

# TSKgel PW<sub>XL</sub>-CP Size Exclusion Chromatography Columns for the Analysis of Water-Soluble Cationic Polymers

TSKgel  
APPLICATION NOTE

## Introduction

In size exclusion chromatography, researchers often face difficulty in the molecular mass measurement of hydrophilic/ionic polymers because such polymers tend to adsorb onto packing materials, which can result in delayed retention and incomplete recovery. Cationic polymers in particular tend to adsorb tightly onto packing materials. Thus, polymer researchers often encounter low recovery when analyzing cationic polymers, as well as poor reproducibility from run to run.

To prevent such adsorption of the polymers onto the particles in SEC columns, polymer scientists have successfully added a high salt concentration (0.3 - 1 mol/L) to the mobile phase or have added an organic amine, such as triethyl amine or ethylene diamine, to the eluent.

TSKgel PW<sub>XL</sub>-CP size exclusion columns were specifically developed for the analysis of water-soluble cationic polymers. These columns eliminate ionic adsorption onto the particle by incorporating a cationic functionality on the particle surface. This modification results in high recovery for cationic polymers and enables elution under low salt conditions. The TSKgel PW<sub>XL</sub>-CP columns show high theoretical plate values, linear calibration curves and high durability.

Three columns are available within the polymethacrylate-based TSKgel PW<sub>XL</sub>-CP series, each with a different particle size, separation range and exclusion limit, allowing polymers within a wide molecular mass range to be separated and characterized.

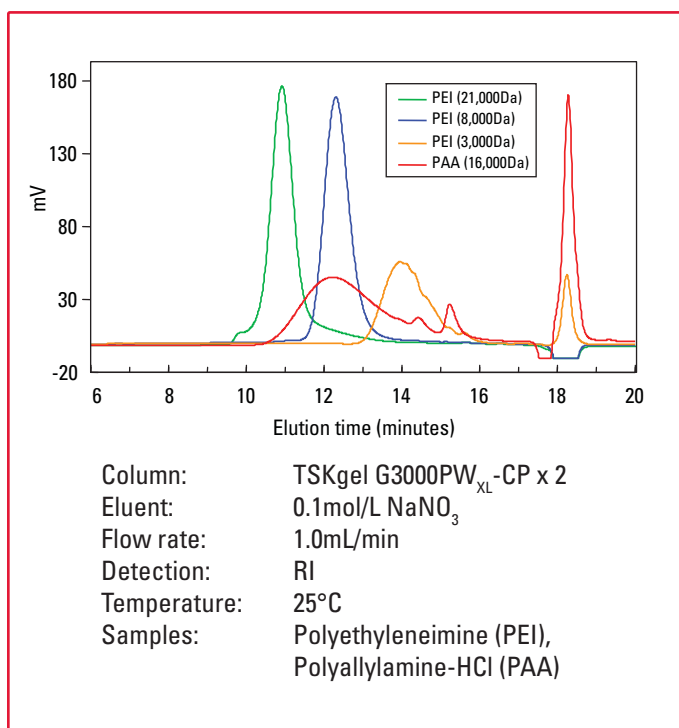
**Table 1** Properties of TSKgel PW<sub>XL</sub>-CP columns

	G3000PW <sub>XL</sub> -CP	G5000PW <sub>XL</sub> -CP	G6000PW <sub>XL</sub> -CP
Particle size	7µm	10µm	13µm
Pore size	200Å	1000Å	>1000Å
Exclusion limit (Da)	100,000	1,000,000	20,000,000
Separation range (Da), (PEO,PEG)	200-50,000	400-500,000	1,000-10,000,000
Theoretical plates	16,000	10,000	7,000

## Results

Small molecular weight cationic polymers were analyzed on two TSKgel G3000PW<sub>XL</sub>-CP columns in series. As *Figure 1* shows, these narrow molecular weight cationic polymers eluted in order of their molecular weights.

**Figure 1.** Elution Profiles of PAA and PEI Polymers on TSKgel G3000PW<sub>XL</sub>-CP Columns



## Conclusion

TSKgel PW<sub>XL</sub>-CP size exclusion columns were specifically developed for the analysis of water-soluble cationic polymers. Since three columns are available within the TSKgel PW<sub>XL</sub>-CP series, each with a different particle size, separation range and exclusion limit, polymers within a wide molecular mass range can be separated and characterized.



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## **TOSOH BIOSCIENCE**

TOSOH Bioscience LLC  
3604 Horizon Drive, Suite 100  
King of Prussia, PA 19406  
Orders & Service: (800) 366-4875  
Fax: (610) 272-3028  
[www.separations.us.tosohbioscience.com](http://www.separations.us.tosohbioscience.com)  
email: [info.tbl@tosoh.com](mailto:info.tbl@tosoh.com)