

## **Evaluation of Chromatography using Sub Two Micron Particles for Fast Pharmaceutical Analysis - What Are the Real Benefits?**

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Sub-two micron particles have many advantages over conventional 3.5 and 5 micron particles, making them an attractive packing material for liquid chromatography (LC) columns. Some of these advantages include higher efficiency, higher optimum linear velocities, and less band broadening at higher linear velocities. When using smaller particles the pressure requirement dramatically increases and in the past two years manufacturers have developed a new generation of LC instrumentation that can accommodate the pressure demands of sub-two micron particles.

One area that has generated significant interest is fast separations using sub-two micron particles. Due to the increased efficiency of these particles, an equivalent separation can be performed in a fraction of the time by reducing the column length when compared to a separation obtained on a column packed with larger particles. With sub-two micron particles, separation times can be further decreased, without losing significant efficiency, by moving to higher linear velocities. In line with theory, separations that are five to seven times faster than those on a conventional LC will be shown.

Fast separations can be advantageous in numerous areas including increased throughput of samples, decreased method development times, and decreased solvent consumption. However the application of sub-two micron particles to fast pharmaceutical separations has challenges that need to be considered. One issue is that with the possibility of sub-one minute run times the injection time of the instrument can become a limiting factor in the overall cycle time. Another problem that can occur is extra column broadening caused by detectors, divert valves, or PEEK tubing. Due to the low peak volume and the reduced bore size of the column, even small increases in the extra column volume can reduce the efficiency of the separation.