

Coupling capillary columns: an *in situ*, user-friendly method

Modern separation systems frequently use coupled-column setups. This is the case in advanced applications such as two dimensional gas chromatography (GC x GC), but also in more standard situations, such as the simple coupling of a pre-column or retention gap to the analytical column. Coupling capillary columns is considered a difficult task, frequently leading to couplings that do not perform optimally, and substantial down time.

Customer research by NLSIS Chromatography has shown that analysts are not satisfied with the existing coupling solutions. Current glass connectors are relatively easy to install, but are prone to leakage, especially at higher temperatures. They are

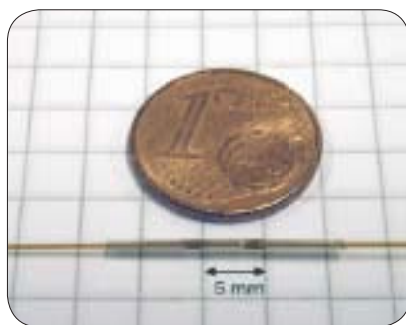


Figure 1. The glass tube connector.

cheap to purchase, but too often deliver unsatisfactory results. Metal connectors are difficult to install, inflexible in terms of possible column i.d.s and o.d.s, have a high risk of degradation, a high thermal mass and are expensive.



Figure 2. The Meltfit One.

Based on the above weaknesses of the current solutions, a breakthrough in coupling capillary columns, the Meltfit One, has been developed. This new solution, which allows reliable *in situ* connectors to be made in less than a minute,

solves a major problem for analysts who experience difficulties in establishing stable and solid connections. A small glass tube is carefully positioned around the columns to form a 'second skin' [Figure 1]. The Meltfit One [Figure 2] achieves this by melting the glass and adding pressure at the same time, a low cost connection solution that enables a much higher sample throughput. This is because the resulting connector is absolute leakproof, and there is no dead volume, adsorption, band broadening or thermal degradation. This was demonstrated by an extensive scientific test programme carried out at the University of Amsterdam to assess the performance of the Meltfit One.

■ The study

Standardised test methods as described in the literature were used. The Grob test was used to probe the inertness of the connections. This comprehensive column test procedure provides quantitative

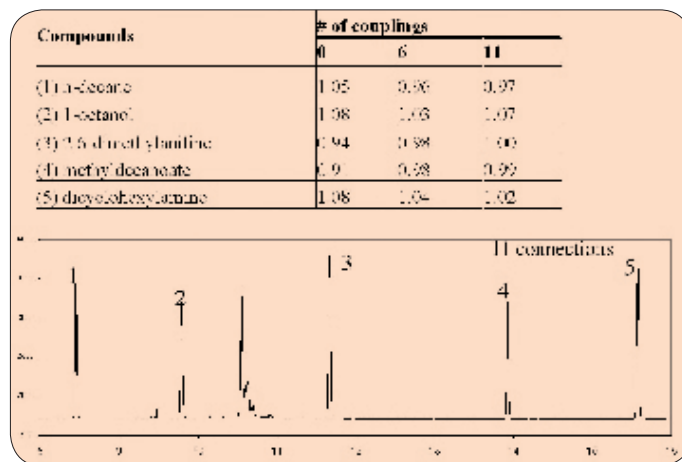


Figure 3. Results of the Grob adsorption test.



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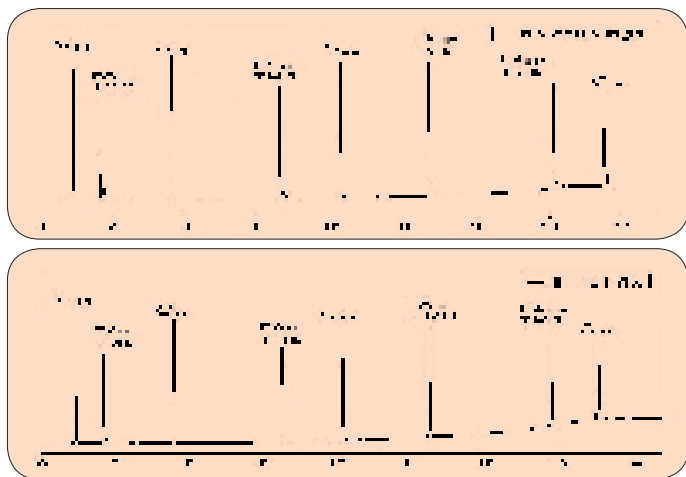


Figure 4. The Donike test showed that thermal degradation was similar with or without column coupling.

information about important aspects of column quality including adsorptive activity. The Grob test mixture contains several compounds which encompass acidic/basic and polar/apolar structures, and the test is performed under standardised conditions. Even with up to eleven column connections no adverse effects were found [Figure 3]. The Donike test was used to study thermal degradation behaviour, and an excellent performance was seen, comparable to that where no couplings were used [Figure 4]. Finally, dead-volume and band broadening were quantified from the band width and symmetry of methane. Even eleven connectors did not produce any significant effect when compared with controls without coupling. These results were presented at the tenth International symposium on Hyphenated Techniques that was held in Bruges, Belgium in February 2008 [<http://www.speciation.net/Public/Events/2006/06/07/2167.html>].

Although Pittcon was the first big trade show that NLISIS Chromatography has attended since the company was founded two years ago, the Melfit connector was the winner of the prestigious Pittcon 2008 Editors' Silver Award. The company's goal is to develop and launch products that make GC-technology easier to use, and to decrease the total cost of ownership through a faster and better performance. The award stimulated the company's research team to intensify their development efforts towards launching additional products that will help solve other problems encountered by chromatography analysts around the world.

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