analytů  
kvůli interakcím s  
povrchy



Okamžitý výkon, na který  
je spolehnutí při každém  
nástřiku





# Acquity<sup>™</sup> PREMIER SOLUTION

MAXPEAK<sup>™</sup>  
HIGH PERFORMANCE SURFACES

Acquity<sup>™</sup> PREMIER

Arc<sup>™</sup> PREMIER



*Redefining Separation Science. **Again.***

# Analytické LC systémy

Waters  
THE SCIENCE OF WHAT'S POSSIBLE.™

UPLC

HPLC

UHPLC



alliance®



Arc™ HPLC



Acuity® Arc™



Arc™ PREMIER



Acuity® UPLC® CLASS Acuity® UPLC® CLASS

Acuity® Advanced Polymer Chromatography™ Acuity® PREMIER

# Přehled LC portfolia



	Alliance	Arc HPLC	Acquity Arc / Arc Premier	Acquity UPLC H-Class PLUS / Acquity PREMIER	Acquity UPLC I-Class
<b>Tlak [bar]</b>	350	650	650	1 000	1 200
<b>Průtok [ml/min]</b>	10	5	5	2	2
<b>Gradient</b>	kvartérní	kvartérní	kvartérní / binární (Premier)	kvartérní / binární	binární
<b>Autosampler</b>	FTN	FTN	FTN	FTN	FTN / FL

# Arc Premier systém

UHPLC s kontrolou rizika pro analyty citlivé na kovy

**Detektory:**  
UV/VIS, PDA, FLR

## Autosampler

- Flow-through needle design
- Velmi nízký carryover
- 4-40°C
- Na až 480 2ml vialek
- Gradient SmartStart



**Max tlak:** 9 500 psi  
**Průtoky:** 0-5 ml/min



## Vývoj metod a flexibilita

- Až 6 15cm kolon
- 4-90°C

## Čerpadla

- Binární nebo kvartérní
- Gradient SmartStart
- 0.005" ID kapiláry
- AutoBlend Plus (QSM)

## Kontrola rizika pro analyty citlivé na kovy



## Software



## Hmotnostní detekce:

- ACQUITY QDa, SQD2,
- Xevo TQ-S micro & Cronos

## Kvalifikace systému

# ACQUITY Premier systém

Velký pokrok v LC separacích

## Detektory:

ACQUITY TUV, PDAeλ, FLR

## Autosampler

- Flow-through needle design
- Velmi nízký carryover
- 4-40°C
- až 480 2ml vialek
- Gradient SmartStart



Max tlak: 15 000 psi

Průtoky: 0-2 ml/min

Acquity PREMIER

## Vývoj metod

- Až 6 15cm kolon
- 4-90°C

## Čerpadla

- Binární nebo kvartérní
- 0.004" ID kapiláry
- AutoBlend Plus (QSM)

