Parallel Synthesis of Peptidic Dendrimers as Macromolecular Host for Selective Catalysis with the PSW1100

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General:
Peptide dendrimers are tree-like molecules that contain three different topological regions: the core, the branches and the surface (Figure 1). Each of these regions can exhibit functional properties.

Figure 1. Dendritic structure

Recently Reymond and co-workers reported that peptide dendrimers displaying multiple histidine residues at the surface exhibit a strong positive dendritic effect in ester hydrolysis reactions (Scheme 1). Their investigations have shown that the catalytic activity is proportional to the number of histidine at the surface of the dendrimer. In order to investigate the contribution of each region in the catalysis, new peptide dendrimers have to be synthesized. Therefore an automated synthesis approach for the peptide dendrimers becomes crucial.

Scheme 1. Ester hydrolysis reaction catalysed by peptide dendrimers

We report here the parallel, automated synthesis of 16 peptide dendrimers with the Chemspeed Multiple Peptide Synthesiser PSW1100 (Figure 2). During the synthesis of peptide dendrimers the loading is doubled after each coupling of the branching unit 2,3-diamino-propanoic acid.

One of the major challenges of this project was to adapt a variety of individual manual conditions to the requirement of automation suitable for a variety of different dendrimers.

Conclusion:
The PSW1100 offers a unique flexibility for the design of highly customised protocols. 16 peptide dendrimers (up to 80 possible) have been synthesized within 4 days, whereas manual synthesis allows only the synthesis of 2 per week.

References: