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アプリケーションノート

XBridge Prep Columns: Scalability and Loadability for Preparative Separations

Fang Xia, Jie Y. Cavanaugh, Diane M. Diehl

Waters Corporation

Abstract

This application note details about the efficiency of XBridge Prep Columns.

Benefits

BEH Technology, the second generation of patented organic–inorganic hybrid particle technology (HPT), is the new benchmark for HPLC columns. Waters XBridge Prep Columns reach a new level of maximum loadability and direct scalability.

Introduction

XBridge Columns were designed to be the most pH-stable phases commercially available, while still providing maximum efficiency, peak shape, and robustness. For method development consideration, we offer C_{18}, C_8, phenyl and RP_{18} chemistries, available 2.5, 3.5, and 5 µm particle sizes and dimensions from analytical to prep. XBridge Prep Columns are manufactured with the patent pending Optimum Bed Density (OBD) design, which helps us to achieve direct scale-up from analytical to preparative columns, with the same efficiency and excellent column lifetimes.

Experimental

Scalability

Columns:	XBridge C_{18} 5 µm 4.6 x 100 mm; XBridge Prep C_{18} 5 µm 19 x 100 mm
Mobile phase A:	10 mM ammonium bicarbonate buffer at pH 10
Mobile phase B:	Acetonitrile/100 mM ammonium bicarbonate buffer, pH 10 (90/10)
Flow rate:	1.06 mL/min (analytical); 18 mL/min (preparative)
Gradient:	10-min linear from 5% to 95% B
Injection volume:	30 µL (analytical); 510 µL (preparative)

Sample:	Econazole and miconazole in DMSO (100 mg/mL each)
Instrument:	Waters AutoPurification System

Loadability

Columns:	XBridge Prep C_{18} 5 µm 19 x 50 mm
Mobile phase A:	0.1% diethylamine in water
Mobile phase B:	0.1% diethylamine in acetonitrile
Flow rate:	23.9 mL/min
Gradient:	8-min linear from 5% to 95% B
Injection volume:	660 µL
Sample:	Labetolol (50 mg/mL), quinine (50 mg/mL), diltiazem (50 mg/mL), verapamil (100 mg/mL) and amitriptyline (50 mg/mL) in DMSO
Instrument:	Waters AutoPurification System

Results and Discussion

The retention and separation of two antifungal drugs on the analytical XBridge C_{18} Column is shown in Figure 1A. Under the total load of 6 mg, we observe very symmetric peaks. The mass load was proportionally scaled-up and run on the preparative XBridge Prep C_{18} Column, as shown in Figure 1B. Note the direct scale up, excellent peak shapes, and total mass load of 102 mg.

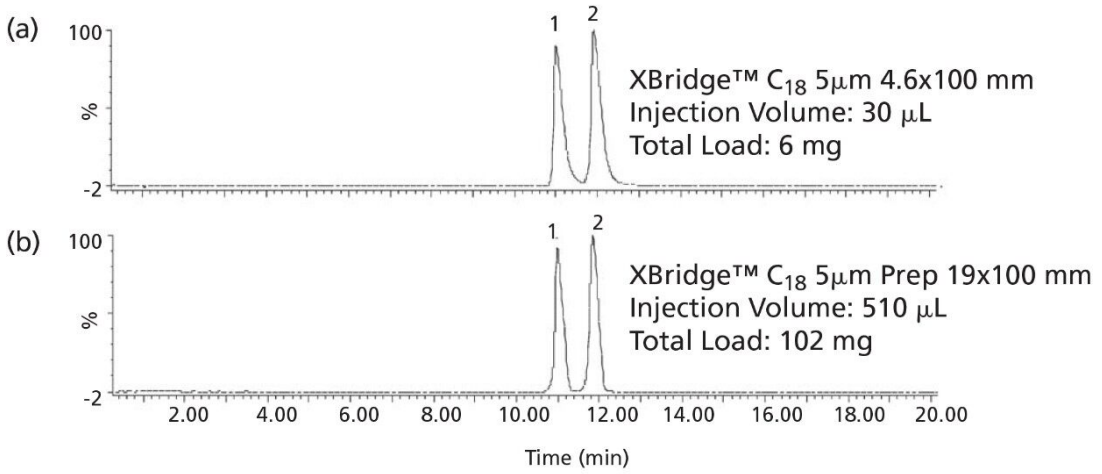

Figure 1. Scale-up of a critical pair of antifungal drugs from analytical to preparative XBridge columns. (A) XBridge C_{18}, 5 µm 4.6 x 100 mm. (B) XBridge Prep C_{18} 5 µm 19 x 100 mm. Analytes: (1) econazole, (2) miconazole.

The separation and loadability of five basic analytes on XBridge Prep C_{18} Column under high pH mobile phase conditions is shown in Figure 2. We successfully loaded 198 mg of bases on a 19 x 50 mm column without sacrificing peak shape.

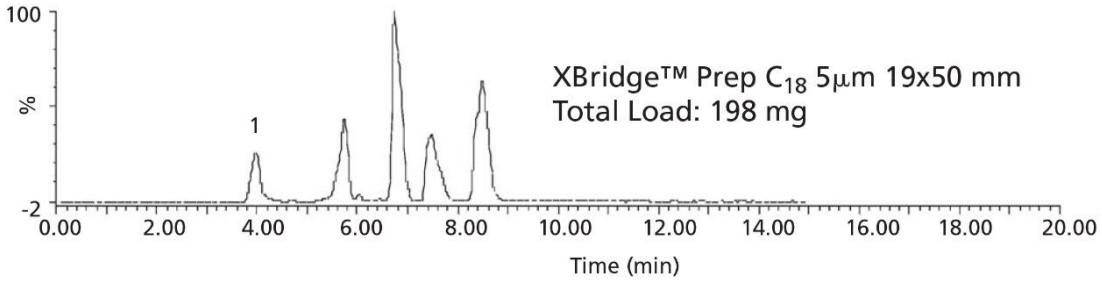

Figure 2. Separation of five basic drugs on XBridge Prep column in high-pH mobile phase. Analytes in order of elution: labetolol, quinine, diltiazem, verapamil and amitriptyline.

Conclusion

XBridge Prep Columns provide highly efficient separations, direct scale-up, and maximum loadability, crucial for isolation of critical mixture components.

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