Electronic Supplementary Information

Blend memebranes of quaternized poly (vinylbenzyl chloride-co-styrene) and quaternized polysulfone for anion-exchange membrane fuel cells

Xiaofeng Liao, Yujiao Gong, Yi Liu, Danying Zuo, Hongwei Zhang*

College of Materials Science and Engineering, Wuhan Textile University, WuHan, 430073, PR China

Determination method of Intrinsic Viscosity [1-3]

P(VBC-co-St) was dissolved in N,N-dimethylformamide and filtered to obtain P(VBC-co-St) solution with a concentration of 0.00904 g/mL. Measurements were performed at 35 ^{o}C ± 0.1 ^{o}C. Each determination was carried out at least three times with variation lower than 0.10 % and the average value was used as the result. At least five concentrations were measured for the [η] determination by the dilution of stock solution. The intrinsic viscosity was determined by linear extrapolation of the concentration dependence of reduced viscosity (specific viscosity divided by concentration) to zero concentration from the following two equations.

$$\frac{\eta_{sp}}{c} = [\eta] + k'[\eta]^2 c \qquad (1)$$

$$\frac{\ln \eta_r}{c} = [\eta] - \phi[\eta]^2 c \qquad (2)$$

Where η_r means relative viscosity, η_{sp} represents specific viscosity, k′ and ϕ are the Huggins and Kramer constants, respectively, and c is the concentration (g/mL) of the polymer solution.

*Corresponding author: Tel.: +86-27-59367580; fax: +86-27-59367580. E-mail: hanqiujiang@163.com.

The η_{sp}/c and $\ln\eta_r/c$ against the concentration were plotted in Figure S1, the intercept was the [η] value. Based on the [η] value, the viscosity average molecular weight (*Mv*) could be obtained through the following Mark-Houwink equation if the K and α values were known.

$$[\eta] = KM^{\alpha} \qquad (3)$$

Where K and α are empirical constants and depend on the solvent system (ionic strength and pH), temperature, and molecular weight etc.

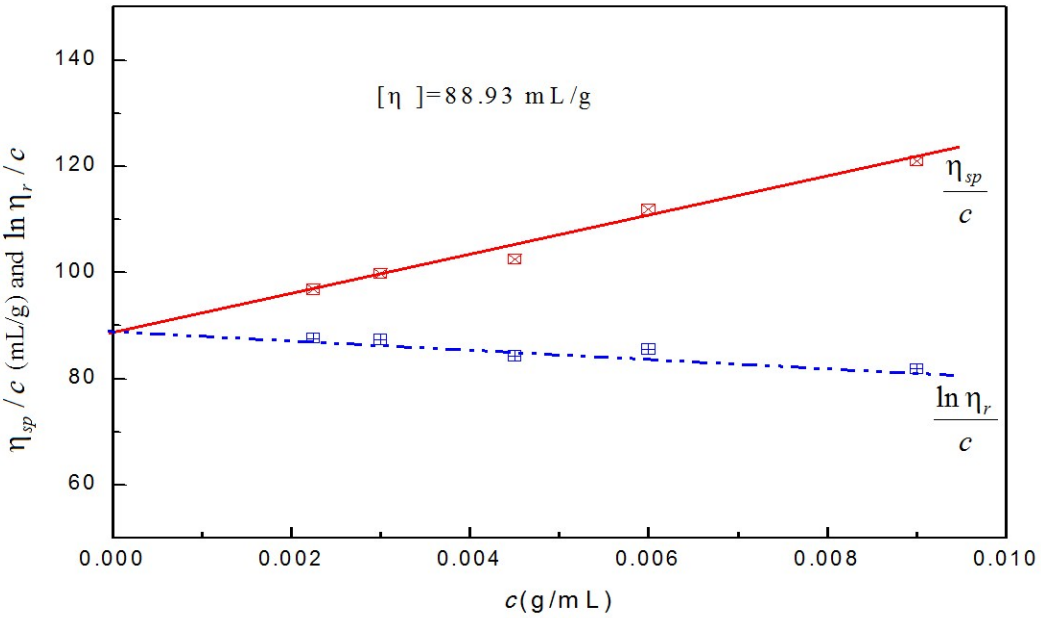

Figure S1 Specific viscosity and log of relative viscosity over concentration vs. concentration in N,N-dimethylformamide at 35 °C

Reference

[1] Antoniou E, Tsianou M. Solution properties of dextran in water and in formamide. J Appl Polym Sci 2012;125:1681-92.

[2] Podzimek S, Hermannova M, Bilerova H, Bezakova Z, Velebny V. Solution properties of hyaluronic acid and comparison of SEC-MALS-VIS data with off-line capillary viscometry. J Appl Polym Sci 2010;116:3013-20.

[3] Costa CN, Teixeira VG, Delpech MC, Souza JVS, Costa MAS. Viscometric study of chitosan solutions in acetic acid/sodium acetate and acetic acid/sodium chloride. Carbohydr Polym 2015;133:245-50.