

Rapid LC Analysis of Naproxen Using SPP Column Technology

Introduction

Naproxen is a nonsteroidal anti-inflammatory drugs (NSAIDs) used to treat certain types of arthritis and other acute inflammatory conditions.¹ It was first released to the prescription drug market in 1976

under the name Naprosyn. Then a few years later its counterpart salt, naproxen sodium, was released for prescription use and is used predominately in formulations today.

The HPLC analysis of Naproxen on a porous silica C18 column is well documented in the literature. However, with the current trend in liquid chromatography being towards higher kinetic efficiency and shorter analysis time the subsequent development in column technology has realised that, without the need to change instrumentation. This application brief will illustrate the application of a superficially porous particles (SPP) column for the analysis of naproxen, Figure 1.

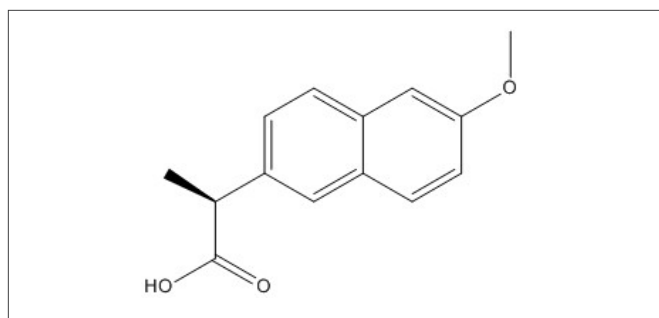


Figure 1. Chemical structure of Naproxen.

Experimental Conditions

Method Parameters

All HPLC method parameters are shown in Table 1.

Table 1. HPLC Method Parameters.

Quasar SPP C18	100 mm	4.6 mm	5 μm	N9308957
Mobile Phase	A: 25 mM NH_4OAc B: CAN 20-80% B in 10 minutes			
Flow Rate	1.5 mL/min			
Temp	25 $^{\circ}\text{C}$			
Wavelength	230 nm			
Injection Volume	5 μl			
Analyte	Naproxen			

Solvents and Samples

All solvents were HPLC grade and samples were filtered using a 0.45 μm nylon filter, P/N 02542880.

Results and Discussion

With the development and certification for medical use of naproxen being completed several decades ago, initial analytical methods used traditional porous silica C18 columns. Well documented in the literature, analysis of Naproxen with a typical retention time of between 6-8 minutes.

Superficially porous particles, SPP (also called: shell, fused-core™, core-shell™, partially porous, pellicular) are made of a solid, non-porous core surrounded by a shell of a porous material that has properties similar to those of the fully porous materials conventionally used in HPLC. The terminology of “fused-core” was introduced by Jack Kirkland. As the name implies, fused-core particles are manufactured by “fusing” a porous silica layer onto a solid silica particle (Figure 2). Such phases can be used on standard HPLC instrumentation, without worrying about high backpressure or compromising column longevity.

With a shorter diffusion path with the SPP particle itself, coupled with a uniform packed bed and ultra-inert silica surface, reductions in run times can be realised. The run time for Naproxen using the Quasar SPP C18 column is now under 4 minutes, Figure 3. Excellent peak symmetry of naproxen is also observed, as the ultra-high purity based phase minimised unwanted secondary silanol interactions.

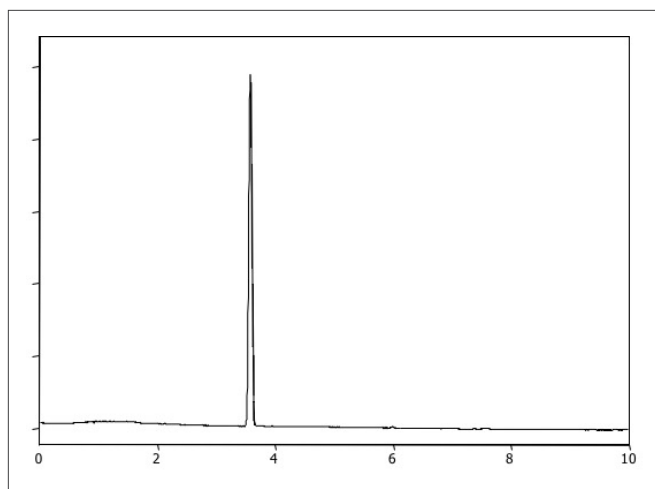


Figure 3. HPLC Analysis of Naproxen.