## Kontrola rizika pro analyty citlivé na kovy



## Software

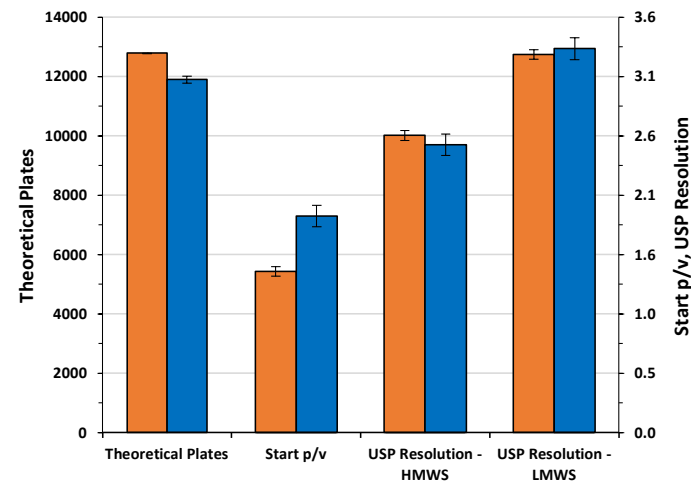
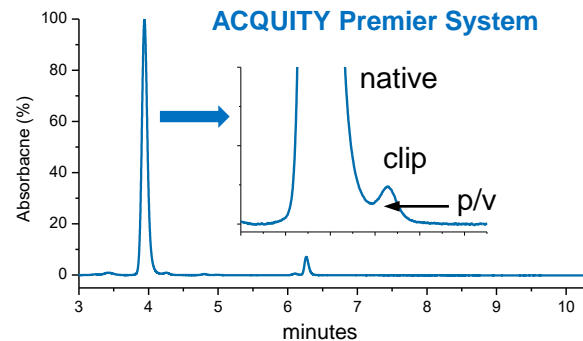
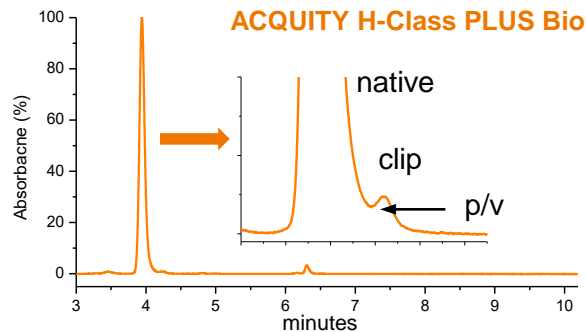
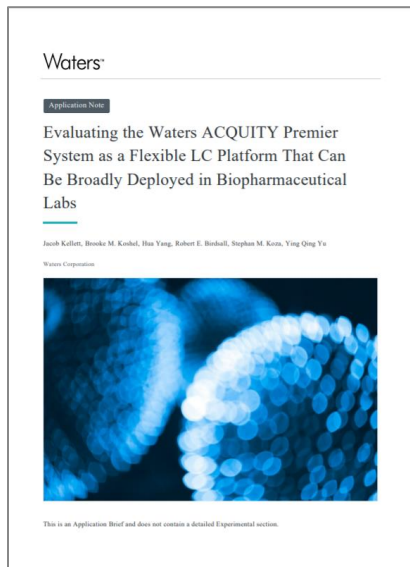


## Hmotnostní detekce

- Single Quad (QDa, SQD2)
- Tandem Quad (Xevo TQ-S/XS)
- Time-of-flight (Xevo G2-XS)
- Ion Mobility (Synapt, SELECT SERIES)

