

SUPPORTING INFORMATION

Kinetic Modeling of Steady-State Situations in Cytochrome P450 Enzyme Reactions

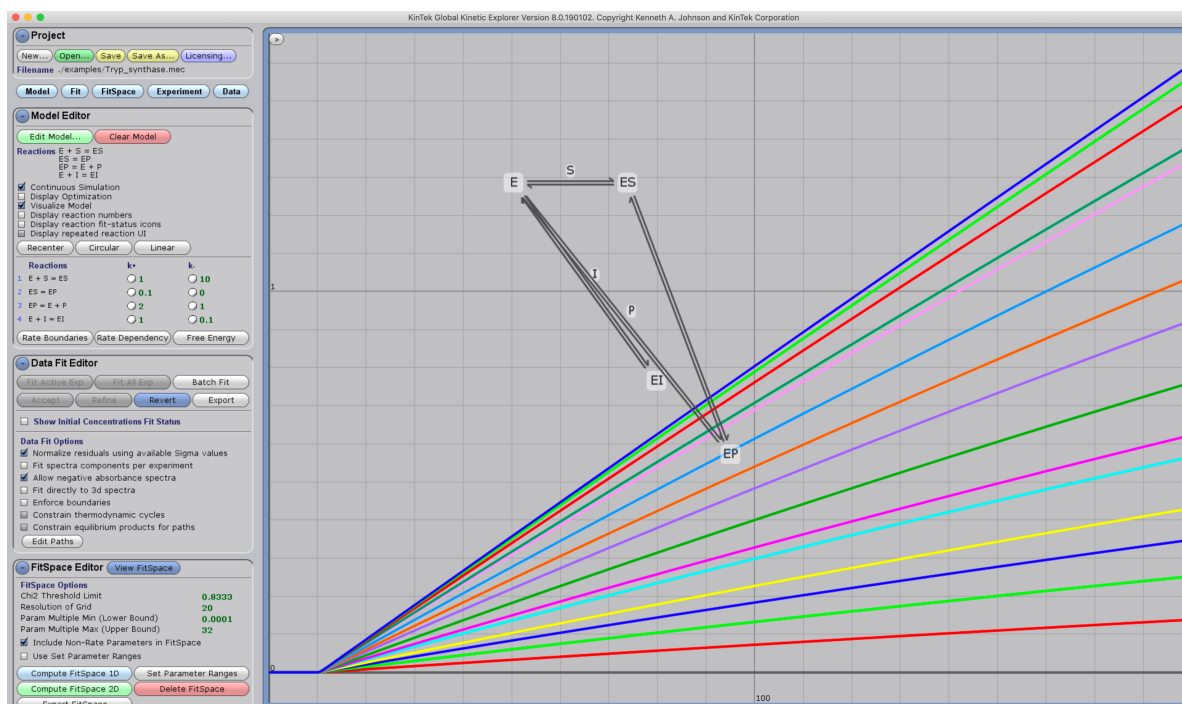
F. Peter Guengerich

TABLE OF CONTENTS

Fig. S1.	Screenshots of KinTek Explorer® setup for the modeling in Fig. 1A.
Fig. S2.	Screenshot of KinTek Explorer® model for experiment of Fig. 1B.
Fig. S3.	Step t_1 for the reaction model (Fig. 1B) shown in Fig. S1.
Fig. S4.	Step t_2 for the reaction mode (Fig. 1B) shown in Fig. S1.
Fig. S5.	Observables (Analytic Fit option) for analyzing the reaction model (Fig. 1B) in Fig. S1.
Fig. S6.	Linear fitting of plots in Fig. S1.
Fig. S7.	Plot of <Rate vs. Conc> from rates obtained in Fig. S5 (Hyperbola).
Fig. S8.	Selected fit from Fig. S6 (following <Copy to Repository> in the step in Fig. S6).

