

Effect of ethylene glycol on the conformation of bovine β -lactoglobulin

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Introduction

Effect of ethylene glycol (EGOH) on the conformation of bovine β -lactoglobulin was investigated. The present work was done because; (1) we have been investigating protein folding at subzero temperatures. To do research at subzero temperatures, it is necessary to use anti-freeze such as EGOH. (2) EGOH can be used as a radical scavenger to avoid radiation damage during x-ray scattering study.

Results

Figures 1 and 2 show protein concentration dependence of radius of gyration (R_g) and zero angle intensity $I(0)$. Except one point, R_g does not depend on the protein concentration in the presence and in the absence of EGOH. The averaged R_g values are $18.18 \pm 0.11 \text{ \AA}$ and $17.65 \pm 0.08 \text{ \AA}$ in the absence and presence of 45% EGOH, respectively. R_g was also estimated as $17.90 \pm 0.2 \text{ \AA}$ at 3.8°C in the presence of EGOH. The difference of R_g might be ascribed to conformational change, uniform shrinkage or hydration effect. To elucidate this point in more detail, we plotted scattering patterns of BLG in the presence and the absence of EGOH against $R_g \cdot h$, which is shown in Figure 3. Both scattering patterns agree well. This demonstrates that EGOH would induce hydration change or uniform shrinkage, but no significant conformational deformation. It is most likely that EGOH reduces hydration effect. Thus, it seems that EGOH is good reagent to be used in maintain moderate condition for cryo-solvent and more advantageously a reagent to protect radiation damage.

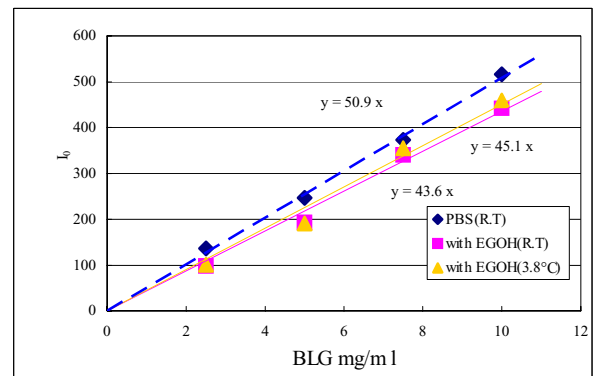
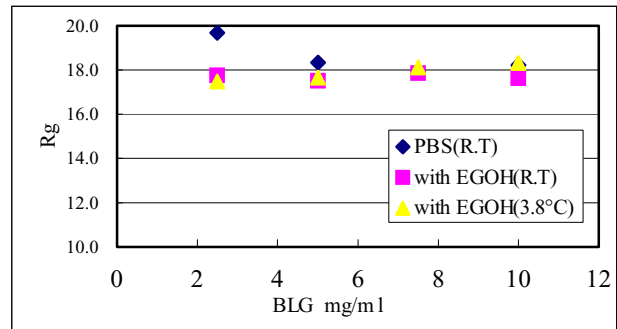


Fig. 1 & 2. Concentration dep. of R_g and I_0 respectively.

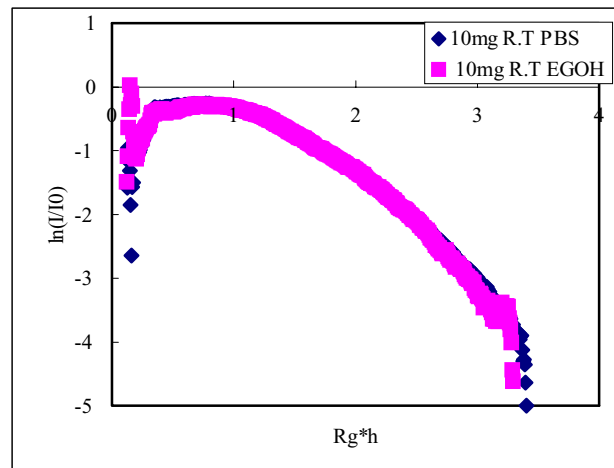


Fig. 3. Kratky plot. Abscissa was normalized by R_g .

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