

Magnetic Field Effects on Poly(vinyl alcohol)/Iodine Complex Formation in Aqueous Solutions

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Blue-colored complexes of poly(vinyl alcohol) (PVA) with iodine has been widely applied to industrial and biomedical fields. It is well known that PVA/iodine complexes form helix [1] and iodine species in them are polyiodide ions. PVA/iodine complex formation has revealed the influence of the molecular parameters of PVA, such as stereoregularity, hydrogen bonds, short branches, and degrees of saponification and polymerization. In this study, we have examined magnetic field effects on formation of PVA/iodine complexes in aqueous solution. A 6 T magnetic field promoted formation of I_3^- and I_5^- , depending on the polymerization and saponification of PVA.

PVA/iodine complexes in aqueous solutions were prepared at 278 K adding 3.6 g/L aqueous PVA solution of 3.0 mL to 2.0 M aqueous boric acid solution of 4.0 mL containing 0.24 M iodine and 0.62 M potassium iodide. In-situ UV-Vis absorbance and Raman intensity were measured under magnetic fields at various temperatures, $(273 - 293) \pm 0.1$ K.

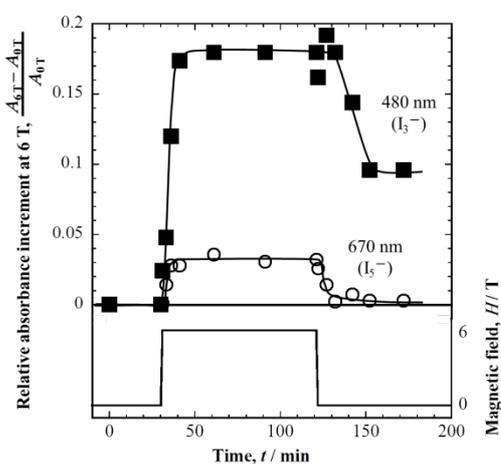


Fig.1 Dependence of absorbance of I_3^- and I_5^- on magnetic field strength at 278 ± 0.1 K

The absorbance of polyiodide ions increased by applying magnetic fields below 278 K. Figure 1 shows that when a 6 T magnetic field was applied to, the absorbance at 480 and 670 nm increased immediately to approach to a saturation value within 10 min. After removing the magnetic field, the absorbance returned to the initial value. Raman bands for polyiodide ions also increased with application of magnetic fields. Such promotion of formation of polyiodide ions (I_3^- and I_5^-) due to magnetic fields were observed irrespective of degree of polymerization and saponification.

References:

- [1] M. M. Zwick, *J. Appl. Polym. Sci.*, **1965**, 9, 2393.