C18-bound partially sub-1µm porous silica monolith particles as low cost HPLC-stationary phase of excellent chromatographic performance and fast HPLC analysis

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Miniaturized partially sub-1µm porous silica monolith particles with large pore size, exhibiting excellent chromatographic performance have been synthesized in a relatively large scale by an elaborated sol-gel procedure. The resultant silica monolith particles were chemically modified with chloro-dimethyl-octadecylsilane (C18), and end-capped with a mixture of hexamethyldisilazane and chlorotrimethylsilane. Very good separation efficiency (185,000/m) and resolution (6.05) were achieved when the C18-bound phase was evaluated for a test mixture of five benzene derivatives after packing in a stainless steel column (1.8 mm × 150 mm). The optimized elution conditions were found to be 70/30 (v/v) acetonitrile/water with 0.1% TFA at a flow rate of 25 µL/min. The column was also evaluated for fast HPLC analysis using a flow rate of 100 µL/min where all the five analytes were eluted in three minutes with still reasonable efficiency (Ca. 96000/m) and excellent resolution within the pressure limit of conventional HPLC. The strategy of particle size reduction combined with C18 modification along with large pores and monolithic architecture has resulted in a useful stationary phase (C18-bound silica monolith particles) of low production cost showing excellent chromatographic performance capable of fast HPLC analysis.

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