# CHBE 552 Problem Set 4

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Table 1: GN-M Method Results

| Q1 | kH & CI | kR & CI | KA & CI |
|---|---|---|---|
| Model A 600 | 0.094 [0.069 0.118] | 0.607 [0.400 0.812] | 0.517 [0.390 0.642] |
| Model A 575 | 0.832 [0.779 0.934] | 0.119 [0.112 0.124] | 0.397 [0.352 0.442] |
| Model B 600 | 0.084 [0.064 0.103] | 0.732 [0.515 0.948] | 0.516 [0.346 0.451] |
| Model B 575 | 0.922 [0.834 1.012] | 0.126 [0.118 0.133] | 0.399 [0.346 0.451] |
| Q2 | ko & CI | kp & CI | |
| | 1330.8 [1209.5 1407.7] | 0.612 [0.411 0.803] | |

Note that "CI" refers to 95% confidence interval.

Table 2: Results for Model A at T = 600 Parameter Estimation of Q1 using modified G-N method

| Iteration Number | Objective Function Value | kH | kR | KA |
|---|---|---|---|---|
| 1 | 0.000260 | 0.085 | 0.683 | 0.520 |
| 2 | 0.000066 | 0.088 | 0.668 | 0.522 |
| 3 | 0.000064 | 0.089 | 0.656 | 0.522 |
| 4 | 0.000064 | 0.090 | 0.646 | 0.521 |
| 5 | 0.000064 | 0.091 | 0.638 | 0.520 |
| 6 | 0.000064 | 0.092 | 0.631 | 0.519 |
| 7 | 0.000063 | 0.092 | 0.626 | 0.519 |
| 8 | 0.000063 | 0.092 | 0.621 | 0.518 |
| 9 | 0.000063 | 0.093 | 0.618 | 0.518 |
| 10 | 0.000063 | 0.093 | 0.616 | 0.518 |
| 11 | 0.000063 | 0.093 | 0.613 | 0.517 |
| 12 | 0.000063 | 0.093 | 0.612 | 0.517 |
| 13 | 0.000063 | 0.094 | 0.611 | 0.517 |
| 14 | 0.000063 | 0.094 | 0.610 | 0.517 |
| 15 | 0.000063 | 0.094 | 0.609 | 0.517 |
| 16 | 0.000063 | 0.094 | 0.608 | 0.517 |
| 17 | 0.000063 | 0.094 | 0.608 | 0.517 |
| 18 | 0.000063 | 0.094 | 0.608 | 0.517 |
| 19 | 0.000063 | 0.094 | 0.607 | 0.517 |
| 20 | 0.000063 | 0.094 | 0.607 | 0.517 |
| 21 | 0.000063 | 0.094 | 0.607 | 0.517 |
| 22 | 0.000063 | 0.094 | 0.607 | 0.517 |
| 23 | 0.000063 | 0.094 | 0.607 | 0.517 |

Table 3: Results for Model A at T = 575 Parameter Estimation of Q1 using modified G-N method