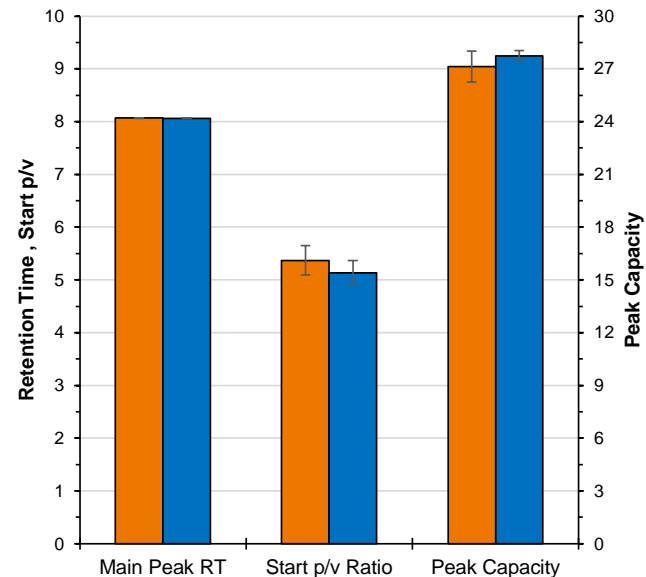
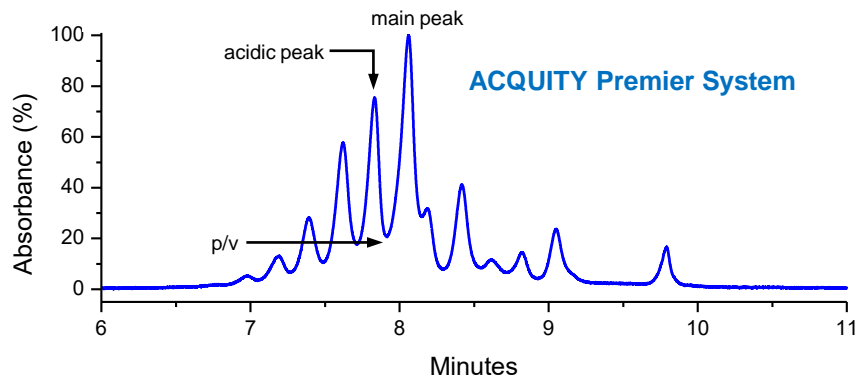
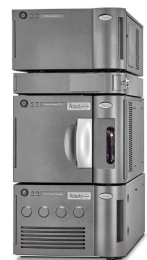
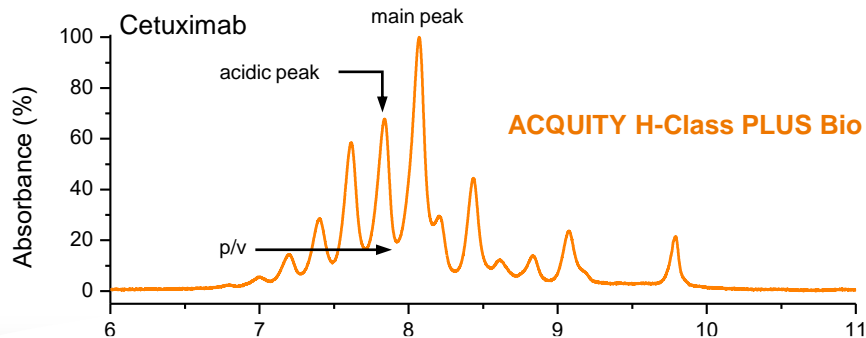
## Kvalifikace systému

# Acquity H-Class PLUS Bio vs. Acquity Premier: SEC (Size Exclusion Chromatography)



Evaluating the Waters ACQUITY Premier System as a Flexible LC Platform That Can Be Broadly Deployed in Biopharmaceutical Labs, 720007286

