Synopsis of Original Research Paper

Study of Hydration and its Function by Using Reversed Micellar Systems

Ayako Goto

School of Administration and Informatics, University of Shizuoka

Reversed micelles can control the size of water pools and the physical property of water by changing Wo(=[water]/ [surfactant]). The property of bound water and its function were studied based upon the enzymatic catalysis and the dimerization of cysteine by the irradiation in water pools. Sodium bis (2-ethylhexyl) sulfosuccinate (AOT), hexadecyltrimethyl ammonium chloride (HTAC) and octaethylene dodecylether ($C_{12}E_8$) were used as anionic, cationic and nonionic surfactants, respectively. Hexokinase (HK) and polynucleotide phosphorylase (PNPase) were used as enzymes. The electrostatic effect due to the inner surfaces of AOT and HTAC reversed micelles increased with increasing Wo, leading to the suppression of the HK activity. On the other hand, high HK activity was revealed in hydrated ethyleneoxide chains of $C_{12}E_8$. The PNPase could also polymerize ADP in $C_{12}E_8$ reversed micelles by using a small amount of Fe^{3+} in stead of Mg^{2+}. Furthermore, it was found that the formed poly (A) was precipitated with increasing temperature. This means that the formed poly (A) can be isolated easily from the reversed micellar solution. This phenomenon is closely related with appearance of free water molecules due to elevation of temperature.

The effect of bound water on the conversion of cysteine by UV irradiation was studied. It was assumed that the solubilized cysteine in water pools was easily converted into cystine in bound water by UV irradiation. The results suggested a long life time of activated oxygens produced by UV irradiation in bound water region.