



54th Canadian Chemical Engineering Conference

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270	BIO3	08:30 Tuesday AM	Glen 202
<p>Factorial Design Based Medium Optimization for Hen Egg-White Lysozyme (HEWL) Production by <i>Aspergillus Niger</i> R. Gheshlaghi <rgheshla@engmail.uwaterloo.ca>, J.M. Scharer <jscharer@engmail.uwaterloo.ca>, M. Moo-Young <mooyoung@cape.uwaterloo.ca> and P.L. Douglas <pdouglas@cape.uwaterloo.ca>, Department of Chemical Engineering, University of Waterloo, 200 University Avenue West, Waterloo, Ontario, Canada, N2L- 3G1, Fax: +1- 519- 7464979 .</p> <p>Medium optimization for the production of the heterologous enzyme hen egg-white lysozyme by <i>Aspergillus niger</i> WT-13-16 was performed. A statistical based experimental design was used to investigate the effect of starch, peptone, ammonium sulfate, yeast extract, and CaCl₂.2H₂O. The initial approach consisted of a 2⁵⁻¹ fractional factorial design (FFD) using 16 factorial runs together with 5 experiments at the center point. The FFD were effective in searching for the main factors influencing lysozyme production and revealed that peptone, starch, and ammonium sulfate were the most significant factors with positive effects, whereas yeast extract and CaCl₂.2H₂O were not important at the levels tested at 95% confidence interval. The levels of the two nonsignificant factors were kept at the central point of the FFD in all subsequent experiments. Then, the path of steepest ascent was employed to approach the proximity of the optimum. The effects of the three main factors were further investigated by a central composite design. This design comprised a full 2³ factorial design with its 8 cubic points, augmented with 6 replications of the center point, and another 6 at the axial points. The optimum medium composition for lysozyme production was found to be: 34 g L⁻¹ starch, 34 g L⁻¹ peptone, 11.9 g L⁻¹ ammonium sulfate, 0.5 g L⁻¹ yeast extract, and 0.5 g L⁻¹ CaCl₂.2H₂O. The theoretical maximum product concentration was 212 mg L⁻¹ lysozyme, approximately 3.5-fold higher than the initial baseline concentration.</p>			

[Top of Conference Schedule](#)

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