Claims:

1. A computer-implemented method for process control of a bioreaction with an organism comprising:

creating a model of a bioreaction with an organism, said model including a matrix L, kinetics of macroreactions and model parameters of calculated values, which comprises the following steps:

a. defining selected metabolic pathways of the organism, their properties of stoichiometry and reversibility as background knowledge and calculating elementary modes from this input;

b. combining the elementary modes from a) in a matrix K, wherein the elementary modes combine the metabolic pathways from a) in macroreactions and the matrix K contains the stoichiometry and reversibility properties of all macroreactions;

c. entering measured data for the bioreaction with the organism;

d. calculating, using an interpolation method, specific rates for the organism of the metabolic pathways based on the measured data entered from c);

e. selecting relevant macroreactions as a subset r(t) of the elementary modes from a) by

i. data-independent and/or data-dependent prereduction of the elementary modes from a);

ii. selection of the subset from the prereduction from e) i. using the measured data from c) and/or one or more rates from d) by means of an algorithm according to a mathematical quality criterion and combination of the subset in a matrix L;

iii. optionally, the subset is shown graphically,

f. calculating, using an interpolation method, reaction rates of the macroreactions of the subset r(t) on the basis of the measured data from c) and/or the rates from d);

g. devising kinetics of the macroreactions of the subset from e) ii. using the following intermediate steps:

i. devising generic kinetics from the stoichiometry of the macroreactions from e);

ii. determining factors influencing the macroreactions from e) from the reaction rates from f);

iii. expanding the generic kinetics from g) i. by model parameter values which quantify the factors determined in g) ii;

h. performing separately for each macroreaction, a first adjustment of the model parameter values of the model parameters of g) iii to the calculated reaction rates from f);

i. optionally repeating steps g) and h) until a predefined quality of adjustment is reached;

j. adjusting the model parameter values of the model parameters of g) iii, h) or i) to the measured data from c);

k. forming the matrix L from e) ii, the kinetics from g) iii and the model parameter values of the model parameters from j) as an output for transferring to a process control module or process development module; and

l. closed-loop controlling the bioreaction using the output of step k).

2. The computer-implemented method according to claim 1, wherein in step d), growth rates of the organism, and optionally also death rates of the organism, are calculated.

3. The computer-implemented method according to claim 1, wherein in step g), an individual adjustment of the kinetics takes place, based on an analysis of the reaction rates from f).

4. The computer-implemented method according to claim 1, wherein in step h), the adjustment of the parameter values of the kinetics from g) takes place by combining several methods of adjustment.

5. The computer-implemented method according to claim 1, wherein in step e) ii., for selecting the subset of the macroreactions, linear estimation of reaction rates of selected macroreactions is carried out.

6. The computer-implemented method according to claim 1, wherein in step e) ii., for selecting the subset of macroreactions, linear estimation of reaction rates of selected macroreactions is carried out in combination with an evolutionary algorithm.

7. The computer-implemented method according to claim 1, wherein the measured data are shifted before using the interpolation method in step d), in order to achieve the description of constant consumption without feed peaks.

8. The computer-implemented method according to claim 1, wherein in step f), linear estimation of reaction rates of selected macroreactions is carried out.

9. The computer-implemented method according to claim 1, wherein in step e) i., a data-dependent prereduction is carried out and the method of linear estimation of reaction rates of selected macroreactions with NNLS is used for this.

10. The computer-implemented method according to claim 1, wherein in step e) iii., validity of selection of the subset of macroreactions is tested by means of a flux map.

11. The computer-implemented method according to claim 1, wherein in step e) ii., the selection from the prereduction from e) i. is carried out using the measured data from c).

12. The computer-implemented method according to claim 1, wherein the method is executed by a computer program.

13. The computer-implemented method according to claim 1 wherein the method is executed by a software program.