Exploring The Power Of Chromatographic Selectivity For Polar & Non-Polar Analytes With A Unique HPLC / UHPLC Polar Embedded Stationary Phase

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THE CHALLENGE

Engineer a new, unique HPLC / UHPLC phase with polar retention / resolution and alternative selectivity that is reproducibile, robust and gives efficient chromatography

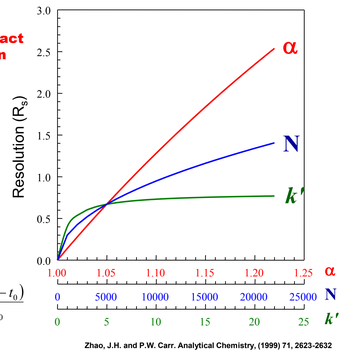
1. RESOLUTION, SELECTIVITY, EFFICIENCY & RETENTION

Selectivity Has The Biggest Impact On Increasing Peak Resolution

Efficiency | Selectivity | Retention

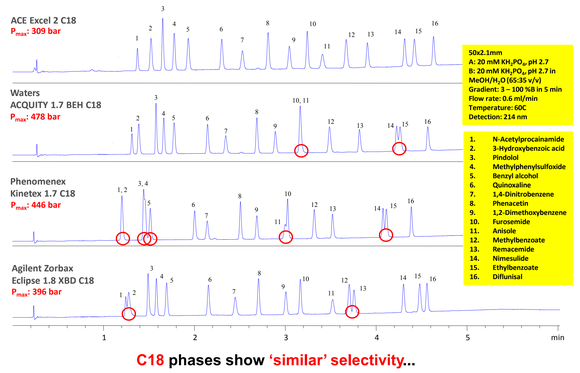
$$R_s = \frac{\sqrt{N}}{4} \cdot \frac{\alpha - 1}{\alpha} \cdot \frac{k'}{1+k'}$$

$$N = 5.54\left(\frac{t_r}{w_{0.5}}\right)^2 \qquad \alpha = \frac{k'_2}{k'_1} \qquad k' = \frac{(t_R - t_0)}{t_0}$$



Zhao, J.H. and P.W. Carr. Analytical Chemistry, (1999) 71, 2623-2632

2. C18 STATIONARY PHASES SHOW SIMILAR SELECTIVITY

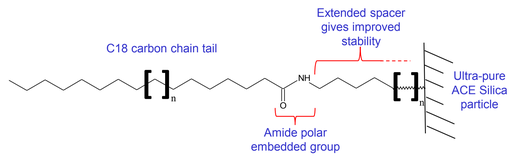


C18 phases show 'similar' selectivity...

All trademarks are recognised...comparative separations may not be representative of all applications

3. ACE® C18-Amide™: A NEW POLAR EMBEDDED PHASE OPTION

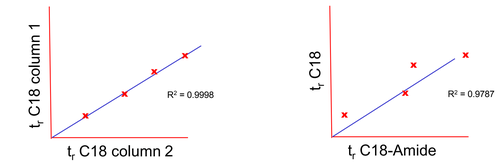
- **Uniquely designed ligand (USP L1 / L60)**
  - Maximise stability and multiple modes of interaction



- **Enhanced retention / resolution of polar acidic analytes**
  - Ideal for H-bond donor analytes: acids, amino, amides etc
- **Enhanced retention and resolution for phenolics**
  - Wine acids, green teas, hydroxylated / polar analytes etc
- **Usable in 100% aqueous eluents: no dewetting**

4. DETERMINING SELECTIVITY VALUES* FOR PHASES

Selectivity = 100 x √ (1 – R²)



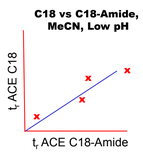
Selectivity = 100 x √ (1 – R²)
= 100 x √ (1 – 0.9998)
= ~ 1

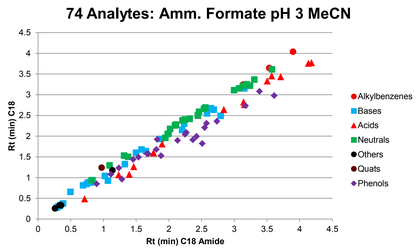
Selectivity = 100 x √ (1 – R²)
= 100 x √ (1 – 0.9787)
= ~ 15

Higher Selectivity values are better

* Neue, O'Gara, Méndez "Selectivity in Reversed-Phase Separations: Influence of the Stationary Phase", J. Chromatogr. A 1127 (2006), 161-174

