

Liquid Chromatography

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Furanic Compounds Determination in HPLC

Introduction

The analysis of furanic compounds in transformer oil has gained significance in transformer life assessment as a potential alternative to depolymerisation degree determination of paper samples.

A certain correlation of depolymerised degree value of paper and furfural in oil was detected by several research groups.

However, there is relationship between furanic compounds in oil and remaining life time of transformer.

The content of furanic compounds in the oil depends on operation temperature, transformer design, type of oil and paper.

Potential Market

- Energy (e.g. Electrical plants, Power generation)
- Service labs (e.g. Preventive maintenance)

Recommended HPLC conditions

Analytical Column: PerkinElmer Aqueous C18, 3 µm particle size, length x I.D. 100 mm x 4.6 mm

Mobile phase: Water / Acn 85-15 (initial) gradient to 0-100 (final)

Flow: 1 mL/min @ 2020 psi

Column Temperature: 25 °C

UV/Vis Detector: 278 nm – 218 nm - 278 nm

Injection Volume: 10 µL

Total Run Time: 15 min

Suggested HPLC Flexar Instrument configuration

Flexar® Pump Binary pump

Flexar VD Vacuum degasser 3 channels

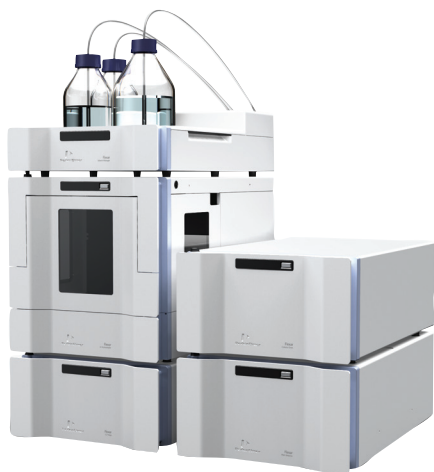
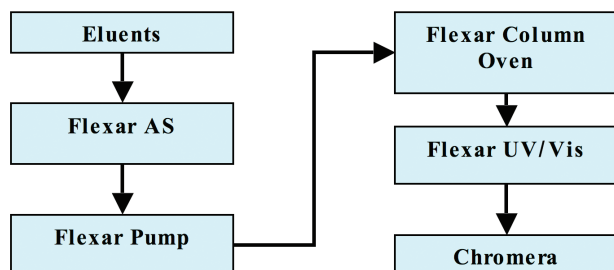
Flexar Autosampler Autosampler

Flexar Oven Column Oven

Flexar UV/Vis UV/Vis detector

Chromera® Chromatography Data System

Strategic HPLC configuration

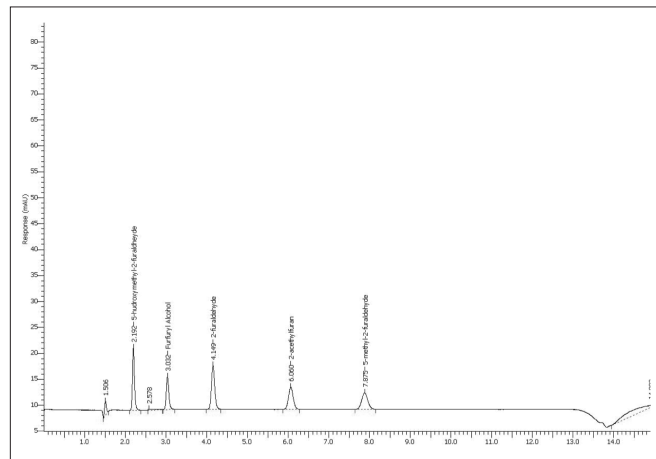


Results

Standard

Furanic Standard Solution with HPLC

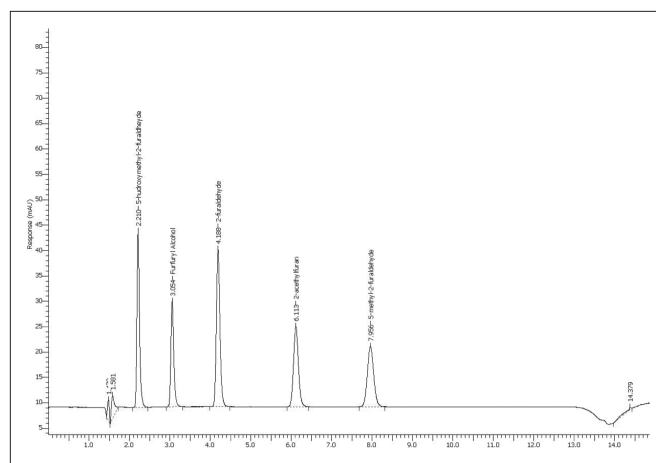
- 5 µL injected 50 ppm for each chemical, injected amount 5 ng/mL



