

**APPENDIX D** Experiment data @ pH 2

| Run # | Time (secs) | Mass of Sample (g) | Mass of HNO <sub>3</sub> (g) | Flow rate (g sol/min) | m <sub>Si</sub> (mol/kg) | m <sub>Ca</sub> (mol/kg) |
|-------|-------------|--------------------|------------------------------|-----------------------|--------------------------|--------------------------|
| A1    | 16290       | 6.50               | 0                            | 0.43                  | 7.22E-04                 | 1.63E-03                 |
| A2    | 80220       | 15.06              | 0                            | 0.89                  | 7.41E-05                 | 3.41E-04                 |
| A3    | 165600      | 15.23              | 0                            | 0.85                  | 3.82E-05                 | 1.70E-04                 |
| A4    | 250380      | 15.16              | 0                            | 0.84                  | 1.89E-05                 | 1.28E-04                 |
| A5    | 336840      | 16.24              | 0                            | 0.90                  | 1.48E-05                 | 1.12E-04                 |
| A6    | 446700      | 12.10              | 0                            | 0.81                  | 1.29E-05                 | 1.04E-04                 |
| A7    | 597660      | 11.99              | 0                            | 0.80                  | 1.18E-05                 | 9.46E-05                 |
| A8    | 609900      | 12.87              | 0                            | 0.86                  | 1.23E-05                 | 1.01E-04                 |
| A9    | 687945      | 15.09              | 0                            | 0.75                  | 1.22E-05                 | 1.76E-04                 |
| Q0    | 120         | 27.20              | 0                            | 13.60                 | 0.00E+00                 | 0.00E+00                 |
| Q1    | 720         | 27.20              | 0                            | 13.60                 | 1.15E-04                 | 4.78E-04                 |
| Q2    | 4320        | 27.45              | 0                            | 13.73                 | 8.49E-05                 | 1.47E-04                 |
| Q3    | 14520       | 27.43              | 0                            | 13.72                 | 2.53E-05                 | 5.53E-05                 |
| Q4    | 87918       | 26.40              | 0                            | 11.48                 | 3.01E-06                 | 1.51E-05                 |
| Q1    | 720         | 27.20              | 0                            | 13.60                 | 1.14E-04                 | -----                    |
| Q2    | 4320        | 27.45              | 0                            | 13.73                 | 7.74E-05                 | -----                    |
| Q3    | 14520       | 27.43              | 0                            | 13.72                 | 2.66E-05                 | -----                    |
| R0    | 150         | 24.77              | 0                            | 9.91                  | 0.00E+00                 | 0.00E+00                 |
| R1    | 1050        | 24.77              | 0                            | 9.91                  | 1.30E-04                 | 6.78E-04                 |
| R2    | 5520        | 25.76              | 0                            | 12.88                 | 3.76E-05                 | 1.12E-04                 |
| R3    | 14520       | 24.89              | 0                            | 12.45                 | 1.93E-05                 | 5.38E-05                 |
| R4    | 28320       | 29.63              | 0                            | 14.82                 | 7.45E-06                 | 2.76E-05                 |
| R5    | 72570       | 24.32              | 0                            | 9.73                  | 3.72E-06                 | 1.54E-05                 |
| R6    | 88620       | 27.59              | 0                            | 9.20                  | 3.69E-06                 | 1.59E-05                 |
| T0    | 120         | 23.05              | 0                            | 11.53                 | 0.00E+00                 | -----                    |
| T1    | 420         | 23.05              | 0                            | 11.53                 | 4.86E-05                 | -----                    |
| T1a   | 420         | 23.05              | 0                            | 11.53                 | 4.61E-05                 | -----                    |
| T2    | 73200       | 24.24              | 0                            | 8.08                  | 4.59E-06                 | -----                    |
| T2a   | 73200       | 24.24              | 0                            | 8.08                  | 4.37E-06                 | -----                    |
| T3    | 89250       | 26.66              | 0                            | 10.66                 | 2.67E-06                 | -----                    |
| T3a   | 89250       | 26.66              | 0                            | 10.66                 | 2.20E-06                 | -----                    |

