

Liquid Chromatography

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HPLC Analysis of Paracetamol Using a Quasar C8 Column Based on the United States Pharmacopeia Monograph

comparison with other analgesics such as aspirin) go towards explaining why it is so widely used. Paracetamol has generic status with many manufacturers making it a commercially important compound. Despite being so widely used the mechanism of action of paracetamol is not fully known. It has been shown to interact with same enzymes as non-steroidal anti-inflammatory drugs, but exclusively in the central nervous system as oppose to the periphery.²

This application brief describes the use of a Quasar C8 for the analysis of paracetamol (Figure 1) adapted from the official USP monograph.³

Paracetamol, also known as acetaminophen, is an analgesic/antipyretic drug, that reduces fever and pain and is ubiquitous in treating these symptoms.¹ Providing relief for these common symptoms combined with the fact that paracetamol is very well tolerated (in

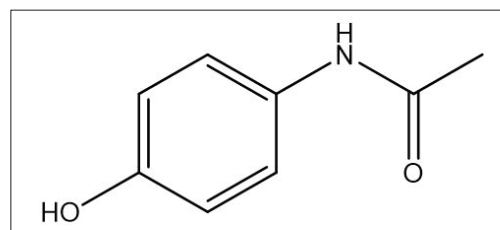


Figure 1. Structure of paracetamol.

Experimental Conditions

Method Parameters

All HPLC method parameters are shown in Table 1.

Table 1. HPLC method parameters for analysis.

Instrument	PerkinElmer Flexar™ with PDA Plus™ Detector			
Quasar C8	100 mm	4.6 mm	3 µm	N9308884
Mobile Phase	A: Buffer (12.5 mM Monobasic Potassium Phosphate, 12.7 mM Dibasic Sodium Phosphate) B: Methanol			
Gradient Profile	Time (min)	Buffer (%)	Methanol (%)	
	0.0	99	1	
	3.0	99	1	
	7.0	19	81	
	7.1	99	1	
10.0	99	1		
Flow Rate	1.0 mL/min			
Temp	35 °C			
Wavelength	230 nm			
Injection Volume (Fully Porous)	5 µL			
Analyte	Paracetamol			

Solvents and Samples

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

A standard solution was prepared in methanol using paracetamol (0.1 mg/mL). The mobile phase buffer solution was prepared by dissolving 1.7 g of monobasic potassium phosphate and 1.8 g of anhydrous dibasic sodium phosphate in 1000 ml of water.

Results and Discussion

Paracetamol has been successfully analyzed in 10 minutes using a Quasar C8 (100 x 4.6 mm, 3.0 µm) column (P/N: N9308884) as demonstrated in Figure 2. The Quasar C8 is ideally suited to the analysis of paracetamol, due to the reduced hydrophobicity of the stationary phase in contrast with a C18 column. The excellent peak shape is a result of the optimized ligand bonding technology and ultra-high purity silica base, which minimizes unwanted silanol interactions.

The tailing factor of the peak was measured at 5% peak height and gave a value of 1.0 demonstrating exceptional peak symmetry. In order to provide a suitable measure of repeatability, the RSD of the peak areas of five replicate injections was calculated. The resultant RSD was 0.14% which demonstrates an excellent level of repeatability.

