Preparation and properties of urease immobilized to Merrifield resin in solvents of low polarity

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The immobilisation of enzymes to Merrifield resin with urease as an example has recently been described. A characteristic of these catalysts is, that the activity goes through a distinct maximum as a function of enzyme supply.
However, if the preparation is carried out in water, containing ethanol, acetone, or dioxane the maximum vanishes and the activity increases significantly. The presence of only 2.5vol% ethanol already leads to an activity being 50% higher than that of a catalyst prepared in pure water. If the concentration of the organic component is varied, two ranges of maximum activities are obtained; the corresponding concentrations of ethanol, acetone, and dioxane are: ∿2/∿50, 27/73, and 10/73 vol%.-
The activity of d i s s o l v e d urease shows a minimum at medium concentrations of the organic solvent and then increases again.-
The results are traced back to a change of enzyme structure with decreasing polarity of the solvent, leading to a change of bond type between urease and Merrifield resin. Furthermore, the space requirement of a single enzyme molecule may be altered by this parameter. This hypothesis is supported in part by the results of amino acid analysis of catalysts prepared in differently concentrated ethanol/water mixtures. Though the enzyme supply was always the same, the amount of enzyme bound to the carrier strongly depended on the polarity of the reaction mixture.
Kinetic measurements exhibit that the affinity of the substrate molecule to the active site of urease immobilized to Merrifield resin is slightly reduced. The residual activities of the bound enzyme are between 45 and 65%.