| Iteration Number | Objective Function Value | kH | kR | KA |
|---|---|---|---|---|
| 1 | 0.000889 | 0.109 | 0.177 | 0.472 |
| 2 | 0.000013 | 0.127 | 0.172 | 0.447 |
| 3 | 0.000006 | 0.142 | 0.163 | 0.431 |
| 4 | 0.000005 | 0.157 | 0.157 | 0.421 |
| 5 | 0.000004 | 0.171 | 0.152 | 0.415 |
| 6 | 0.000003 | 0.183 | 0.149 | 0.412 |
| 7 | 0.000003 | 0.194 | 0.146 | 0.410 |
| 8 | 0.000003 | 0.203 | 0.145 | 0.408 |
| 9 | 0.000003 | 0.212 | 0.143 | 0.407 |
| 10 | 0.000003 | 0.219 | 0.142 | 0.407 |
| 11 | 0.000002 | 0.226 | 0.141 | 0.406 |
| 12 | 0.000002 | 0.233 | 0.140 | 0.406 |
| 13 | 0.000002 | 0.239 | 0.139 | 0.405 |
| 14 | 0.000002 | 0.245 | 0.138 | 0.405 |
| 15 | 0.000002 | 0.250 | 0.137 | 0.405 |
| 16 | 0.000002 | 0.256 | 0.137 | 0.405 |
| 17 | 0.000002 | 0.260 | 0.136 | 0.404 |
| 18 | 0.000002 | 0.265 | 0.136 | 0.404 |
| 19 | 0.000002 | 0.270 | 0.135 | 0.404 |
| 20 | 0.000002 | 0.274 | 0.135 | 0.404 |
| 21 | 0.000002 | 0.278 | 0.135 | 0.404 |
| 22 | 0.000002 | 0.282 | 0.134 | 0.403 |
| 23 | 0.000002 | 0.286 | 0.134 | 0.403 |
| 24 | 0.000002 | 0.290 | 0.134 | 0.403 |
| 25 | 0.000002 | 0.293 | 0.133 | 0.403 |
| 26 | 0.000002 | 0.297 | 0.133 | 0.403 |
| 27 | 0.000002 | 0.300 | 0.133 | 0.403 |
| 28 | 0.000002 | 0.303 | 0.132 | 0.403 |
| 29 | 0.000002 | 0.306 | 0.132 | 0.403 |
| 30 | 0.000002 | 0.310 | 0.132 | 0.403 |
| ... | ... | ... | ... | ... |
| 996 | 0.000001 | 0.831 | 0.119 | 0.397 |
| 997 | 0.000001 | 0.831 | 0.119 | 0.397 |
| 998 | 0.000001 | 0.832 | 0.119 | 0.397 |
| 999 | 0.000001 | 0.832 | 0.119 | 0.397 |
| 1000 | 0.000001 | 0.832 | 0.119 | 0.397 |

Table 4: Results for Model B at T = 600 Parameter Estimation of Q1 using modified G-N method

| Iteration Number | Objective Function Value | kH | kR | KA |
|---|---|---|---|---|
| 1 | 0.000092 | 0.094 | 0.628 | 0.504 |
| 2 | 0.000066 | 0.091 | 0.649 | 0.506 |
| 3 | 0.000065 | 0.090 | 0.665 | 0.508 |
| 4 | 0.000064 | 0.088 | 0.678 | 0.510 |
| 5 | 0.000064 | 0.087 | 0.688 | 0.511 |
| 6 | 0.000064 | 0.087 | 0.696 | 0.512 |
| 7 | 0.000064 | 0.086 | 0.702 | 0.512 |
| 8 | 0.000064 | 0.086 | 0.707 | 0.513 |
| 9 | 0.000064 | 0.085 | 0.712 | 0.513 |
| 10 | 0.000064 | 0.085 | 0.715 | 0.514 |
| 11 | 0.000064 | 0.085 | 0.718 | 0.514 |
| 12 | 0.000064 | 0.085 | 0.721 | 0.514 |
| 13 | 0.000063 | 0.084 | 0.723 | 0.515 |
| 14 | 0.000063 | 0.084 | 0.724 | 0.515 |
| 15 | 0.000063 | 0.084 | 0.726 | 0.515 |
| 16 | 0.000063 | 0.084 | 0.727 | 0.515 |
| 17 | 0.000063 | 0.084 | 0.728 | 0.515 |
| 18 | 0.000063 | 0.084 | 0.728 | 0.515 |
| 19 | 0.000063 | 0.084 | 0.729 | 0.515 |
| 20 | 0.000063 | 0.084 | 0.730 | 0.515 |
| 21 | 0.000063 | 0.084 | 0.730 | 0.515 |
| 22 | 0.000063 | 0.084 | 0.731 | 0.515 |
| 23 | 0.000063 | 0.084 | 0.731 | 0.515 |
| 24 | 0.000063 | 0.084 | 0.731 | 0.515 |
| 25 | 0.000063 | 0.084 | 0.731 | 0.515 |
| 26 | 0.000063 | 0.084 | 0.732 | 0.515 |
| 27 | 0.000063 | 0.084 | 0.732 | 0.516 |
| 28 | 0.000063 | 0.084 | 0.732 | 0.516 |
| 29 | 0.000063 | 0.084 | 0.732 | 0.516 |
| 30 | 0.000063 | 0.084 | 0.732 | 0.516 |

