

The Use of Zirconium Based HPLC Columns for Heterocyclic Amines Analysis

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Objectives

- Outline the chemistry, use and development of zirconium based HPLC columns
- Demonstrate the application of these columns for Nicotine product related substance analysis.

Methodology

Waters HPLC system with UV Detector
Mobile Phase used similar to current Stretch mobile phase
Column Temperature : 40 C° to 80 C°

Results

Columns can be used for heterocyclic amines degradation analysis

Run time significantly reduced
Greatly increased column life

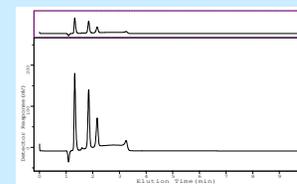
Column Information

Zirchrom – PBD, 3µm, 300 Å pore size
150 x 4.6 mm, Part # ZR 03-1546Serial # PBD111302U

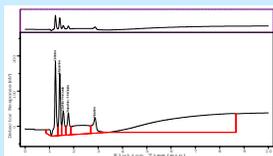
Chromatographic Parameters: ----
Flow rate: 1.5ml/min.
Wavelength: 260 nm Injection volume: 50 µl

Mobile phase preparation: ----
Using method C-1909.06 (85: 15: 3: 0.2 M Phosphate Buffer : Acetonitrile : TEA)

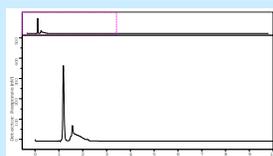
pH 4.8, Temp 70C ° Run Time: 10 min



pH 5.6, Temp 70C°, Run Time: 10min



pH 7.4, Temp 70C°, Run Time: 10min



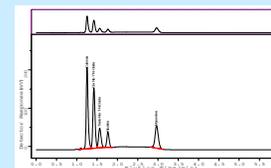
Column/Method Information

Zirchrom – PBD, 3µm, 300 Å pore size
150 x 4.6 mm,

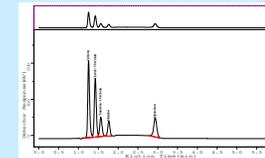
Chromatographic Parameters: ----
Flow rate: 1.5ml/min.
Wavelength: 260 nm injection volume: 50 µl

Mobile phase preparation: ----
Using method C-1909.06 (85: 15: 3: 0.2 M Phosphate Buffer : Acetonitrile : TEA)
PH 5.61, Run time: 6 minutes

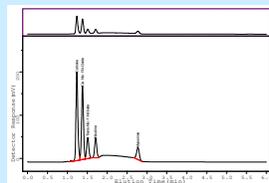
Temperature: 25C°
Resolution cis and trans = 1.34



Temperature: 30C°
Resolution cis and trans = 1.4



Temperature: 40C°
Resolution cis and trans = 1.4



Summary

Faster run time.
Good resolution of cis & tran compounds.
Greater versatility in method development.
Robustness of column makes methods more reliable

Conclusions

Improved method flexibility for operating temperature and mobile phase pH range.
Drastically reduced runtimes which can result in significant cost savings and faster turnaround time.

Conclusions:

Significant additional savings from increased column life.
Possible column life of more than 2000 injections.

Acknowledgements

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