**APPENDIX D** Experiment data @ pH 2

| Run # | Time (secs) | Mass of Sample (g) | Mass of HNO <sub>3</sub> (g) | Flow rate (g sol/min) | m <sub>Si</sub> (mol/kg) | m <sub>Ca</sub> (mol/kg) |
|-------|-------------|--------------------|------------------------------|-----------------------|--------------------------|--------------------------|
| U0    | 732         | 31.07              | 0                            | 2.55                  | 1.68E-04                 | 0.00E+00                 |
| U1    | 1632        | 31.07              | 0                            | 2.55                  | 3.35E-04                 | 1.43E-03                 |
| U2    | 15960       | 23.72              | 0                            | 1.48                  | 4.90E-04                 | 8.13E-04                 |
| U3    | 83220       | 23.45              | 0                            | 1.02                  | 5.02E-05                 | 2.16E-04                 |
| U4    | 97200       | 17.61              | 0                            | 0.70                  | 3.85E-05                 | 1.99E-04                 |
| U5    | 99600       | 24.05              | 0                            | 2.41                  | 6.75E-06                 | 3.40E-05                 |
| U6    | 159900      | 24.15              | 0                            | 1.86                  | 8.74E-06                 | 5.79E-05                 |
| U7    | 161700      | 29.01              | 0                            | 5.80                  | 3.24E-06                 | 2.20E-05                 |
| U8    | 177060      | 25.27              | 0                            | 6.32                  | 2.94E-06                 | 1.85E-05                 |
| U9    | 346020      | 25.29              | 0                            | 5.06                  | 2.47E-06                 | -----                    |
| U9    | 346020      | 25.29              | 0                            | 5.06                  | 2.66E-06                 | 1.94E-05                 |
| U10   | 509700      | 23.87              | 0                            | 4.77                  | 2.66E-06                 | 1.94E-05                 |
| U11   | 600000      | 26.95              | 0                            | 13.48                 | 1.02E-06                 | 4.80E-06                 |

**APPENDIX D** Experiment data @ pH 3

| Run # | Time (secs) | Mass of Sample (g) | Mass of HNO <sub>3</sub> (g) | Flow rate (g sol/min) | m <sub>Si</sub> (mol/kg) | m <sub>Ca</sub> (mol/kg) |
|-------|-------------|--------------------|------------------------------|-----------------------|--------------------------|--------------------------|
| J0    | 120         | 24.36              | 0.99                         | 12.18                 | 0.00E+00                 | 0.00E+00                 |
| J1    | 1020        | 24.36              | 0.99                         | 12.18                 | 4.01E-05                 | 2.67E-04                 |
| J2    | 5340        | 21.52              | 0.77                         | 10.76                 | 3.17E-05                 | 6.10E-05                 |
| J3    | 16530       | 24.95              | 1.06                         | 9.98                  | 1.11E-05                 | 3.31E-05                 |
| J4    | 65550       | 26.10              | 0.96                         | 10.44                 | 1.93E-06                 | 1.63E-05                 |
| J5    | 73800       | 27.11              | 0.84                         | 13.56                 | 1.54E-06                 | 1.31E-05                 |
| J6    | 82920       | 24.50              | 0.97                         | 17.50                 | 2.61E-06                 | 1.68E-05                 |
| J4    | 65550       | 26.10              | 0.96                         | 10.44                 | 2.28E-06                 | -----                    |
| J5    | 73800       | 27.11              | 0.84                         | 13.56                 | 1.71E-06                 | -----                    |
| J6    | 82920       | 24.50              | 0.97                         | 17.50                 | 2.54E-06                 | -----                    |
|       |             |                    |                              |                       |                          |                          |
| K0    | 180         | 25.06              | 1.02                         | 8.35                  | 0.00E+00                 | 0.00E+00                 |
| K1    | 1080        | 25.06              | 1.02                         | 8.35                  | 3.70E-05                 | 4.77E-04                 |
| K2    | 14580       | 23.50              | 0.92                         | 7.83                  | 1.17E-05                 | 4.09E-05                 |
| K3    | 29100       | 26.42              | 0.89                         | 5.28                  | 7.94E-06                 | 4.25E-05                 |
| K4    | 91260       | 24.80              | 0.93                         | 4.96                  | 3.54E-06                 | 2.73E-05                 |
| K1    | 1080        | 25.06              | 1.02                         | 8.35                  | 3.70E-05                 | 3.98E-04                 |
|       |             |                    |                              |                       |                          |                          |
| L0    | 210         | 26.97              | 1.00                         | 7.71                  | 0.00E+00                 | 0.00E+00                 |
| L1    | 1410        | 26.97              | 1.00                         | 7.71                  | 8.34E-05                 | 5.79E-04                 |
| L2    | 14700       | 25.28              | 0.95                         | 5.06                  | 1.71E-05                 | 5.90E-05                 |
| L3    | 27000       | 28.61              | 1.04                         | 5.72                  | 7.49E-06                 | 3.22E-05                 |
| L4    | 56700       | 29.97              | 0.95                         | 7.49                  | 2.61E-06                 | 1.74E-05                 |
| L5    | 85680       | 23.64              | 0.92                         | 7.88                  | 2.63E-06                 | 1.87E-05                 |
|       |             |                    |                              |                       |                          |                          |
| S0    | 78          | 26.52              | 1.05                         | 20.40                 | 0.00E+00                 | 0.00E+00                 |
| S1    | 378         | 26.52              | 1.05                         | 20.40                 | 1.09E-05                 | 2.27E-04                 |
| S2    | 73890       | 25.54              | 1.06                         | 10.22                 | 2.88E-06                 | 1.25E-05                 |
| S3    | 90270       | 24.08              | 1.05                         | 9.63                  | 3.00E-06                 | 1.20E-05                 |