Fig. S1

A



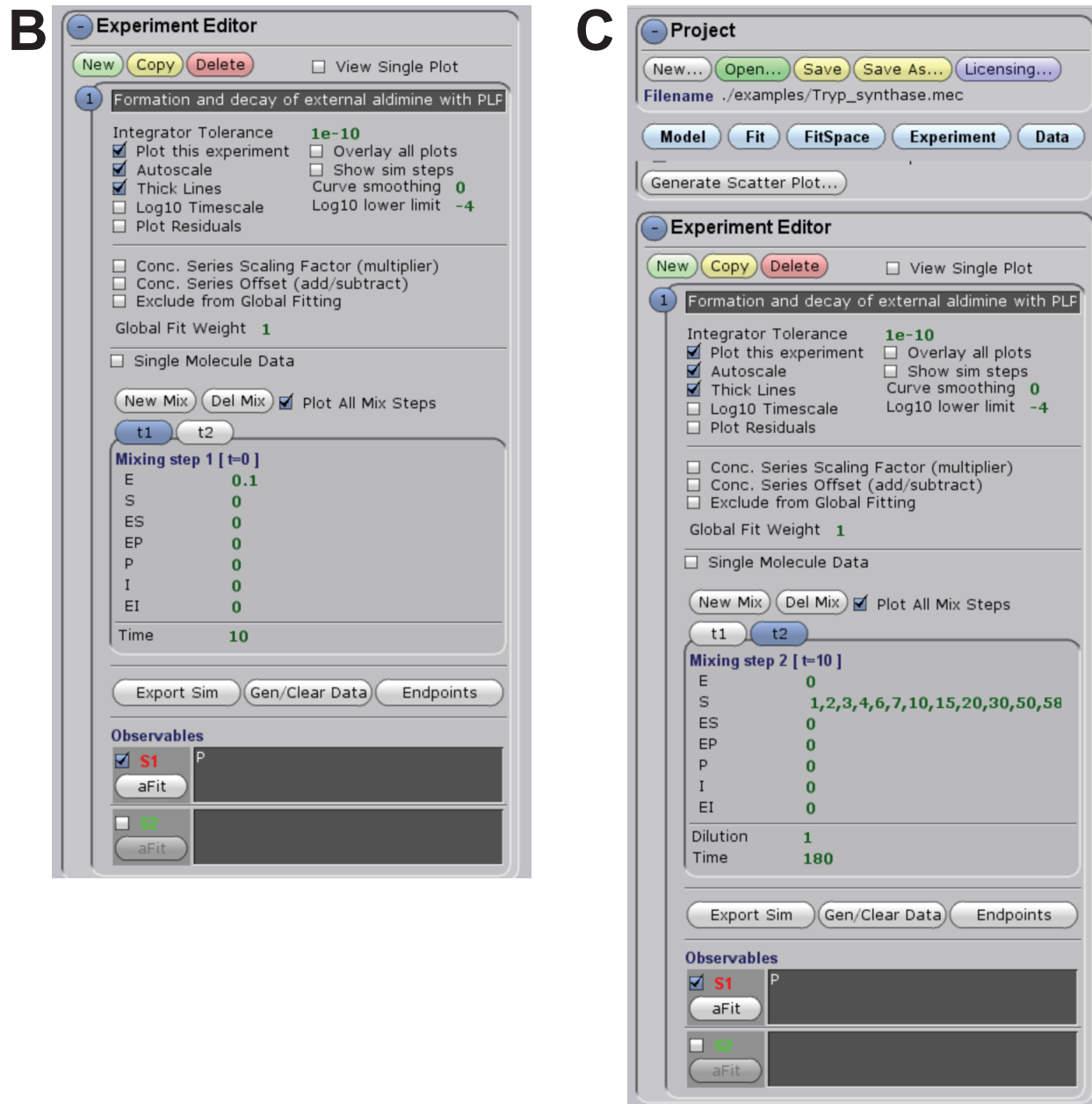


Fig. S1. Screenshot of KinTek Explorer® setup for the modeling in Fig. 1A. The three parts (A, B, C) show poses in the screen to indicate the basic setup.

