

## Stabilizing Effects of Deep Eutectic Solvents on Alcohol Dehydrogenase Mediated Systems

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**Abstract :** This study explored the effects of different organic solvents, temperature, and the amount of glycerol on the alcohol dehydrogenase (ADH)-catalysed stereoselective reduction of different ketones. These conversions were then analyzed by gas chromatography. It was found that when the amount of deep eutectic solvents (DES) increases, it can improve the stereoselectivity of the enzyme although reducing its ability to convert the substrate into the corresponding alcohol. Moreover, glycerol was found to have a strong stabilizing effect on the ADH from *Ralstonia* sp. (*E. coli*/RasADH). In the case of organic solvents, it was observed that the best conversions into the alcohols were achieved with DMSO and hexane. It was also observed that temperature decreased the ability of the enzyme to convert the substrates into the products and also affected the selectivity. In addition to that, the recycling of DES up to three times gave good conversions and enantiomeric excess results and glycerol showed a positive effect in the stability of various ADHs. Using RasADH, a good conversion and enantiomeric excess into the *S*-alcohol were obtained. It was found that an enhancement of the temperature disabled the stabilizing effect of glycerol and decreased the stereoselectivity of the enzyme. However, for other ADHs a temperature increase had an opposite positive effect, especially with ADH-T from *Thermoanaerobium* sp. One of the objectives of this study was to see the effect of cofactors such as NAD(P) on the biocatalysis activities of ADHs.

**Keywords :** alcohol dehydrogenases, DES, gas chromatography, RasADH

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