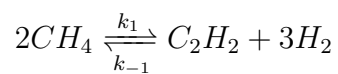


Exercise Sheet 1

April 20, 2015

Exercise 1. *Tutorial*

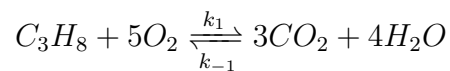
We consider the following chemical reaction



- Give a differential equation model of the chemical reaction system assuming mass action kinetics.
- Implement the model in Copasi. Use the standard values for the concentrations and $k_1 = 0.1$ and $k_{-1} = 0.01$ for the rate laws. Choose reasonable parameters for the time course and plot the concentrations against time.

Exercise 2. *Tutorial*

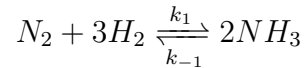
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Exercise 3. Tutorial

We consider the following chemical reaction

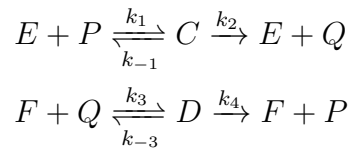


- a) Give a differential equation model of the chemical reaction system assuming mass action kinetics.
- b) Implement the model in Copasi. Use the standard values for the concentrations and $k_1 = 0.1$ and $k_{-1} = 0.01$ for the rate laws. Choose reasonable parameters for the time course and plot the concentrations against time.

Exercise 4. Homework

4 P.

We consider the chemical network consisting of the activation of a protein substrate P with intermediate complex C and enzyme E (kinase), and the deactivation of Q using a phosphatase F and intermediate complex D . The corresponding chemical reactions are:



- a) Give the vectors S and $R(S)$ and the matrix Γ for the differential equation model.
- b) Implement the model in Copasi. Use the standard values for the concentrations and for the following rate laws:

$$k_i = i \cdot 0.1 \quad \text{and} \quad k_{-i} = i \cdot 0.01$$

Choose reasonable parameters for the time course and plot the concentrations against time.

Send the model and the solutions until Friday 24th, 10 a.m. to Therese.Lorenz@fu-berlin.de.