

Chemistry 4000/5000/7000 Fall 2010 Assignment 6

Due: Friday, Oct. 22, 4:00 p.m.

Marks: 28

Retrieve the photosynthesis model of Poolman and coworkers [1] from the SBML model database.

1. The flux of interest in this case is the rate of carbon assimilation, i.e. the rate at which carbon dioxide is incorporated into sugars (reaction E1). Compute flux control coefficients for all the enzymes in this model. Which enzyme or enzymes mainly control the carbon assimilation flux? [20 marks]
2. Double the concentration of the enzyme with the highest flux control coefficient. Does this double the carbon assimilation flux? Has the distribution of flux control coefficients changed after this virtual overexpression experiment? What does that tell you about what you need to do to further improve the carbon assimilation flux? [8 marks]

Note: You may not need to recompute all the flux control coefficients to answer the second part of the question since some of them will remain very small.

References

- [1] M. G. Poolman, H. E. Assmus, and D. A. Fell. Applications of metabolic modelling to plant metabolism. *J. Exp. Bot.*, 55:1177–1186, 2004.