Fig. S2

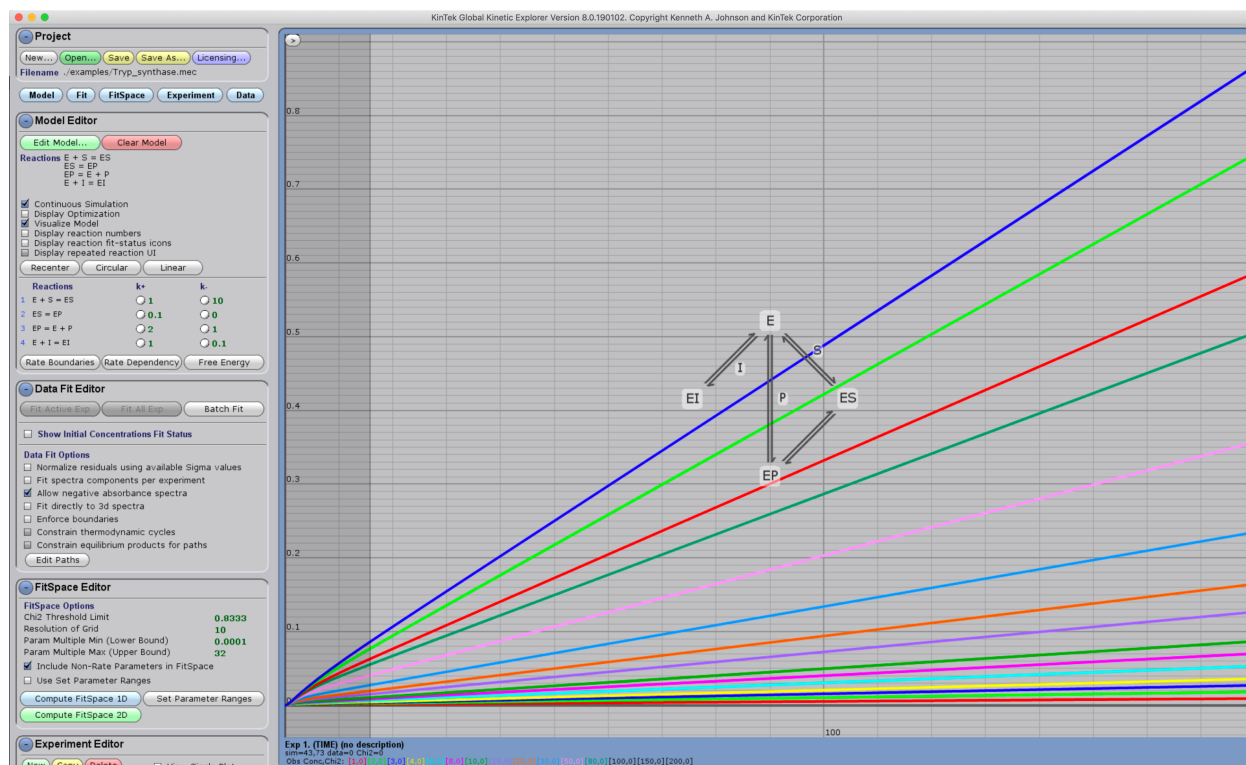


Fig. S2. Screenshot of KinTek Explorer® model for experiment of Fig. 1B. See parameters under Model Editor. Units are in μM and seconds (s^{-1} for first order reactions and $\mu\text{M}^{-1} \text{s}^{-1}$ for second order reactions). A “=” symbol indicates a reversible reaction, and a back reaction rate constant of zero is used to make a reaction irreversible.

Fig. S3

Experiment Editor

New Copy Delete ☐ View Single Plot

1

Integrator Tolerance **1e-08**

☒ Plot this experiment ☐ Overlay all plots

☒ Autoscale ☐ Show sim steps

☒ Thick Lines Curve smoothing **0**

☐ Log10 Timescale Log10 lower limit **-3**

☐ Plot Residuals

☐ Conc. Series Scaling Factor (multiplier)

☐ Conc. Series Offset (add/subtract)

☐ Exclude from Global Fitting

Global Fit Weight **1**

☐ Single Molecule Data

New Mix Del Mix ☐ Plot All Mix Steps

t1 t2

Mixing step 1 [t=0]

E	0.1
S	0
ES	0
EP	0
P	0
I	2
EI	0
Time	0.1

Export Sim Gen/Clear Data Endpoints

Export Simulation

Simulation Steps **200**

☒ Export Data Sigma

Export export ver p-2.7.14 m-2.2.0

Reagent Endpoints

E	0.00495968
S	0.990358
ES	0.000486325
EP	4.6844e-05
P	0.00910839
I	1.90549
EI	0.0945072

Export

Observables

☒ S1 P

aFit

☐ S2 I

aFit

Fig. S3. Step t_1 for the reaction model (Fig. 1B) shown in Fig. S1.

Fig. S4

Experiment Editor

New Copy Delete ☐ View Single Plot

1

Integrator Tolerance **1e-08**

☒ Plot this experiment ☐ Overlay all plots

☒ Autoscale ☐ Show sim steps

☒ Thick Lines Curve smoothing **0**

☐ Log10 Timescale Log10 lower limit **-3**

☐ Plot Residuals

☐ Conc. Series Scaling Factor (multiplier)

☐ Conc. Series Offset (add/subtract)

☐ Exclude from Global Fitting

Global Fit Weight **1**

☐ Single Molecule Data

New Mix Del Mix ☐ Plot All Mix Steps

t1 t2

Mixing step 2 [t=0.1]

E	0
S	1,2,3,4,6,8,10,15,20,30,50,80
ES	0
EP	0
P	0
I	0
EI	0
Dilution	1
Time	180

Export Sim Gen/Clear Data Endpoints

Export Simulation

Simulation Steps **200**

☒ Export Data Sigma

Export export ver p-2.7.14 m-2.2.0

Reagent Endpoints

E	0.00495968
S	0.990358
ES	0.000486325
EP	4.6844e-05
P	0.00910839
I	1.90549
EI	0.0945072

Export

Observables

☒ S1 P

aFit

☐ S2 I

aFit

Fig. S4. Step t_2 for the reaction mode (Fig. 1B) shown in Fig. S1.

