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REGULAR ARTICLE

Factors screening to statistical experimental design of racemic atenolol kinetic resolution via transesterification reaction in organic solvent using free *Pseudomonas fluorescens* lipase

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Abstract

As the (*R*)-enantiomer of racemic atenolol has no β-blocking activity and no lack of side effects, switching from the racemate to the (*S*)-atenolol is more favorable. Transesterification of racemic atenolol using free enzymes investigated as a resource to resolve the racemate via this method is limited. Screenings of enzyme, medium, and acetyl donor were conducted first to give *Pseudomonas fluorescens* lipase, tetrahydrofuran, and vinyl acetate. A statistical design of the experiment was then developed using Central Composite Design on some operational factors, which resulted in the conversions of 11.70–61.91% and substrate enantiomeric excess (*ee*) of 7.31–100%. The quadratic models are acceptable with R^2 of 95.13% (conversion) and 89.63% (*ee*). The predicted values match the observed values reasonably well. Temperature, agitation speed, and substrate molar ratio factor have low effects on conversion and *ee*, but enzyme loading affects the responses highly. The interaction of temperature–agitation speed and temperature–substrate molar ratio show significant effects on conversion, while temperature–agitation speed, temperature–substrate molar ratio, and agitation speed–substrate molar ratio affect *ee* highly. Optimum conditions for the use of *Pseudomonas fluorescens* lipase, tetrahydrofuran, and vinyl acetate were found at 45°C, 175 rpm, 2000 U, and 1:3.6 substrate molar ratio.