**APPENDIX D** Experiment data @ pH 4

| Run # | Time (secs) | Mass of Sample (g) | Mass of HNO <sub>3</sub> (g) | Flow rate (g sol/min) | m <sub>Si</sub> (mol/kg) | m <sub>Ca</sub> (mol/kg) |
|-------|-------------|--------------------|------------------------------|-----------------------|--------------------------|--------------------------|
| B1    | 2400        | 15.43              | 1.03                         | 1.03                  | 3.57E-05                 | 6.58E-05                 |
| B2    | 3600        | 15.44              | 1.01                         | 1.03                  | 3.24E-05                 | 6.98E-05                 |
| B3    | 8115        | 19.61              | 1.00                         | 0.97                  | 2.59E-05                 | 6.28E-05                 |
| B4    | 15900       | 19.31              | 0.99                         | 0.97                  | 3.99E-05                 | 6.07E-05                 |
| B5    | 84000       | 22.41              | 1.01                         | 1.12                  | 4.61E-05                 | 5.63E-05                 |
| B6    | 109710      | 18.13              | 1.00                         | 1.17                  | 4.45E-05                 | 5.89E-05                 |
| B7    | 169800      | 19.77              | 0.99                         | 0.94                  | 4.11E-05                 | 5.45E-05                 |
| B8    | 183000      | 18.76              | 1.00                         | 0.94                  | 4.23E-05                 | 5.30E-05                 |
| B9    | 427800      | 18.67              | 1.03                         | 0.93                  | 3.14E-05                 | 5.41E-05                 |
| B10   | 518940      | 24.20              | 1.02                         | 1.15                  | 5.97E-05                 | 5.75E-05                 |
| B11   | 597270      | 20.10              | 1.03                         | 0.98                  | 5.44E-05                 | 4.98E-05                 |
| B12   | 685200      | 19.60              | 1.05                         | 0.98                  | 4.82E-05                 | 4.99E-05                 |
| B13   | 770886      | 19.73              | 1.05                         | 0.99                  | 3.00E-05                 | 5.61E-05                 |
|       |             |                    |                              |                       |                          |                          |
| G0    | 60          | 23.61              | 1.06                         | 23.61                 | 9.97E-07                 | 0.00E+00                 |
| G1    | 660         | 23.61              | 1.06                         | 23.61                 | 4.61E-06                 | 3.45E-05                 |
| G2    | 1320        | 26.93              | 1.08                         | 13.47                 | 6.94E-06                 | 4.73E-05                 |
| G3    | 1920        | 27.14              | 1.09                         | 13.57                 | 6.37E-06                 | 4.63E-05                 |
| G4    | 3720        | 23.73              | 1.05                         | 11.87                 | 5.42E-06                 | 4.43E-05                 |
| G5    | 5509.8      | 26.57              | 1.06                         | 14.52                 | 4.19E-06                 | 3.65E-05                 |
| G6    | 7320        | 28.74              | 1.07                         | 14.37                 | 4.47E-06                 | 3.20E-05                 |
| G7    | 9132        | 31.06              | 1.06                         | 14.12                 | 4.34E-06                 | 2.98E-05                 |