Observables

☒ **S1** P

Analytic Fit Options for S1

Select Data to Fit:

☒ Fit to Simulated Observable

Select Analytic Function:

☒ Linear (a0,b)

☐ 1 Exp (a0,a1,b1)

☐ 2 Exp (a0,a1,b1,a2,b2)

☐ 3 Exp (a0,a1,b1,a2,b2,a3,b3)

☐ 4 Exp (a0,a1,b1,a2,b2,a3,b3,a4,b4)

☐ 1 Exp Burst (a0,a1,b1,b2)

☐ 2 Exp Burst (a0,a1,b1,a2,b2,b3)

☐ 3 Exp Burst (a0,a1,b1,a2,b2,a3,b3,b4)

☐ Polynomial of Degree

☐ Hyperbola (a0,a1,Kd)

☐ Michaelis (kcat, Km)

☐ Menten (kon,kcat)

☐ Quadratic (a0,a,Kd,E)

☐ Hill (a0,a,K,n)

☐ 2-Site (a0,a,K1,K2)

$$y = a_0 + b \cdot t$$

☐ Manage Initial Parameter Values

Fig. S5. Observables (Analytic Fit option) for analyzing the reaction model (Fig. 1B) in Fig. S1.

Fig. S6

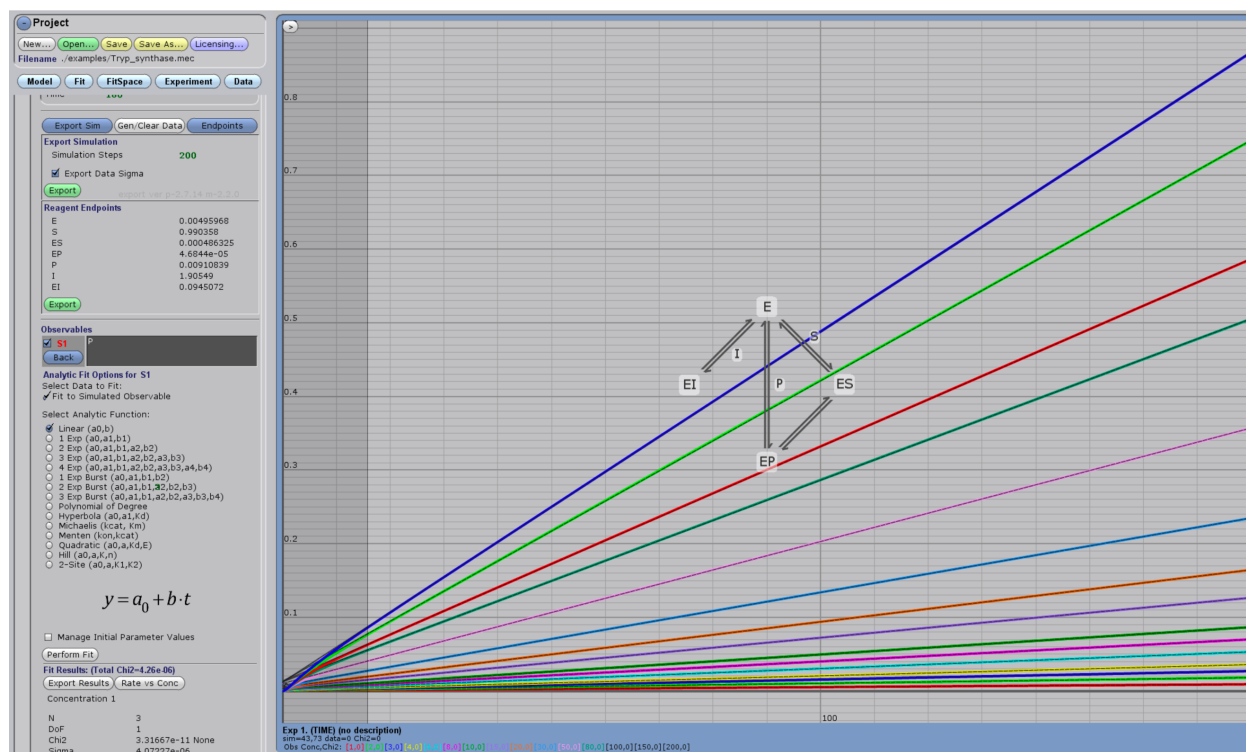


Fig. S6. Linear fitting of plots in Fig. S1.