Table 5: Results for Model B at T = 575 Parameter Estimation of Q1 using modified G-N method

| Iteration Number | Objective Function Value | kH | kR | KA |
|---|---|---|---|---|
| 1 | 0.001072 | 0.033 | 0.564 | 0.512 |
| 2 | 0.000095 | 0.042 | 0.555 | 0.515 |
| 3 | 0.000021 | 0.043 | 0.542 | 0.517 |
| 4 | 0.000020 | 0.044 | 0.529 | 0.518 |
| 5 | 0.000019 | 0.045 | 0.516 | 0.518 |
| 6 | 0.000019 | 0.045 | 0.502 | 0.517 |
| 7 | 0.000019 | 0.046 | 0.489 | 0.515 |
| 8 | 0.000018 | 0.047 | 0.475 | 0.513 |
| 9 | 0.000018 | 0.048 | 0.460 | 0.511 |
| 10 | 0.000018 | 0.049 | 0.445 | 0.507 |
| 11 | 0.000017 | 0.050 | 0.430 | 0.504 |
| 12 | 0.000017 | 0.051 | 0.414 | 0.500 |
| 13 | 0.000016 | 0.052 | 0.397 | 0.495 |
| 14 | 0.000016 | 0.054 | 0.380 | 0.490 |
| 15 | 0.000015 | 0.056 | 0.361 | 0.485 |
| 16 | 0.000014 | 0.059 | 0.342 | 0.479 |
| 17 | 0.000014 | 0.062 | 0.322 | 0.472 |
| 18 | 0.000013 | 0.066 | 0.300 | 0.466 |
| 19 | 0.000012 | 0.071 | 0.278 | 0.458 |
| 20 | 0.000011 | 0.079 | 0.255 | 0.450 |
| 21 | 0.000009 | 0.089 | 0.232 | 0.442 |
| 22 | 0.000008 | 0.103 | 0.212 | 0.434 |
| 23 | 0.000007 | 0.120 | 0.195 | 0.427 |
| 24 | 0.000006 | 0.137 | 0.184 | 0.421 |
| 25 | 0.000005 | 0.153 | 0.177 | 0.417 |
| 26 | 0.000004 | 0.166 | 0.172 | 0.414 |
| 27 | 0.000004 | 0.178 | 0.168 | 0.412 |
| 28 | 0.000003 | 0.189 | 0.165 | 0.411 |
| 29 | 0.000003 | 0.199 | 0.163 | 0.410 |
| 30 | 0.000003 | 0.207 | 0.161 | 0.409 |
| ... | ... | ... | ... | ... |
| 996 | 0.000001 | 0.922 | 0.126 | 0.399 |
| 997 | 0.000001 | 0.923 | 0.126 | 0.399 |
| 998 | 0.000001 | 0.923 | 0.126 | 0.399 |
| 999 | 0.000001 | 0.923 | 0.126 | 0.399 |
| 1000 | 0.000001 | 0.923 | 0.126 | 0.399 |

