Waters

XBridge™ Prep Columns: Scalability and Loadability for Preparative Separations

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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.

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 Conditions

Scalability

Columns: XBridge™ C_{18} 5 µm 4.6 × 100 mm; XBridge™ Prep C_{18} 5 µm 19 × 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)

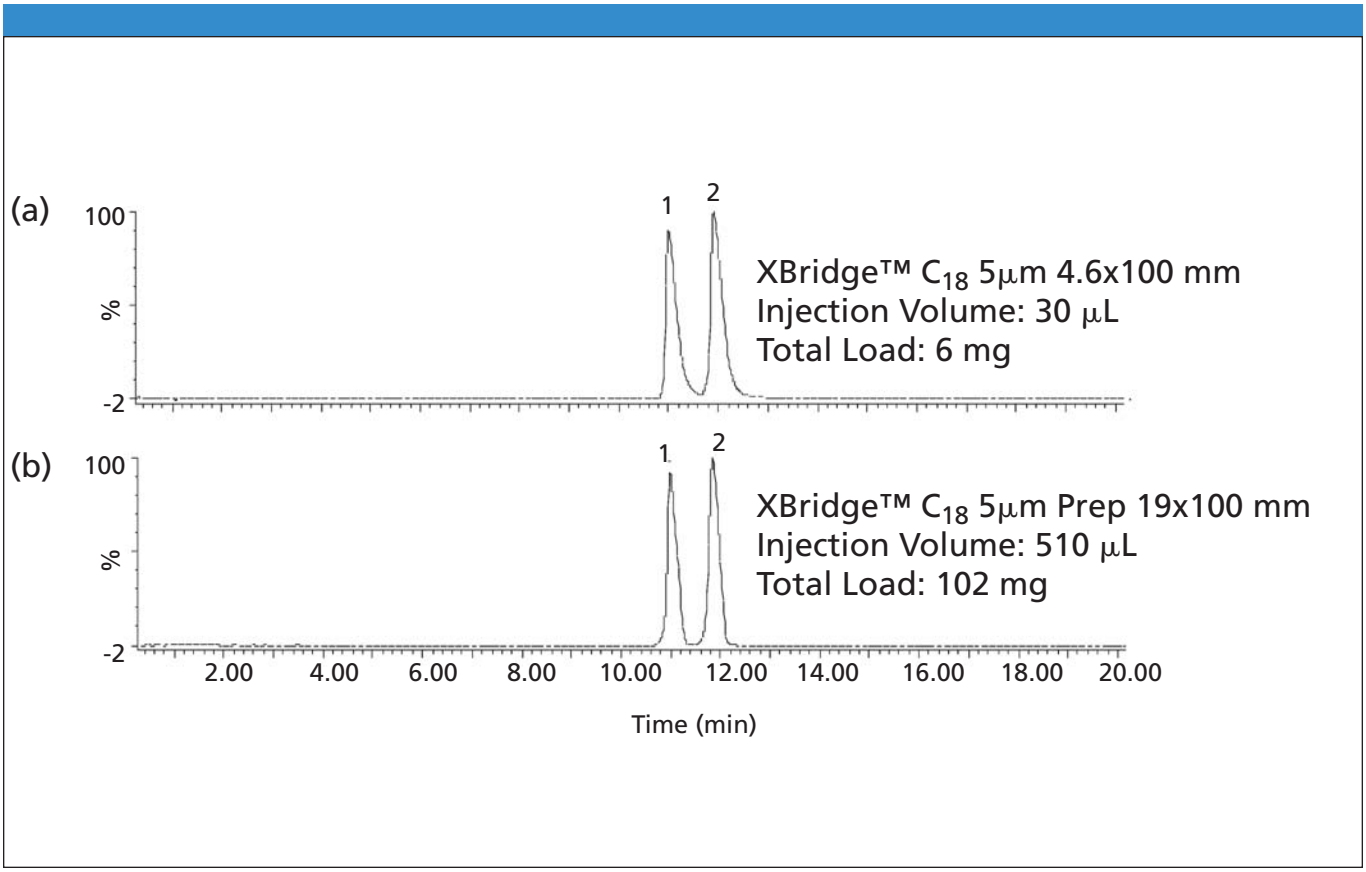

Figure 1: Scale-up of a critical pair of antifungal drugs from analytical to preparative XBridge™ columns. (A) XBridge™ C_{18}, 5 µm 4.6 × 100 mm. (B) XBridge™ Prep C_{18} 5 µm 19 × 100 mm. Analytes: (1) econazole, (2) miconazole.