Fig. S7

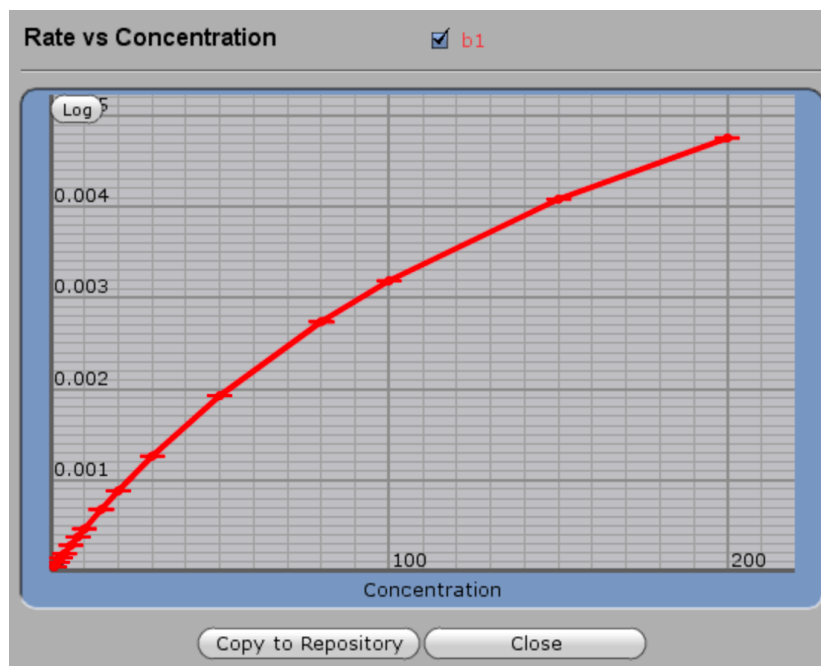


Fig. S7. Plot of <Rate vs. Conc> from rates obtained in Fig. S5 (Hyperbola). Alternatively <Michaelis> could have been selected to obtain the same result.

Fig. S8

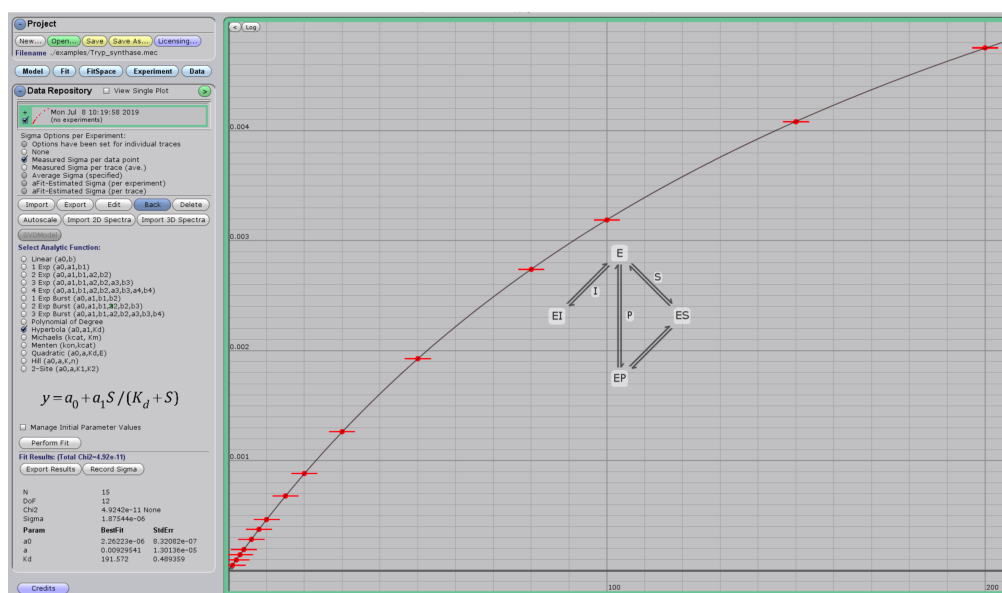


Fig. S8. Selected fit from Fig. S6 (following <Copy to Repository> in the step in Fig. S6).