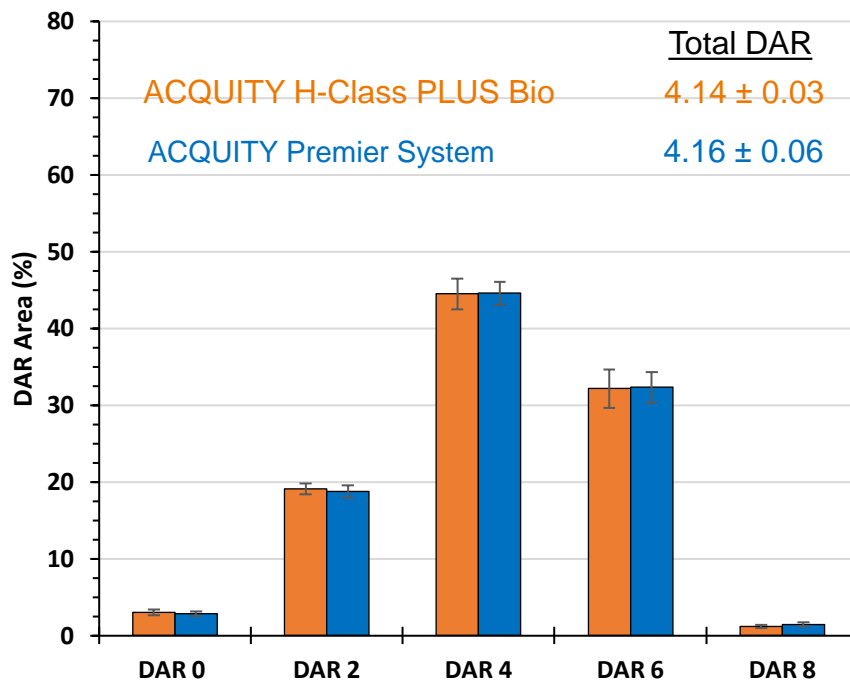
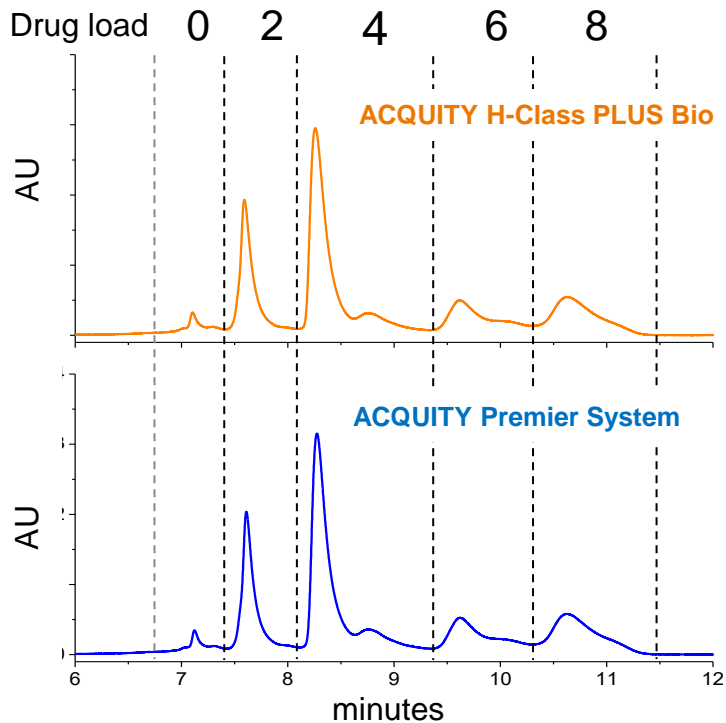
# Acquity H-Class PLUS Bio vs. Acquity Premier: IEC (Ion Exchange Chromatography)



Evaluating the Waters ACQUITY Premier System as a Flexible LC Platform That Can Be Broadly Deployed in Biopharmaceutical Labs, 720007286

# Acquity H-Class PLUS Bio vs. Acquity Premier:

*HIC (Hydrophobic Interaction Chromatography)*

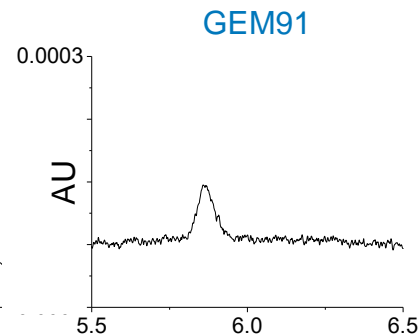
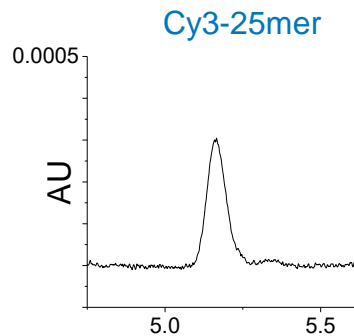
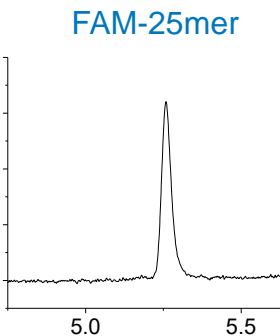
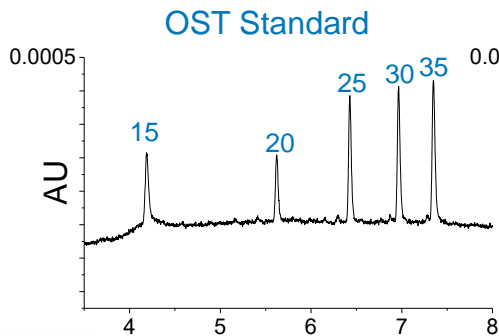


