

Effective Separation of Sulfa Drugs using Quasar C18 HPLC

Introduction

Sulfa drugs are accredited as the first set of compounds to exhibit antibiotic properties used to prevent bacterial infections in humans. The first sulfonamide, trade named Prontosil, was developed by Bayer in 1932.¹ The subsequent years saw rapid

development of antibacterial drugs and by the 1940's sulfanilamide was widely used. Though the medicine was relatively safe, allergic reactions such as skin rashes, fever and nausea were common place. With the introduction of less-toxic derivatives and especially with the mass production of penicillin, its use declined.

These short acting synthetic sulfa drugs are effective against a wide range of pathogenic microorganisms and are now commonly used in veterinary medicine.² Sulfathiazole administered to cattle in combination with penicillin and chlortetracycline has been shown to yield higher rates of weight gain and improved feed efficiency.³

This application brief illustrates the efficient separation of three sulfa drugs, Figure 1, using the Quasar C18 HPLC column.

Experimental Conditions

Method Parameters

All HPLC method parameters are shown in Table 1.

Table 1. HPLC Method Parameters.

Quasar C18	150 mm	4.6 mm	5 µm	N9308802
Mobile Phase	H ₂ O 0.1% formic acid: MeOH, 70:30			
Flow Rate	1 mL/min			
Temp	20 °C			
Wavelength	254 nm			
Injection Vol.	5 µl			
Analyte	1. Sulfathiazole 2. Sulfamerazine 3. Sulfamethoxazole			

Solvents and Samples

All solvents were HPLC grade and samples were filtered using a 0.45 µm nylon filter.

Results and Discussion

The sulfa drugs illustrated in Figure 1, are successfully analysed in just under 10 minutes using the Quasar C18 column, 150 mm in length, Figure 2. Ideally suited to the analysis of small molecules, such as these antibiotics, the Quasar C18 phase has been developed employing an optimised ligand bonding process to provide exceptional surface coverage. The resulting high column efficiency provides increased resolving power and consequently the structurally similar compounds are separated with greater than baseline resolution.

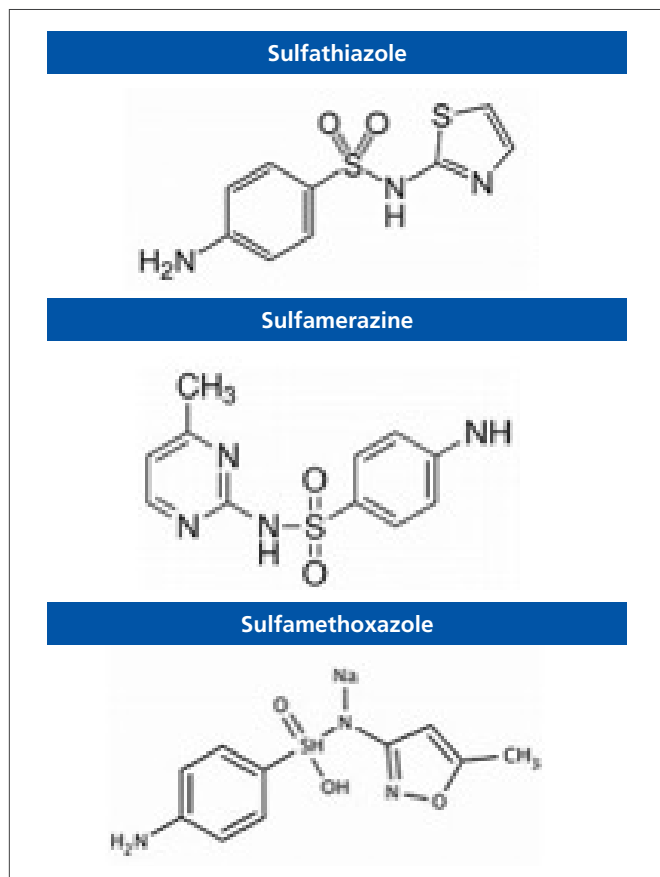


Figure 1. Chemical Structures of Sulfathiazole, Sulfamerazine and Sulfamethoxazole.

