

XPS STUDIES OF THE CELLULASE ADSORPTION ON PARTICULATE CELLULOSES

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Summary

In heterogeneous biocatalysis, the substrate effective concentration is proportional to the accessible surface area. In previous work, this area was measured with the help of BSA adsorption isotherms. In this work, it is shown that the affinity in the BSA adsorption on cellulose does not depend on the cellulose crystallinity, since the concentration of BSA on different cellulose surfaces is similar, as measured by the XPS determination of the nitrogen content.

It is shown that the cellulolytic enzymes are able to adsorb two to three times more than the BSA molecule does at the saturation level, which means that the cellulases adsorb either in multilayers or in a more organized (compacted) way than the BSA. Finally, it is shown that the surfactant Tween 85 is able to reduce the amount of adsorbed enzymes when the bulk enzyme concentration is relatively low, which correlates with a higher enzyme activity. When the enzyme concentration is raised, both the adsorbed enzyme concentration and the enzyme activity remain unaffected by the surfactant. This seems to support the hypothesis that the surfactant helps the enzyme by enabling the sequence of events adsorption-desorption.