Evaluating the Waters ACQUITY Premier System as a Flexible LC Platform That Can Be Broadly Deployed in Biopharmaceutical Labs, 720007286

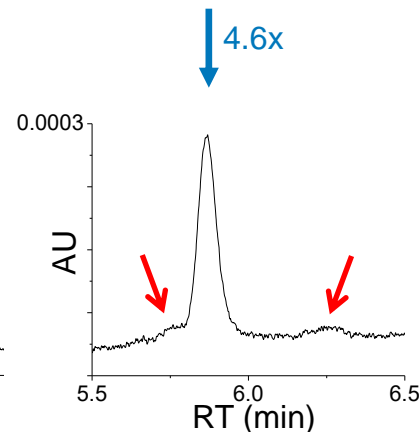
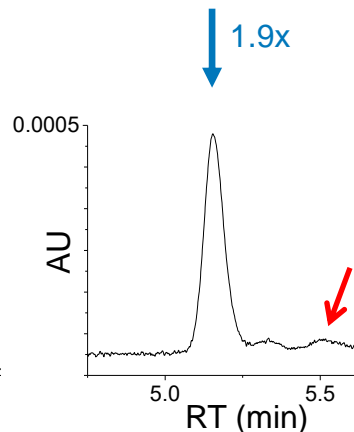
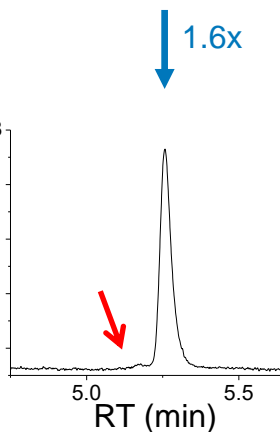
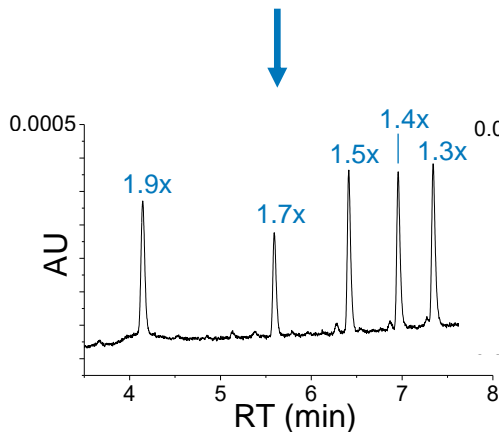


# Acquity H-Class PLUS Bio vs. Acquity Premier: *oligonukleotidy*

Stainless-Steel Column  
ACQUITY H-Class PLUS Bio



ACQUITY Premier Column  
ACQUITY Premier System



## Nejuniverzálnější platforma pro chromatografii

Výhody **HPS (High-Performance Surfaces)** od vialky, přes kolonu až po LC systém, bez nespecifických interakcí analyt/kovový povrch:



Arc™ PREMIER

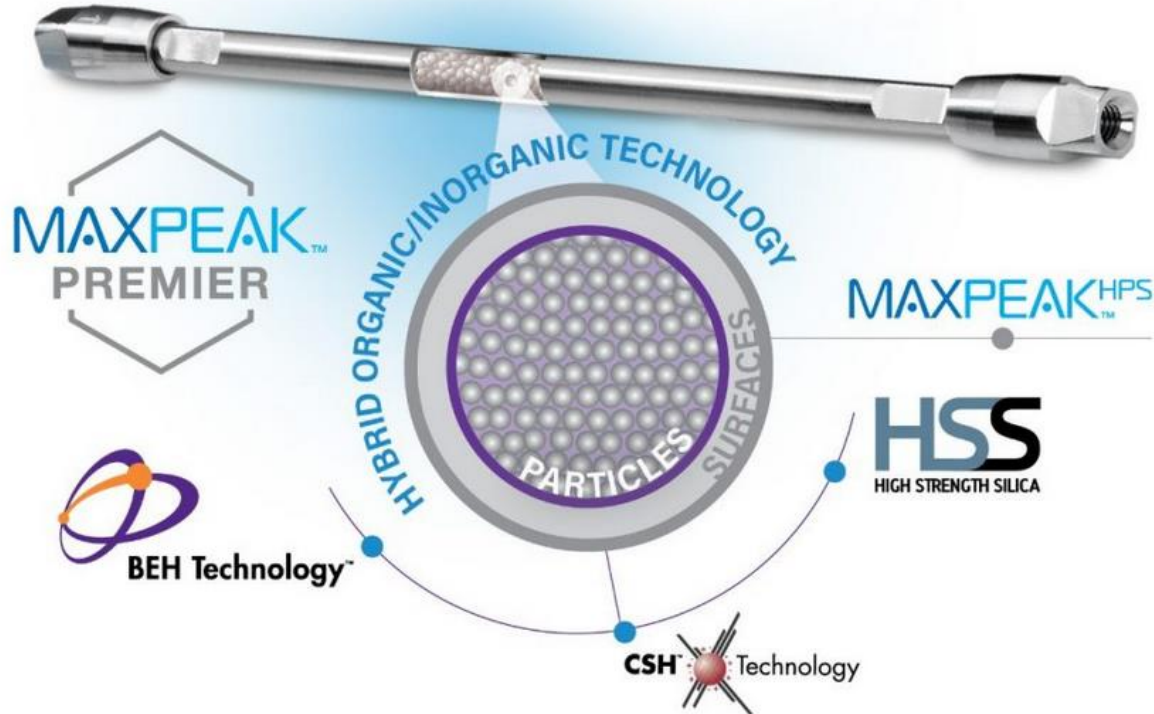
Acquity™ PREMIER

MAXPEAK™  
HIGH PERFORMANCE SURFACES



QuanRecovery™  
iMAXPEAK™

- Lepší **reprodukovatelnost a opakovatelnost**, konzistentní a spolehlivé výsledky
- Lepší **recovery** redukcí variability a ztrát způsobených interakcí s povrchy
- Rychlejší a přesnější **integrace chromatogramů**
- Menší **variabilita mezi systémy**
- **Snadnější a rychlejší** vývoj metod
- Bez **kondicionace**, zpracování více vzorků snadněji a rychleji
- Přímá náhrada BioLC systémů



Patents Pending

## Nyní dostupné



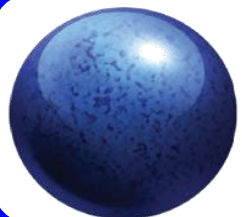
**BEH Technology**  
**Excelentní pH stabilita**  
Všestrannost co do použití  
mobilních fází a rozsahu teplot

Atlantis PREMIER BEH C18 AX  
ACQUITY PREMIER BEH C18  
ACQUITY PREMIER Peptide BEH 130Å C18  
ACQUITY PREMIER Peptide BEH 300Å C18  
ACQUITY PREMIER Oligonucleotide BEH  
130Å C18



**CSH Technology**  
**Vynikající „mas  
loading“**  
Excelentní tvar píků pro  
bazické analyty

ACQUITY PREMIER CSH C18  
ACQUITY PREMIER CSH Phenyl-Hexyl  
ACQUITY PREMIER Peptide CSH C18



**HSS Technology**  
**Maximální retence**  
Pro polární i nepolární  
molekuly

ACQUITY PREMIER HSS T3  
ACQUITY PREMIER Peptide HSS T3

# Aktualizovaný seznam moderních kolon

Doplňené označení MaxPeak PREMIER

Waters  
THE SCIENCE OF WHAT'S POSSIBLE.™

## WATERS COLUMNNS AND ANALYTICAL STANDARDS AND REAGENTS SELECTION GUIDE

Waters' comprehensive family of columns offer scientists a diverse range of selectivity and particle size choices that provide exceptional scalability within UPLC, UHPLC, HPLC, and preparative LC applications. In addition, Waters' growing family of QC Reference Materials and application-specific standards help users to effortlessly confirm column and system performance.

