

Fig 6 Experimental substrate concentration profile model with 150 g/l initial substrate concentration

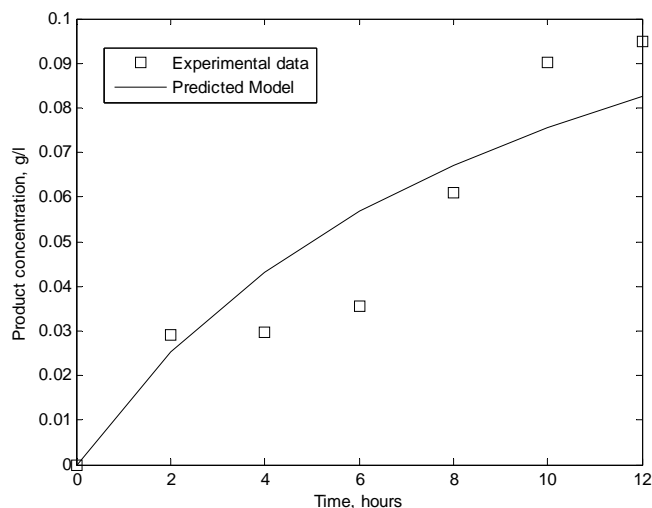


Fig 7 Experimental gluconic acid concentration profile and model with 150 g/l initial substrate concentration

V. CONCLUSION

Batch fermentation of glucose to produce gluconic acid has been accomplished using three different substrate concentrations with high initial *Aspergillus niger* mycelium concentration. Kinetic parameters for cell growth, substrate consumption, and product formation have been determined for gluconic acid batch fermentation by *Aspergillus niger* FNCC 6098.

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REFERENCES

- [1] J.Z. Liu, L.P. Weng, Q.L. Zhang, H. Xu, L. N. Ji, "A mathematical model for gluconic acid fermentation by *Aspergillus niger*", *Biochemical Engineering Journal*, vol. 14, pp. 15–64, 2003.
- [2] S. Velizarov, V. Beschkov, "Biotransformation of glucose to free gluconic acid by *Gluconobacter oxydans*: substrate and product inhibition situations", *Process Biochemistry*, vol. 33, no. 5, pp.527-534, 1998.
- [3] H. Znad, J. Markos, V. Bales, "Production of gluconic acid from glucose by *Aspergillus niger*: growth and non-growth conditions", *Process Biochemistry*, vol. 39, pp. 1341-1345, 2004.
- [4] M.L. Shuler, F. Kargi, *Bioprocess Engineering Basic Concept*. New Jersey: Prentice-Hall Inc., 1992, pp.176.
- [5] T. Takamatsu, S. Shioya, T. Furuya, "Mathematical model of gluconic acid fermentation by *Aspergillus niger*", *J. Chem. Technol. Biotechnol.*, vol. 31, pp. 697-704, 1981.
- [6] H. Znad, M. Blazej, V. Bales, J. Markos, "A kinetic model for gluconic acid production by *Aspergillus niger*", *Chem. Pap.*, vol. 58, no. 1, pp. 23-28, 2004.