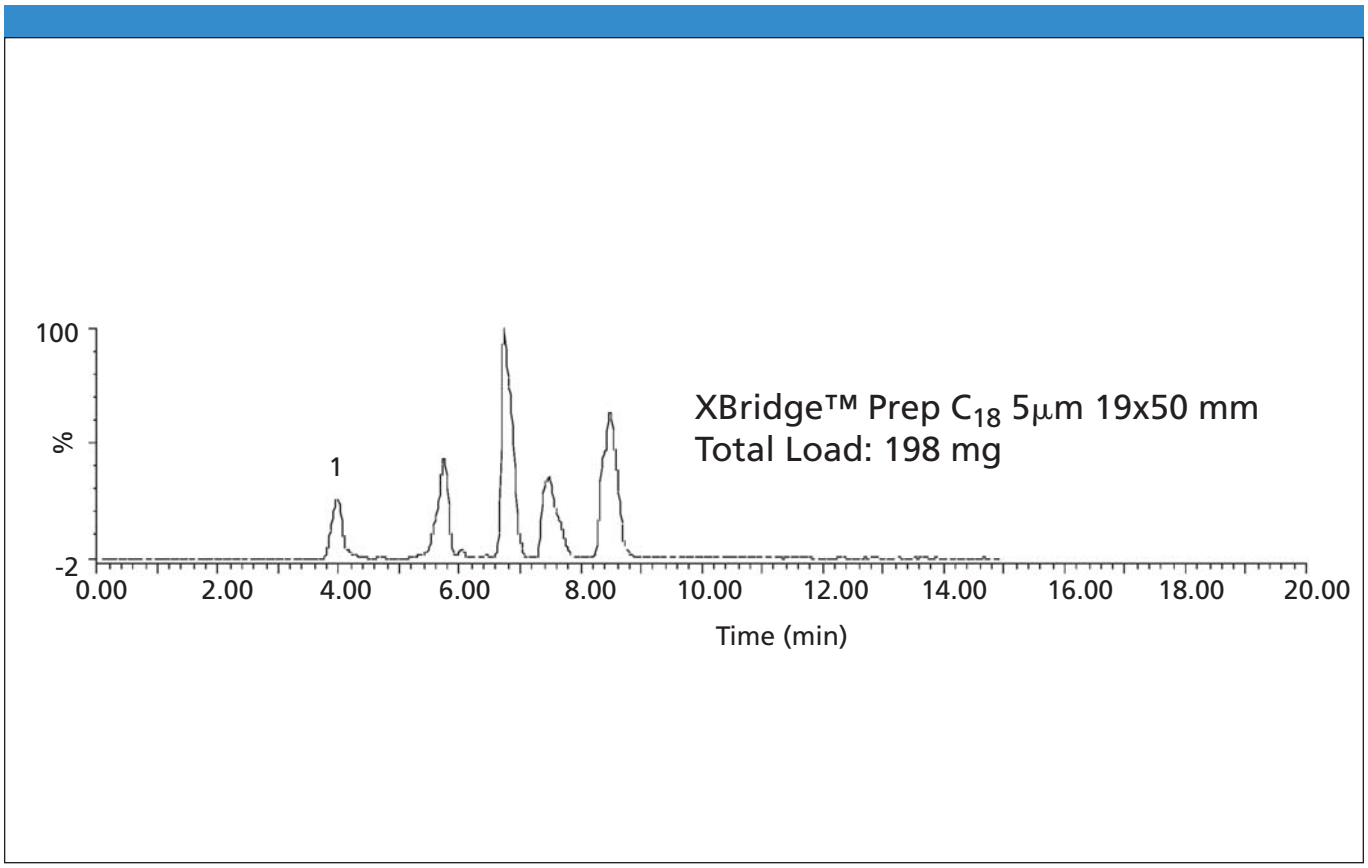

Figure 2: Separation of five basic drugs on XBridge™ Prep column in high-pH mobile phase. Analytes in order of elution: labetolol, quinine, diltiazem, verapamil and amitriptyline.

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 × 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

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.

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 × 50 mm column without sacrificing peak shape.

Conclusions

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

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