5. ACE® C18-Amide™ EXCELLENT POLAR SELECTIVITY

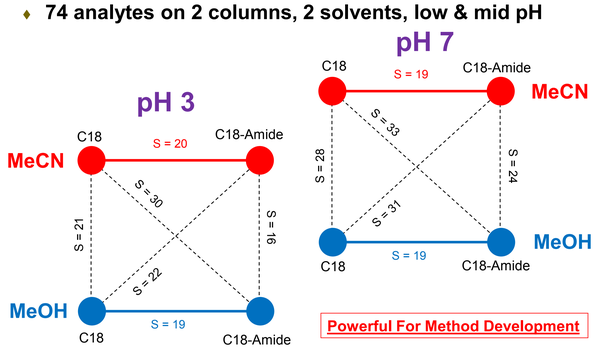




Selectivity = 20 → Powerful For Method Development

6. POLAR SELECTIVITY INCLUDING LOW & MID pH EFFECTS

- **74 analytes on 2 columns, 2 solvents, low & mid pH**

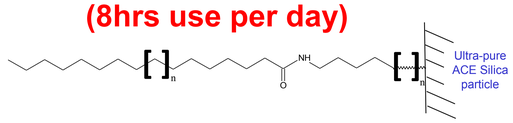


Powerful For Method Development

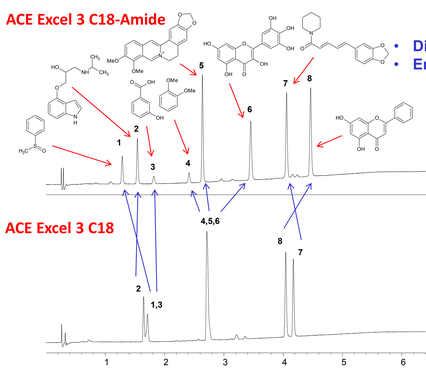
7. EMBEDDED PHASE STABILITY AT LOW & MID pH

- **Real time stability data collected on retention and efficiency (acidic, neutral, basic analytes):**
  - 20,000 column volumes @ 60C / pH 2.5 (phosphate)
  - 20,000 column volumes @ 60C / pH 7.0 (phosphate)

Equates to > 60 days of use
(8hrs use per day)

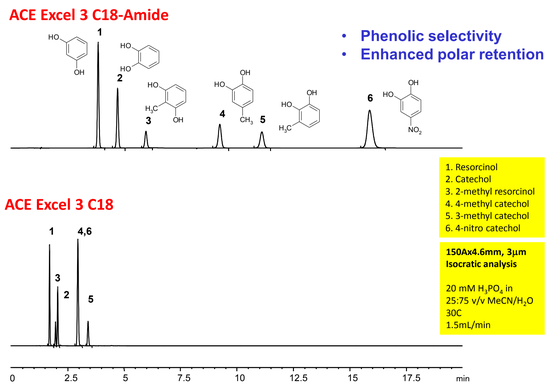


8. METHOD DEVELOPMENT: ALTERNATE POLAR SELECTIVITY



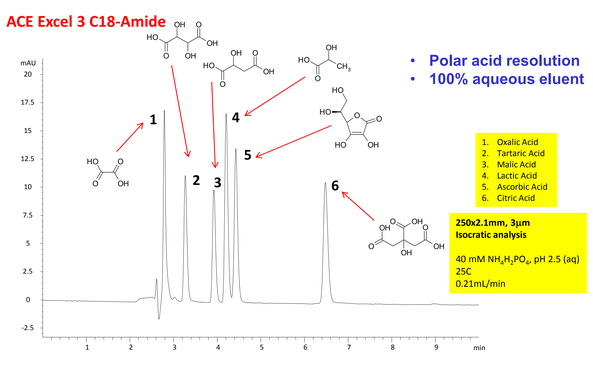
- Different elution order
- Enhanced resolution

9. SEPARATION OF CATECHOLS AND RESORCINOLS



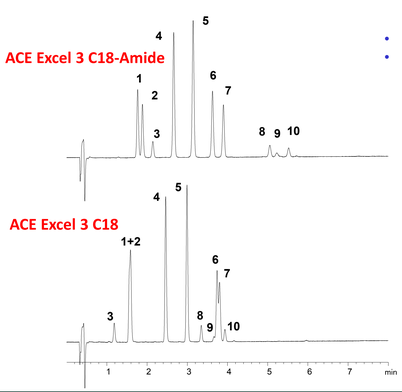
- Phenolic selectivity
- Enhanced polar retention

10. RAPID BEVERAGE ANALYSIS: WINE ACIDS – 100% AQUEOUS



- Polar acid resolution
- 100% aqueous eluent

11. PHARMACOPEIAL RELATED ANALYSES: STEROIDS



- Enhanced resolution
- Enhanced polar retention

12. SUMMARY AND CONCLUSIONS

- Separations of very polar to non polar species are achievable using the ACE® C18-Amide™.
- The ACE® C18-Amide™ provides alternative selectivity to C18 based phases which is ideal for method development or sample screening purposes. Further applications are available.
- The unique ligand design of the ACE® C18-Amide™ improves the hydrophobic retention mechanism contribution to separations whilst providing enhanced stationary phase stability.
- The ACE® C18-Amide™ provides chromatographers and method developers with an NEW selectivity option for mixtures containing very polar and / or non-polar analytes.

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