

Parameter	$\mu^*$ (3 s.f.) $\mu M$	Proportionality
$k_{f,16}$	$1.07 \times 10^{-1}$	(-)
$R_{pc}$	$1.00 \times 10^{-1}$	(+)
$k_{f,15}$	$5.53 \times 10^{-2}$	(+)
$k_{f,12}$	$5.05 \times 10^{-2}$	(-)
$k_{f,6}$	$4.81 \times 10^{-2}$	(+)
$Ca$	$3.66 \times 10^{-2}$	(+)
$R$	$3.60 \times 10^{-2}$	(+)
$R$	$3.60 \times 10^{-2}$	(+)
$k_{f,8}$	$3.55 \times 10^{-2}$	(+)
$P_c$	$3.50 \times 10^{-2}$	(+)
$k_{f,14}$	$3.42 \times 10^{-2}$	(+)
$k_{r,8}$	$3.41 \times 10^{-2}$	(-)
$k_{f,10}$	$3.05 \times 10^{-2}$	(+)
$PIP2$	$2.28 \times 10^{-2}$	(+)
$P$	$2.08 \times 10^{-2}$	(+)
$k_{f,9}$	$1.81 \times 10^{-2}$	(-)
$R_g$	$1.29 \times 10^{-2}$	(+)
$K_{m,14}$	$1.28 \times 10^{-2}$	(-)
$k_{f,7}$	$1.19 \times 10^{-2}$	(-)
$L_s$	$8.40 \times 10^{-3}$	(+)
$K_{m,15}$	$8.30 \times 10^{-3}$	(-)
$k_{f,4}$	$8.00 \times 10^{-3}$	(+)
$k_{f,5}$	$7.54 \times 10^{-3}$	(-)
$k_{r,10}$	$6.70 \times 10^{-3}$	(-)
$G_d$	$5.95 \times 10^{-3}$	(+)
$K_{d,2}$	$5.49 \times 10^{-3}$	(-)
$k_{f,13}$	$4.95 \times 10^{-3}$	(-)
$k_{r,9}$	$2.72 \times 10^{-3}$	(+)
$K_{d,11}$	$2.11 \times 10^{-3}$	(-)
$k_{f,11}$	$2.09 \times 10^{-3}$	(-)

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Table S4: Model sensitivity analysis results: Peak Concentration The full list of significant parameters is given. Parameters are ranked by  $\mu^*$ . Additionally, a column depicting whether the parameter is proportional (+) or inversely proportional (-) to the objective function is supplied. The measure of proportionality is taken from the sign of  $\mu$ , hence reveals the effect of the parameter on the objective function direction on average across all tests.