Component Name	Retention time (min)
5-hydroxymethyl-2-furaldehyde	2.192
Furfuryl Alcohol	3.032
2-furaldehyde	4.149
2-acethylfuran	6.060
5-methyl-2-furaldehyde	7.875

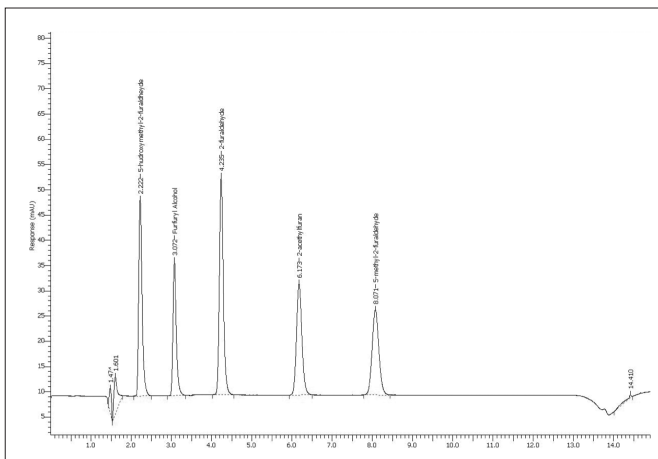
Furanic Standard Solution with HPLC

- 20 µL injected 50 ppm for each chemical, injected amount 20 ng/mL



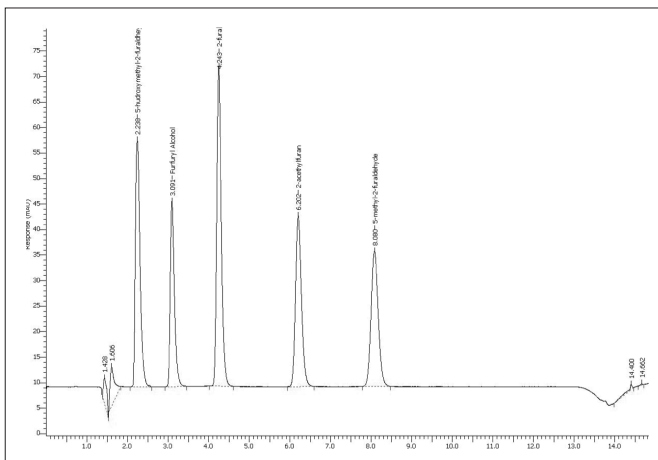
Furanic Standard Solution with HPLC

- 30 µL injected 50 ppm for each chemical, injected amount 30 ng/mL



Furanic Standard Solution with HPLC

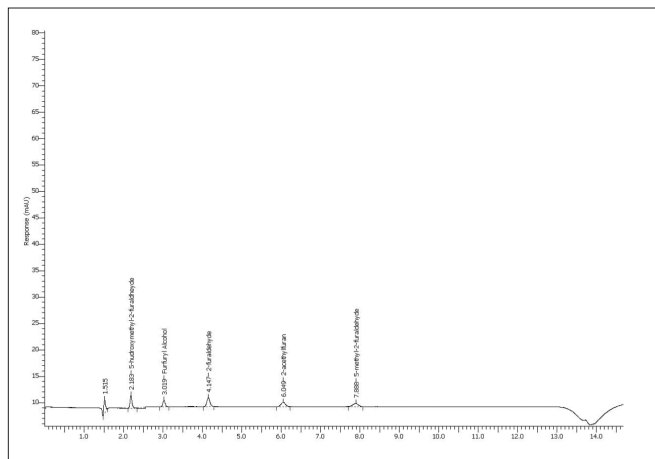
- 50 µL injected 1 ppm for each chemical, injected amount 50 ng/mL



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Furanic Standard Solution with HPLC

- 1 µL injected 1 ppm for each chemical, injected amount 1 ng/mL*



*This amount is used as method quantification limits

References

Reference Method: ASTM®: D 5837 – 99

Conclusions

The usage of Flexar HPLC provides several advantages:

- This method using Flexar HPLC allows running the analysis in less than 15 minutes
- Excellent peaks separation
- This method is compliant to ASTM® D 5837-99
- Very low detection limits
- This method can be easier transferred to Flexar UHPLC with a strong reduction in run time and solvent consumption

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