```
final simplex: (array([[6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                          7.46000827e+03, 2.06035955e+04, 6.61140843e-04, 2.63846605e+00,
                                                                                                           6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
                                                                                                          6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00, 7.46000827e+03, 2.06035955e+04, 6.61140841e-04, 2.63846606e+00,
                                                                                                          6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
                                                                                                          6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                           7.46000827e+03, 2.06035955e+04, 6.61140844e-04, 2.63846605e+00,
                                                                                                          6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
                                                                                                          6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                          7.46000827e+03, 2.06035956e+04, 6.61140846e-04, 2.63846605e+00,
                                                                                                          6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                           7.46000827e+03, 2.06035955e+04, 6.61140843e-04, 2.63846604e+00,
                                                                                                           6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
                                                                                                          6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                          7.46000827e+03, 2.06035955e+04, 6.61140843e-04, 2.63846605e+00,
                                                                                                           6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
                                                                                                          6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                          7.46000827e+03, 2.06035955e+04, 6.61140843e-04, 2.63846606e+00,
      ['SM data type data plots for mutation', 'Regulatool8]e+02, 3.24643802e+04, 1776005e-04, 4.56769262e+00, ucer -> sensor (GFP output) inducer -> S[6] 18047088 24091, 1.6278856 5e+0 Converged 79e+03, 1.09654125e+00,
inducer -> sensor (GFP output)
                                                                                                           7.46000827e+03, 2.0603595 ---- 4Converged 44e-04, 2.63846605e+00,
                                                                                                         6.83835638e+02, 3.2464380 e+0 Converged 5e-04, 4.56769262e+00, 6.32148081e-01, 9.72768210 e-01, Converged 79e+03, 1.09654125e+00, [6.18047086e+02, 1.6278856
                                                                                                           7.46000826e+03, 2.\phi6035955e+04, 6.61140844e-04, 2.63846604e+00,
                                                                       10^{4}
                                                                                                          6.89835638e+02, 9.24643802e+04, 4.73376905e-04, 4.56769262e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                           7.46000827e+03, 2.\06035955e+04, 6.61140843e-04, 2.63846606e+00,
                                                                                                           6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
                                                                                                           6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         <u>[6.18047086e+02, 1.6</u>2788566e+04, 1.30065379e+03, 1.09654125e+00, 7046000827e+03, 2.06035956e+04, 6.61140846e-04, 2.63846604e+00,
                                        10-2
                                                                            10<sup>-5</sup>
                          10-3
                                                                                           10^{-4}
                                                                                         inducer -> S -| Output (GFP)
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                           7.46000827e+03, 2.\06035955e+04, 6.61140840e-04, 2.63846607e+00,
                                                                 4 \times 10^{3}
                                                                                                          🖚83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
                                                                                                           632148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                 3 \times 10^{3}
                                                                                                          [6:18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                          7.46000627e+03, 2.06035955e+04, 6.61140843e-04, 2.63846605e+00, 6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00, 6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                 2 \times 10^{3}
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                                                                                                          7.46000827e+03, 2.06035955e+04, 6.61140843e-04, 2.63846606e+00,
                                                                                                         6.83835638e \pm 0.2, 3.24643802e \pm 0.4, 4.73376905e \pm 0.4, 4.56769262e \pm 0.0, 6.83835638e \pm 0.0, 7.2768210e \pm 0.0, 2.64017386e \pm 0.0, 1.91933916e \pm 0.0, [6.18047086e \pm 0.0], [6.18047086e \pm
                                                                             10^{-5}
                                        10^{-2}
                                                       10^{-1}
                                                                                           10^{-4}
                          10^{-3}
         Across all four plots:
                                                                                                           7.46000827e+03, 2.06035956e+04, 6.61140845e-04, 2.63846604e+00,
                                                                                                           6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
            RSS (converged)=0.225
                                                                                                          6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
           RSS (initial)=5.56
                                                                                                          7.46000827e+03, 2.06035955e+04, 6.61140842e-04, 2.63846606e+00,
                                                                                                          6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
           RSS (% reduction)=0.961
                                                                                                          6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00],
                                                                                                         [6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                     epsilon Initial guesses
                                                                Converged
                                                                                                           7.46000827e+03, 2.06035956e+04, 6.61140844e-04, 2.63846605e+00,
                                         618.047086 618.047086
                  0.000000
                                                                                                          6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
                  0.000000
                                       16278.856600 16278.856600
                                                                                                          6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00]]), array([0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541284, 0.22541284, 0.22541284, 0.22541284, 0.22541284, 0.22541284, 0.22541284, 0.22541284, 0.22
                                        1300.653790 1300.653790
                  0.000000
                                                                                                         0.22541283, 0.22541283, 0.22541283, 0.22541283, 0.22541283,
                  0.000000
                                           1.096541
                                                                1.096541
                                                                                                         0.22541283,\ 0.22541283,\ 0.22541283,\ 0.22541283,\ 0.22541283,
       A r 5543.832656
                                           1916.175610 7460.008266
                                                                                                         0.22541283, 0.22541283]))
                                          18874.240800 20603.595543
       B r 1729.354743
                                                                                                             fun: 0.22541282914799146
                                           0.009030
                                                                 0.000661
                -0.008369
                                                                                                         message: 'Optimization terminated successfully.'
                                           0.820433
                 1.818033
                                                                  2.638466
                                                                                                            nfev: 3170
                  0.000000
                                          683.835638
                                                                683.835638
                                                                                                             nit: 2209
                                        32464.380200 32464.380200
                   0.000000
                                                                                                          status: 0
                                            0.000473
                   0.000000
                                                                  0.000473
                                                                                                         success: True
                  1.746341
                                           2.821352
                                                                  4.567693
                                                                                                               x: array([6.18047086e+02, 1.62788566e+04, 1.30065379e+03, 1.09654125e+00,
                  0.000000
                                           0.632148
                                                                  0.632148
                                                                                                         7.46000827e+03, 2.06035955e+04, 6.61140843e-04, 2.63846605e+00,
                  0.000000
                                            0.972768
                                                                  0.972768
                                                                                                         6.83835638e+02, 3.24643802e+04, 4.73376905e-04, 4.56769262e+00,
                   0.000000
                                            2.640174
                                                                  2.640174
                                                                                                         6.32148081e-01, 9.72768210e-01, 2.64017386e+00, 1.91933916e+00])
```

 $10^{4}$ 

 $10^{3}$ 

 $10^{4}$ 

 $10^{3}$ 

 $10^{-5}$ 

 $10^{-4}$ 

 $10^{-4}$ 

Bs

C s

 $N_s$ 

Сr

Νr

Αh

Βh

Ch

Fο

Αо Во

Со

0.000000

1.919339

1.919339