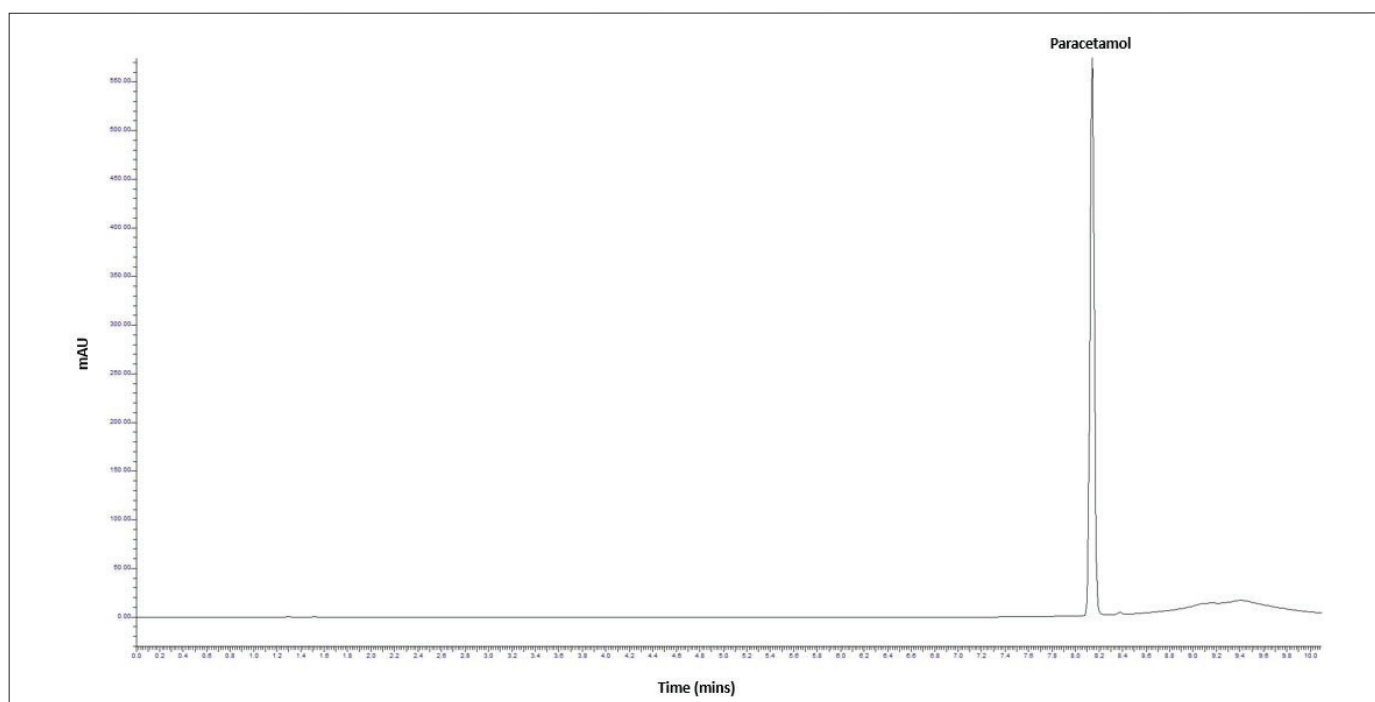


Figure 2. Analysis of paracetamol using a Quasar C8 column (100 x 4.6 mm, 3.0 µm).

Conclusion

- The Quasar C8 (100 x 4.6 mm, 3.0 µm) LC column offers a repeatable and efficient separation of paracetamol.
- The tailing factor and RSD values demonstrate excellent peak shape and repeatability.
- The ultra-high purity silica base and low residual silanol activity yields excellent peak shape.

References

1. S. D. Salhanick in *Essentials of Emergency Medicine*, ed. R. V. Aghababian, Jones and Bartlett Learning, Ontario, Canada, 2011.
2. C. I. Ghanem, J. P. Maria, J. E. Manautou, A. D. Mottino, *Pharmacological Research*, 2016, 109, 119-131.
3. Paracetamol USP monograph, https://online.uspnf.com/uspnf/document/1_GUID-33AD0880-7404-4169-BDD5-F74D808EE77F_3_en-US?source=Quick%20Search&highlight=acetaminophen, (accessed 27/02/2020).

Consumables

Component	Description	Part Number
Columns	Quasar C8 (100 x 4.6 mm, 3.0 µm)	N9308884
HPLC Vials	2 mL Amber 9 mm Screw Top Vial With Write-on Patch and Fill Lines (100/pack)	N9307802
HPLC Vial Caps	9 mm Screw Top Blue (Polypropylene) Cap with PTFE/Silicone Pre-slit Septa (100/pack)	N9306203
Syringes	Syringe 1 mL BD Luer-Lok Disposable, Pack of 100	02542890
Syringe Filters	0.45 µm Nylon Filter	02542880
PEEK Fittings	Finger-tight for 1/16" OD PEEK Tubing	09920513