

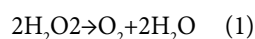
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## ENZYMOMOLOGY AND MOLECULAR BIOLOGY

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**Optimization of catalase activity by *Rhodotorula glutinis* using experimental design**Ayse Ezgi Unlu and Serpil Takac  
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*Rhodotorula glutinis* is a pigmented, salt tolerant yeast and also gains attention due to its oleogenic property. It has high capacity to produce antioxidant molecules such as carotenoids. However, limited research has been conducted on the synthesis of other antioxidant molecules such as catalase (CAT) enzyme. CAT is a heme protein that is present in animal cells, bacteria and plants and it decomposes hydrogen peroxide to water and oxygen (Eqn. (1)). It is widely used in various industrial areas such as textile, food and cosmetics.



The aim of this study is to investigate the parameters that provided the optimum conditions for high CAT activity by *Rhodotorula glutinis*, and to search for the potential utilization of glycerol as a carbon source for high CAT activity, which is a by-product of biodiesel plants. For this aim, central composite design (Design Expert 7.0.0) including 20 runs with 6 central points was performed and temperature (T°C) (10.6-32.4°C), initial medium pH (pH) (3.99-6.0) and glycerol concentration (Gly, gL<sup>-1</sup>) (9.77-60.23) were selected as factors to be optimized for the response, CAT activity, according to the previous findings of the research group. The following second order model (Eqn. (2)) was proposed:

$$\text{CAT (U)} = -4.36106 + 1.34381(\text{pH}) + 0.051575(\text{T}) + 0.028907(\text{Gly}) - 0.13551(\text{pH})^2 - 3.78071 \times 10^{-4}(\text{Gly})^2 \quad (2)$$

The model was found to be statistically significant (R<sup>2</sup>=0.94, R<sup>2</sup><sub>adj</sub>=0.92, model F value 40.95, lack of fit value 2.21). The most effective factor on CAT activity was found as temperature (p<0.0001). The response surface graphics are presented at Fig. 1. Fig. 1a was obtained when Gly was 37.03 mg mL<sup>-1</sup>. According to the figure, the highest CAT activity was obtained at high T and low pH values. Similarly, Fig. 1b showed that activity increased with increasing T however, medium values of Gly provided higher activity values, maximum at 37.5 mg mL<sup>-1</sup>. According to Fig. 1c, the highest CAT activity values were obtained at the medium values of both pH and Gly. As a result of the experiments, it was found that determination of the maximum predicted response required a shift of the experimental region to higher temperature values.

**Biography**

Ayşe Ezgi Unlu has expertise in enzymes, enzymatic reactions, fermentation, protein synthesis, proteomics, enzymatic biopolymers and green solvents. The synthesis of Naproxen, a member of NSAIDs, was the subject of her Master's thesis by using commercial lipase subjected to various pre-treatment strategies that enhanced the activity. Investigation of different parameters on the production of lipase by *Candida rugosa* and also proteomic analysis of the isoenzymes was another subject of her interest. She has done her Post-doctoral research on the synthesis of flavonoids using green solvents.

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