Double HPLC Productivity: Alternating Column Regeneration Techniques

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Introduction

PerkinElmer has designed, manufactured and supported a full line of HPLC instruments and accessories for the past 25 years. We have designed the Series 200 HPLC Systems for efficiency, durability, and productivity. Combining specific hardware characteristics with the addition of a Rheodyne® 2-position 10-port switching valve, we have added a new dimension to automation and high sample throughput, which can provide up to double the throughput productivity of a standard HPLC system. Alternating column regeneration can be utilized on a variety of detection applications and be automated using TotalChrom® Chromatography Data Systems, Analyst®, Xcalibur® and other software platforms.

Experimental

Alternating column regeneration accelerates the processes such as drug discovery, methods development and even routine analysis by eliminating the unproductive time of column equilibration (regeneration). Gradient elution is a common technique for fast separation of complex sample matrixes in LC and LC/MS. Since gradient elution requires the column to be regenerated between analyses, when conventionally performed, this is not time efficient. Utilizing the regeneration techniques, after injection of a sample on column 1 while the data system is collecting the data, a regeneration pump flushes or back-flushes an identical column 2. At the end of the analysis, the 2-position 10-port valve switches and the regenerated, equilibrated column is ready for the next sample injection. Column 1 is then regenerated/equilibrated using the regeneration pump.

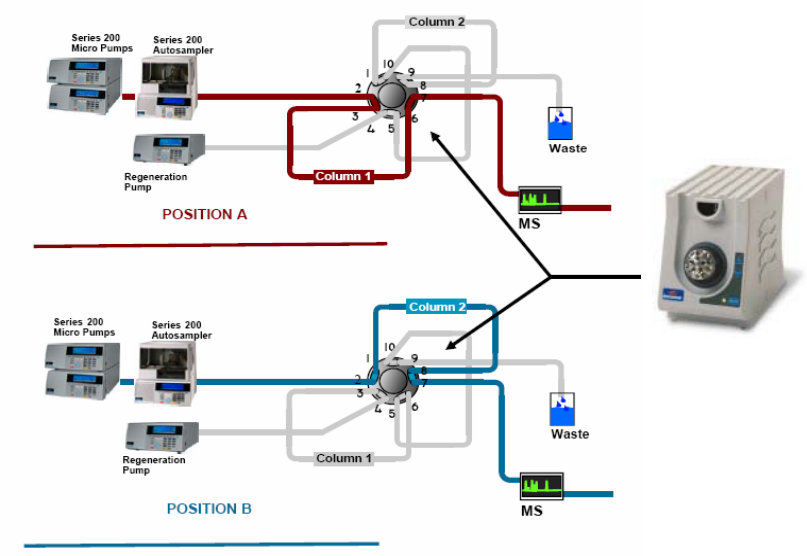

Figure 1. The HPLC hardware setup with the Rheodyne®, selector valve, (reprinted with permission).

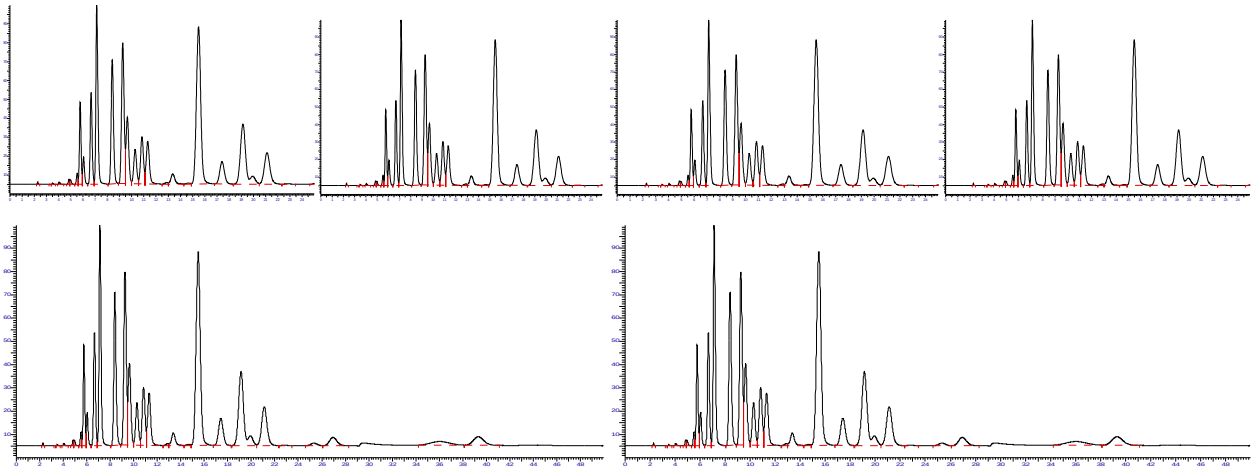

Figure 2. A fully optimized analysis where analysis and equilibration times are equal, providing for a 2X throughput enhancement.

Other factors to improve sample throughput:

- Series 200 Autosampler – fast direct drive, XY based, for up to 3 injections/minute
- Autosampler cleanup is programmable to occur between injections for no lost time
- Internal/external needle wash provides carryover of <0.02%
- Very low pump delay of the Series 200 Micro Pumps permits fast gradient and faster equilibration times

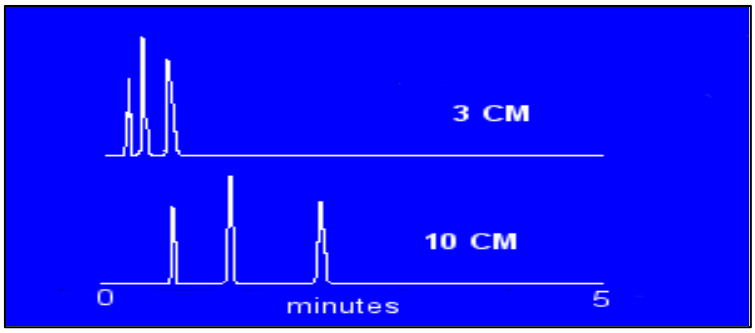

Figure 3. Short, small particle columns permit reduced separation times and reduced equilibration.

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