

# Determination of Polyacrylamides in Reclaimed Water

## Application Note

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### Introduction

Polyacrylamides are often used as settling aids in water clarification processes. These polymers act as flocculants to help remove contaminants from the water stream. Residual polyacrylamides in the reclaimed water can affect subsequent processing operations and have an obvious environmental impact. A fast analytical method is therefore required to monitor traces of residual polyacrylamide in reclaimed water. Aqueous size exclusion chromatography (SEC) is a well documented technique for the characterization of polyacrylamide molecular weight distribution. In this particular application, the primary aim is to quantify the amount of residual polymer, whereas the molecular weight information is of little importance. A single pore size Agilent PL aquagel-OH column was selected to partially exclude the polymer peak and thereby give increased response, and to provide separation between the polymer and any lower molecular weight species, which may be present in the sample. PL aquagel-OH columns are ideal for this purpose because they combine high pore volume and high column efficiency (>35,000 plates/meter) for maximum resolution.



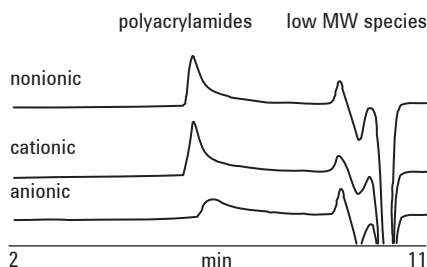
## Conditions

Polyacrylamides can exhibit a variety of chemistries rendering the polymer nonionic, anionic or cationic in nature. In order to stabilize the polymer solution and to inhibit interaction between the polymer and the column packing material, 0.05M Na<sub>2</sub>SO<sub>4</sub> at pH 3 was added to the aqueous eluent. By selection of the appropriate eluent, the full range of polymer types was evaluated.

Column: PL aquagel-OH 50 8 μm,  
300 x 7.5 mm  
(p/n PL1149-6850)  
Sample Loading: 0.1 mg/mL, 200 μL  
Eluent: 0.05 M Na<sub>2</sub>SO<sub>4</sub> at pH 3  
Flow Rate: 1.0 mL/min  
Detection: UV, 208 nm

## Results and Discussion

Acrylamides exhibit strong UV absorbance at low wavelengths. However, the limiting factor in the determination of trace polyacrylamides is purely down to detector sensitivity. Figure 1 reveals the presence of nonionic, anionic and cationic polyacrylamides with good separation between the polymer and lower molecular weight contaminants.



**Figure 1. Chromatogram shows the presence of nonionic, anionic and cationic polyacrylamides with good separation between the polymer and lower molecular weight contaminants**

## Conclusion

SEC and PL aquagel-OH columns successfully quantified polyacrylamides in a sample of reclaimed water. The 'neutral' surface and ability to operate across a wide range of eluent conditions equip PL aquagel-OH for the high performance analysis of analytes with neutral, ionic and hydrophobic moieties, singly or combined.

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