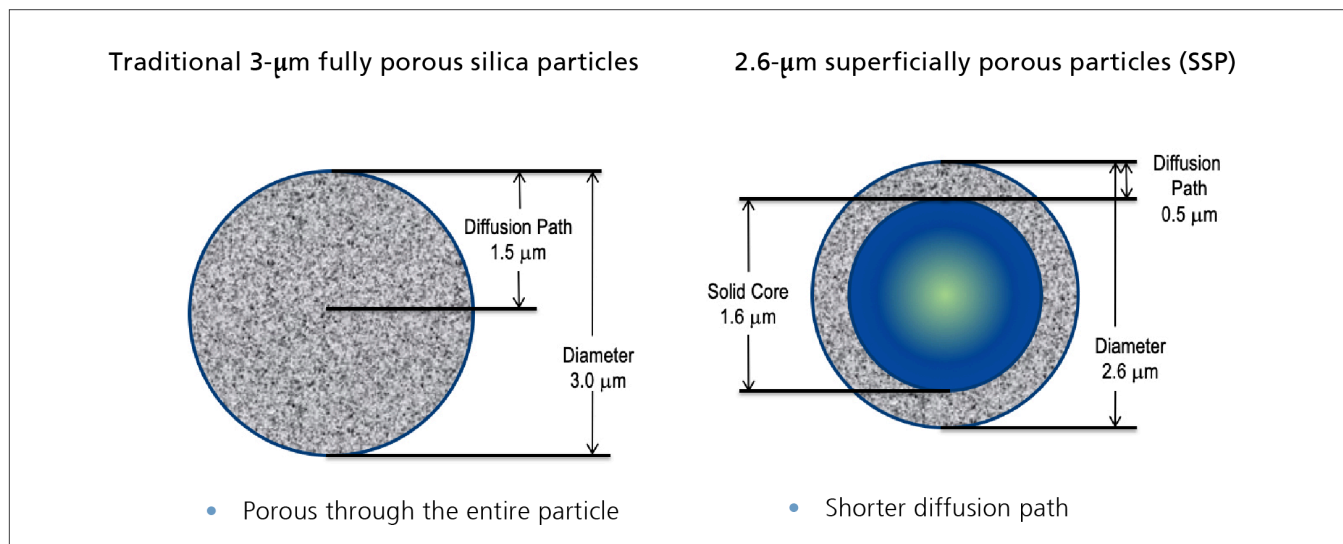


Figure 2. Schematic of porous silica particles and SPP particles.

Conclusion

- The Quasar SPP C18 HPLC phase offers high efficiency separation of this anti-inflammatory drug.
- The ultra-high purity silica base and low residual silanol activity yields excellent peak shape even for analytes containing polar entities, such as naproxen.
- With a solid core and outer porous silica layer you can realise up to a 50% improvement in cost and efficiency over traditional porous silica columns.

References

1. "Naproxen Monograph for Professionals". Drugs.com. AHFS. Retrieved December 19, 2018
2. http://www.iosrphr.org/papers/v2i4/Part_3/D0241924.pdf

Consumables

	Part Number
Nylon filters	02542880

Phase	Length (mm)	I.D. (mm)	µm	Part
Quasar SPP C18	150	4.6	2.6	N9308910
Quasar SPP C18	100	4.6	2.6	N9308911
Quasar SPP C18	50	4.6	2.6	N9308912
Quasar SPP C18	150	3	2.6	N9308913
Quasar SPP C18	100	3	2.6	N9308914
Quasar SPP C18	50	3	2.6	N9308915
Quasar SPP C18	150	2.1	2.6	N9308916
Quasar SPP C18	100	2.1	2.6	N9308917
Quasar SPP C18	50	2.1	2.6	N9308918
Quasar SPP C18	250	4.6	5	N9308955
Quasar SPP C18	150	4.6	5	N9308956
Quasar SPP C18	100	4.6	5	N9308957
Quasar SPP C18	50	4.6	5	N9308958
Quasar SSP C18 Guard Cartridge (3/pack)	10	3	2.6	N9308992
Quasar SSP C18 Guard Cartridge (3/pack)	10	3	5	N9308993
Quasar Guard Cartridge Holder	-	-	-	N9306876
Quasar SPP C18 Method Validation Kit, 150 x 4.6mm (3 Columns Each From a Different Batch)	150	4.6	2.6	N9300942
Quasar SPP C18 Method Validation Kit, 100 x 3.0 mm (3 Columns Each From a Different Batch)	100	3	2.6	N9300943