CORTECS UPLC, UHPLC, and HPLC Columns	Particle/Ligand	Ligand Density	Carbon Load	Endcapped	USP Class No.	pH Range	Temperature Limits	Surface Area	Performance Standards	Application Standards
<b>C<sub>18</sub>+</b> UPLC: 16 µm UHPLC: 2.7 µm HPLC: 27 µm		2.4 µmol/m <sup>2</sup>	5.7%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>C<sub>18</sub></b> UPLC: 16 µm UHPLC: 2.7 µm HPLC: 27 µm		2.7 µmol/m <sup>2</sup>	6.6%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>T3</b> UPLC: 16 µm UHPLC: 2.7 µm HPLC: 27 µm		1.6 µmol/m <sup>2</sup>	4.7%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>C<sub>8</sub></b> UPLC: 16 µm UHPLC: 2.7 µm HPLC: 27 µm		3.4 µmol/m <sup>2</sup>	4.5%	Yes	L7	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>Shield RP18</b> UPLC: 16 µm UHPLC: 2.7 µm HPLC: 27 µm		3.2 µmol/m <sup>2</sup>	6.4%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>Phenyl</b> UPLC: 16 µm UHPLC: 2.7 µm HPLC: 27 µm		3.2 µmol/m <sup>2</sup>	5.9%	Yes	L11	2-8	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>HILIC</b> UPLC: 16 µm UHPLC: 2.7 µm HPLC: 27 µm		N/A	Unbonded	No	L3	1-5	Low pH = 45 °C High pH = 45 °C	100 m <sup>2</sup> /g	HILIC QC Reference Material PIN: 18000226	HILIC QC Reference Material PIN: 18000226

ACQUITY UPLC and XBridge HPLC/UHPLC Columns	Particle/Ligand	Ligand Density	Carbon Load	Endcapped	USP Class No.	pH Range	Temperature Limits	Surface Area	Performance Standards	Application Standards
<b>BEH C<sub>18</sub></b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5, 10 µm		3.1 µmol/m <sup>2</sup>	10%	Yes	L1	1-12	Low pH = 10 °C High pH = 100 °C	105 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633

ACQUITY UPLC and XBridge HPLC/UHPLC Columns	Particle/Ligand	Ligand Density	Carbon Load	Endcapped	USP Class No.	pH Range	Temperature Limits	Surface Area	Performance Standards	Application Standards
<b>CSH C<sub>18</sub></b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5, 10 µm		2.3 µmol/m <sup>2</sup>	10%	Yes	L1	1-11	Low pH = 80 °C High pH = 45 °C	105 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>CSH Phenyl-Hexyl</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		2.3 µmol/m <sup>2</sup>	14%	Yes	L11	1-11	Low pH = 80 °C High pH = 45 °C	105 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>CSH Fluoro-Phenyl</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		2.3 µmol/m <sup>2</sup>	10%	No	L43	1-8	Low pH = 80 °C High pH = 45 °C	105 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>Peptide CSH C<sub>18</sub> 130 Å</b> UPLC: 1.7 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		2.3 µmol/m <sup>2</sup>	18%	Yes	L1	1-11	Low pH = 80 °C High pH = 45 °C	105 m <sup>2</sup> /g	Cytochrome c Digestion Standard PIN: 18000631	Peptide Retention Standard PIN: 18000655
<b>HSS C<sub>18</sub></b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		3.2 µmol/m <sup>2</sup>	10%	Yes	L1	1-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>HSS C<sub>18</sub> SB</b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		1.6 µmol/m <sup>2</sup>	8%	No	L1	2-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>HSS T3</b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		1.6 µmol/m <sup>2</sup>	11%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633
<b>Peptide HSS T3 100 Å</b> UPLC: 1.8 µm UHPLC: 2.5 µm XP HPLC: 3.5, 5 µm		1.6 µmol/m <sup>2</sup>	11%	Yes	L1	2-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Cytochrome c Digestion Standard PIN: 18000631	Peptide Retention Standard PIN: 18000655
<b>HSS PFP</b> UPLC: 1.8 µm		3.2 µmol/m <sup>2</sup>	7%	No	L43	2-8	Low pH = 45 °C High pH = 45 °C	230 m <sup>2</sup> /g	Neutrals QC Reference Material PIN: 18000630	Reversed-Phase QC Reference Material PIN: 18000633