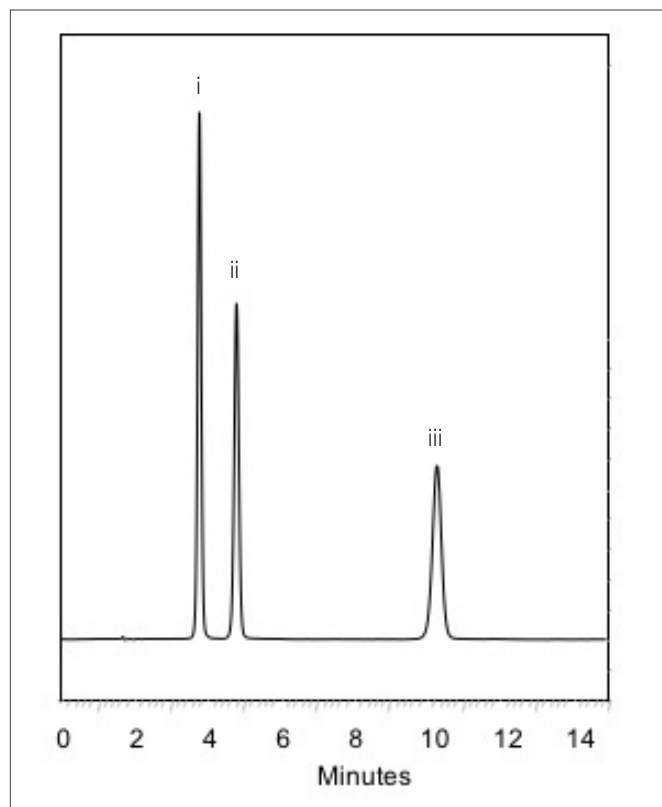


Figure 2. HPLC Analysis of, (i) Sulfathiazole, (ii) Sulfamerazine, (iii) Sulfamethoxazole.

Conclusion

- The Quasar C18 HPLC phase offers high efficiency separation of these early antibiotic compounds.
- The ultra-high purity silica base and low residual silanol activity yields excellent peak shape even for basic analytes, such as these sulfa drugs.
- Developed employing an optimised ligand bonding process, the Quasar C18 phase provides exceptional surface coverage. The resulting high column efficiency provides increased resolving power to separate structurally similar compounds.
- Run time could be further reduced by switching to UHPLC and using a shorter Quasar C18 column, packed with 1.7 µm particles.

References

1. Oxford Handbook of Infectious Diseases and Microbiology. OUP Oxford. 2009. p. 56. ISBN 9780191039621.
2. Bernd Mertschen, Ferdinand Beck, Wolfgang Bauer (2002). "Thiourea and Thiourea Derivatives". Ullmann's Encyclopedia of Industrial Chemistry. Wiley-VCH. doi:10.1002/14356007.a26_803.
3. Sulfathiazole (WHO Food Additives Series 25) <http://www.inchem.org/documents/jecfa/jecmono/v25je07.htm>

Consumables

Phase	Length (mm)	I.D. (mm)	µm	Part
Quasar C18	300	3.9	5	N9308800
Quasar C18	250	4.6	5	N9308801
Quasar C18	150	4.6	5	N9308802
Quasar C18	100	4.6	5	N9308803
Quasar C18	50	4.6	5	N9308804
Quasar C18	150	4.6	3	N9308805
Quasar C18	100	4.6	3	N9308806
Quasar C18	50	4.6	3	N9308807
Quasar C18	150	3.0	3	N9308808
Quasar C18	100	3.0	3	N9308809
Quasar C18	50	3.0	3	N9308810
Quasar C18	150	2.1	3	N9308811
Quasar C18	100	2.1	3	N9308812
Quasar C18	50	2.1	3	N9308813
Quasar C18	100	4.6	1.7	N9308814
Quasar C18	50	4.6	1.7	N9308815
Quasar C18	100	3.0	1.7	N9308816
Quasar C18	50	3.0	1.7	N9308817
Quasar C18	100	2.1	1.7	N9308818
Quasar C18	50	2.1	1.7	N9308819

Phase	Length (mm)	I.D. (mm)	µm	Part
Quasar C18 Guard Cartridge (3/Pack)	10	3	5	N9308980
Quasar C18 Guard Cartridge (3/Pack)	10	3	3	N9308981
Quasar Guard Cartridge Holder	-	-	-	N9306876
Quasar C18 Method Validation Kit, 250 x 4.6 mm (3 Columns Each From a Different Batch)	250	4.6	5	N9300940
Quasar C18 Method Validation Kit, 150 x 4.6 mm (3 Columns Each From a Different Batch)	150	4.6	5	N9300941

	Part Number
Nylon filters	02542880

PerkinElmer, Inc.
940 Winter Street
Waltham, MA 02451 USA
P: (800) 762-4000 or
(+1) 203-925-4602
www.perkinelmer.com



For a complete listing of our global offices, visit www.perkinelmer.com/ContactUs

Copyright ©2019, PerkinElmer, Inc. All rights reserved. PerkinElmer® is a registered trademark of PerkinElmer, Inc. All other trademarks are the property of their respective owners.