

5.5 Abstract

It is beyond question that the use of an appropriate template in the enzyme-catalysed synthesis of polyaniline in aqueous solution has some influence on the finally obtained product.

The template, no matter whether it is polymers, micelles or vesicles, should be negatively charged so that some interaction between the template and the aniline monomers and/or oligomers can take place. But the electrostatics is not the only factor which determines the quantity and or quality of the finally obtained polyaniline since AOT vesicles, which turned out to be a favourable template, have a much higher zeta potential than for example SDBS/decanoic (acid) (1:1) with which a worse or a smaller amount of the product is generated. It is probable that for example the interaction between the enzyme and the monomers and oligomers has an impact on the product as well and that this interaction might be correlated to the interaction between the aniline and the template.

Furthermore, the concentration of the phosphate buffer has some effect not only on the efficiency of the template and thus on the product but also on the reaction time. With a diluted buffer solution the absorption spectra of the polymer changed heavily compared to a solution of a higher salt concentration and it seems as if the polymerisation occurs more slowly.

Additionally, the critical vesicle concentration of AOT has been explored with the aim of determining the form of AOT at a specific concentration. At higher concentrations than approximately 0.3-0.4mM vesicles are formed, whereas the cvc in water is at approximately 3mM only.

For AOT, the optimal concentration for the enzyme-catalysed synthesis of polyaniline in 0.1M phosphate buffer at pH 4.3 was found to be around 1mM. The polymer synthesised in the presence of 1mM AOT featured a high optical density at 1000nm, which is proposed to be the absorption region of long linear polymer chains, as well as a good ratio of optical density at 1000nm to 500nm, which indicates that there are only few short branched polyaniline chains compared to long para-linked ones.

Lastly, the preparation method of the AOT solution also seems to play a role in the polymerisation of aniline since the polyaniline produced in the presence of the extruded AOT solution absorbed less long wave light than the one produced in the

presence of the sonicated solution. It is possible that this is a consequence of metal ions induced into the solution or that the size of the vesicles is different.