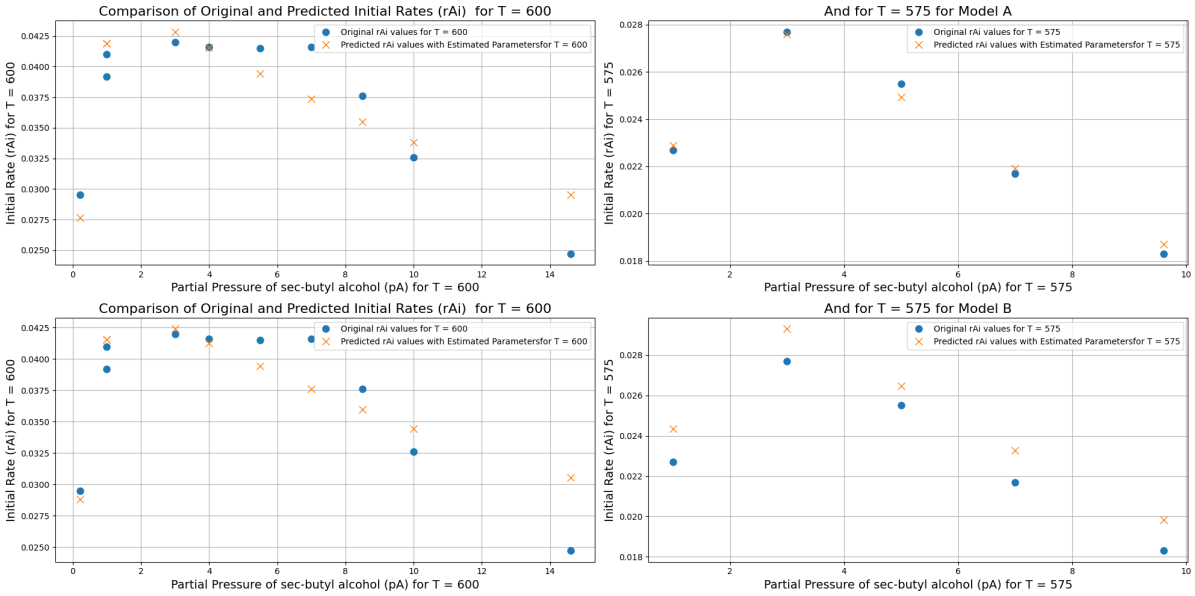


Figure 1: Caption of the image.