# Komplexní řešení z Waters R&D

**MAXPEAK™**  
HIGH PERFORMANCE SURFACES



Vials & Plates

**QuanRecovery™**  
WITH MAXPEAK<sup>HPS</sup>

**Acquity™ PREMIER**

**Arc™ PREMIER**

COLUMNS AND SYSTEMS

with

**MAXPEAK™**  
HIGH PERFORMANCE SURFACES



# QuanRecovery™ WITH MAXPEAK™ HPS

QuanRecovery vialky a platíčka s označením  
MaxPeak High Performance Surfaces (HPS)

- Poprvé použito označení MaxPeak HPS
- Snižuje ztráty analytů v důsledku **nespecifických vazeb způsobených hydrofobními interakcemi**
- hydrofilní modifikace PP
- Lepší recovery, citlivost a opakovatelnost pro analýzy **biomolekul**



300 µL vial



700 µL 96-well plate

## MALÉ MOLEKULY (PHARMA)

PREMIER Standards to Investigate the Inertness of Chromatographic Surfaces

Advantages of using ACQUITY PREMIER UPLC for the bioanalysis of Gefitinib – an EGFR inhibitor

Demonstrating improved sensitivity and dynamic range with MaxPeak High Performance Surfaces (HPS) technology: a case study on the detection of nucleotides

Improvements in sensitivity for quantification of steroid phosphate drugs using ACQUITY Premier LC and MaxPeak HPS columns

Improving Drug Metabolite Identification in Biofluids with the ACQUITY PREMIER and Hybrid Organic Surface Technology: Increased Sensitivity and Reproducibility

## POTRAVINY

Enhancing the LC-MS/MS Analysis of B-group Vitamins with MaxPeak High Performance Surface Technology

Evaluation of HPS technology for the analysis of organic acids in fruit juices

ACQUITY Premier LC Technology Significantly Improves Sensitivity, Peak Shape and Recovery for Phosphorylated and Carboxylate Lipids

## BIOFARMAKA

Bypassing LC System Passivation Requirements Using ACQUITY PREMIER with MaxPeak HPS Technology for the Recovery of a Phosphorylated Peptide

Improved Bioanalysis of Phosphorothioated Oligonucleotide Therapeutics

Utilization of the ACQUITY PREMIER UPLC System & Column for Improved Oligonucleotide Bioanalytical Chromatographic Performance

## BIOMEDICÍNSKÝ VÝZKUM

Maximizing Phosphopeptide Recovery in LC/MS Studies with MaxPeak High Performance Surfaces Technology

Quantitation of TCA Cycle analytes in human plasma by LCMS and HPS Technology

ACQUITY Premier LC Technology Significantly Improves Sensitivity, Peak Shape and Recovery for Phosphorylated and Carboxylate Lipids

## FORENZNÍ ANALÝZA

Improved performance in sports doping with Premier Technology



# MaxPeak HPS komplexní řešení

## MaxPeak High Performance Surfaces

QuanRecovery™  
WITH MAXPEAK HPS™



Vialky & platíčka



R&D



Sub 2.0 µm



Acquity PREMIER

Vývoj / QC



2.5 µm



Arc PREMIER



Waters

THE SCIENCE OF WHAT'S POSSIBLE.™