Thermal Characterization of Gelation for Aqueous Methyl Cellulose Solutions Containing Polyethylene Glycol and Salt

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Methyl Cellulose (MC) and Polyethylene Glycol (PEG) are considered to be environmentally and biologically friendly materials, and they have been applied to industrial and biological uses as highly hydrophilic and viscous polymers. The gelation temperature of aqueous MC solutions is reduced by addition of PEG and/or salt [1]. To evaluate thermal characteristics, DSC can be used to measure gelation temperature. However, these measurements often were difficult to detect gelation peak in low concentration solution from aspect of DSC sensitivity.

In this study, we investigated the influence of PEG and/or salt on MC hydrogel formation using high sensitivity DSC [2].

Gelation peak of MC hydrogel was clearly detected. The gelation temperature and enthalpy decreased with the addition of PEG (Fig. 1). In contrast, the peak enthalpy increased with the addition of salt (Fig. 2). The impact on gelation temperature from the addition of $CaCl_2$ was larger than from the addition of $MgCl_2$.

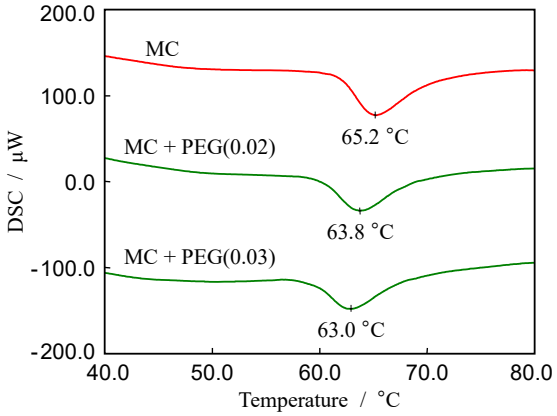

Fig. 1 Influence of PEG for MC
Molar fraction of Ethylene oxide unit of PEG : 0.02 and 0.03

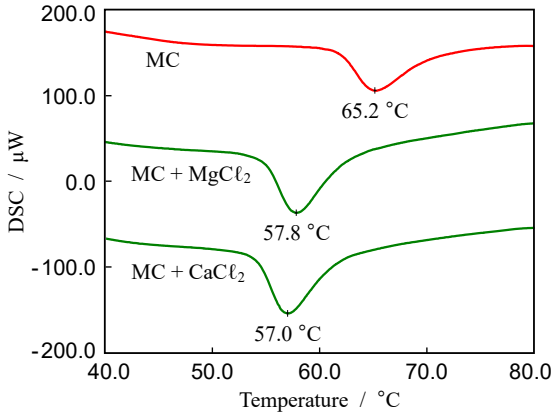

Fig. 2 Influence of Salt for MC
Concentration of $MgC\ell_2$ and $CaC\ell_2$: 0.1 mol/ℓ

[1] M. Takeuchi, S. Kageyama, H. Suzuki, T. Wada, Y. Toyoda, T. Oguma, Y. Ezawa, Y. Tsuriya, T. Kato, F. Ishii : Material Technology, 17, 445 (1999)

[2] E. Shimoda, Y. Nishiyama, Y. Kasai, S. Mochida, Y. Nishimoto, 46th Annual NATAS Conference (2017)

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