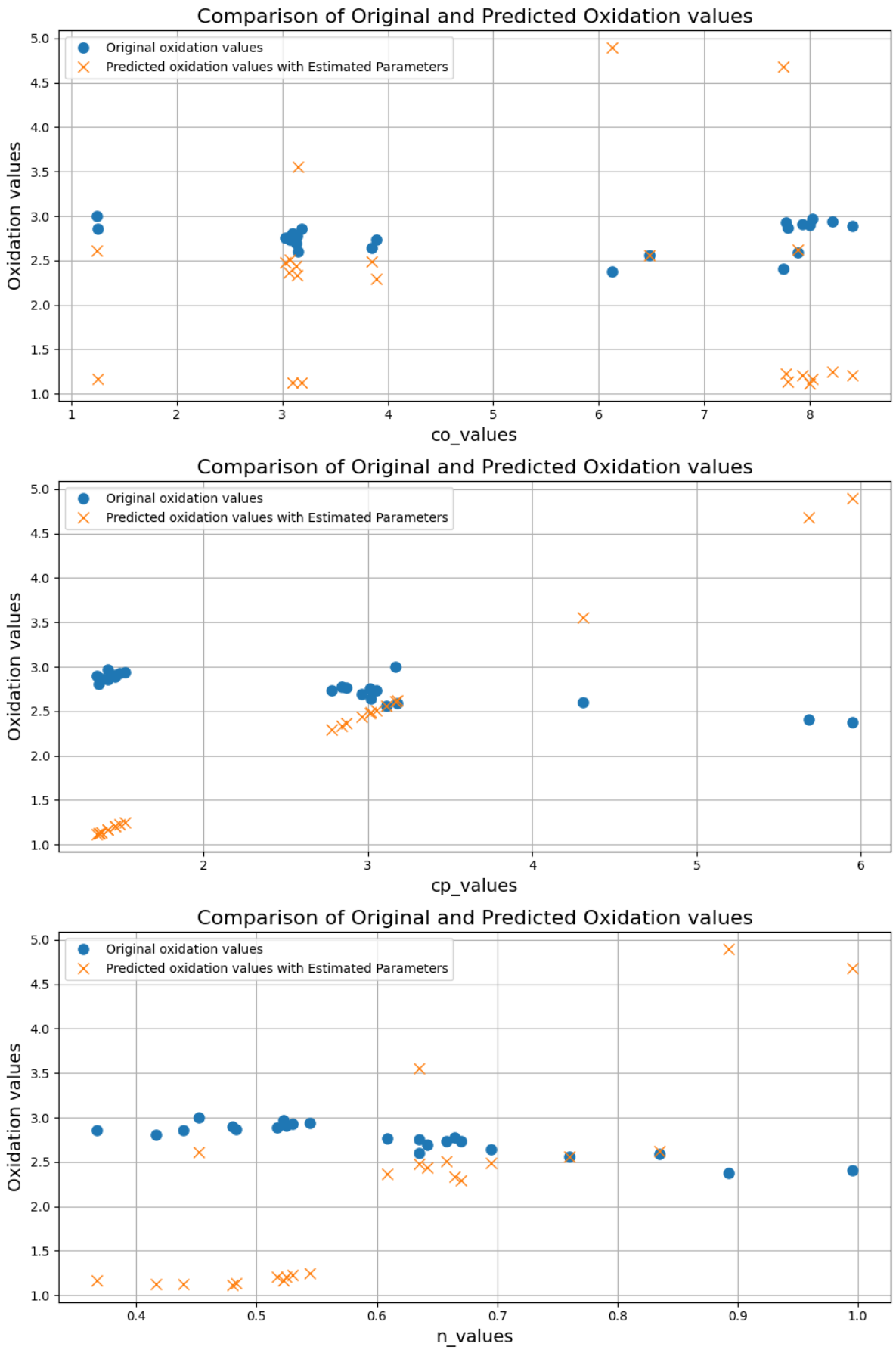


Figure 2: Caption of the image.

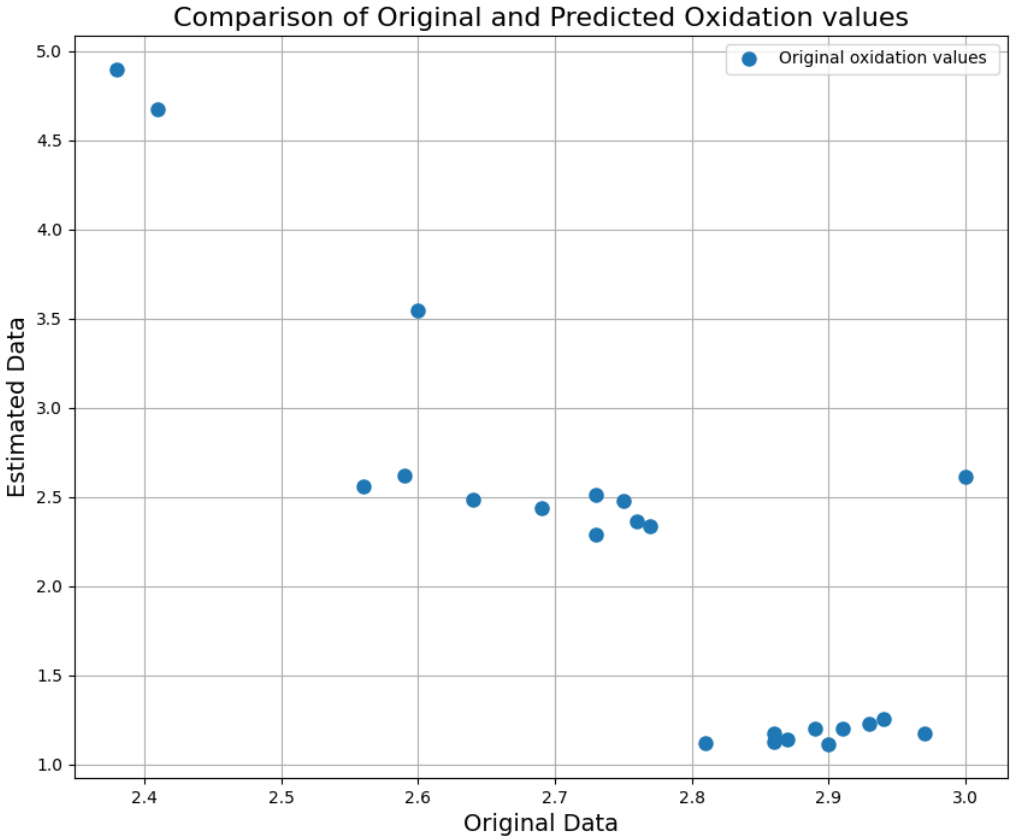


Figure 3: Caption of the image.

Table 6: LJ Method Results

| Q1 | kH | kR | KA |
|---|---|---|---|
| Model A 600 | 0.0876 | 0.6444 | 0.4261 |
| Model A 575 | 0.1259 | 0.0773 | 0.3467 |
| Model B 600 | 0.1896 | 0.2715 | 0.5857 |
| Model B 575 | 0.1610 | 0.9212 | 0.0468 |
| Q2 | ko | kp | |
| | 1325 | 0.692 | |