

Analysis of polyvinyl alcohol

Application

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Polyvinyl alcohols (PVA) are industrially synthesized by the catalytic reaction of polyvinyl acetates with alcohols, typically methanol. Due to properties such as excellent biological degradeability, water solubility, toxilogical harmlessness they are widely used as emulgators, binding agents in adhesives, salves and haircream. The properties can be varied with the molecular weight distribution and the molecular weight which ranges from 20000 to 100000 g/mol.

Both parameters can be fast and reliably monitored by aqueous SEC. This is a convenient method for quality control analyis, and is more informative in production control and end-use performance evaluation than singlepoint viscosity measurements.



Figure 1 SEC chromatogram of polyvinyl alcohol

Conditions

Sample preparation

PVA was dissolved in the mobile phase (concentration 0.1 %)

Column

 $3 \times$ PL aquagel-OH 30 in series, 7.5×300 mm, 8 μ m (Agilent p/n 79911GF-MXA) in series with PL aquagel-OH 30, 7.5×300 mm, 8 μ m (Agilent p/n 79911GF-083)

Mobile phase

0.2 M NaN0H₃, NaH₂P0₄, pH 7

Flow rate

1 mL/min

Column compartment temperature 25 $^\circ$ C

Injection volume

Detector

Refractive index detector

Polymer standards

Polyethylene oxide EasyCal standards in vials for calibration (Agilent p/n 5064-8280)



HPLC performance

 $\begin{array}{ll} \text{RSD of } M_w & < 1. \\ \text{RSD of } M_n & < 3 \end{array}$

< 1.5 % < 3 %

Equipment

Agilent 1100 Series GPC-SEC system

consisting of

- vacuum degasser for efficient degassing of the mobile phase
- isocratic pump with large solvent cabinet
- autosampler with single valve design
- thermostatted column compartment for precise column temperatures
- refractive index detector with automatic recycle valve
- ChemStation Plus with GPC-SEC data analysis software

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