| G8    | 11040       | 27.36              | 1.06                         | 13.68                 | 4.36E-06                 | 2.77E-05                 |
| G9    | 14520       | 25.90              | 1.07                         | 12.95                 | 4.26E-06                 | 2.24E-05                 |
| G10   | 18120       | 29.28              | 0.00                         | 14.64                 | 3.37E-06                 | 1.44E-05                 |
| G10a  | 18120       | 29.28              | 0.00                         | 14.64                 | -----                    | 1.54E-05                 |
| G11   | 21720       | 28.78              | 1.07                         | 14.39                 | 3.05E-06                 | 1.34E-05                 |
| G11a  | 21720       | 28.78              | 1.07                         | 14.39                 | -----                    | 1.44E-05                 |
| G12   | 25320       | 28.12              | 1.06                         | 14.06                 | 2.81E-06                 | 1.34E-05                 |
|       |             |                    |                              |                       |                          |                          |
| G1.0  | 96          | 24.99              | 1.06                         | 15.62                 | 0.00E+00                 | -----                    |
| G1.1  | 396         | 24.99              | 1.06                         | 15.62                 | 7.60E-06                 | -----                    |
| G1.2  | 81756       | 23.46              | 1.01                         | 9.02                  | 2.53E-06                 | -----                    |
| G1.3  | 88278       | 25.08              | 1.05                         | 19.29                 | 1.86E-06                 | -----                    |

**APPENDIX D** Experiment data @ pH 4

| Run # | Time (secs) | Mass of Sample (g) | Mass of HNO <sub>3</sub> (g) | Flow rate (g sol/min) | m <sub>Si</sub> (mol/kg) | m <sub>Ca</sub> (mol/kg) |
|-------|-------------|--------------------|------------------------------|-----------------------|--------------------------|--------------------------|
| H0    | 120         | 28.24              | 1.04                         | 14.12                 | 0.00E+00                 | 0.00E+00                 |
| H1    | 1020        | 26.52              | 1.06                         | 17.68                 | 6.71E-06                 | 5.30E-05                 |
| H2    | 2820        | 28.24              | 1.04                         | 14.12                 | 6.06E-06                 | 5.23E-05                 |
| H3    | 5472        | 30.40              | 1.05                         | 13.82                 | 5.31E-06                 | 4.63E-05                 |
| H4    | 10140       | 26.32              | 1.06                         | 13.16                 | 5.17E-06                 | 3.95E-05                 |
| H5    | 14508       | 31.08              | 0.90                         | 17.27                 | 3.76E-06                 | 2.51E-05                 |
| H6    | 22038       | 28.79              | 1.04                         | 22.15                 | 2.82E-06                 | 1.55E-05                 |
| H7    | 51420       | 27.21              | 1.06                         | 13.61                 | 3.43E-06                 | 1.50E-05                 |
| H8    | 84660       | 25.84              | 1.06                         | 12.92                 | 3.48E-06                 | 1.78E-05                 |
| I0    | 300         | 23.90              | 1.04                         | 4.78                  | 0.00E+00                 | 0.00E+00                 |
| I1    | 1200        | 23.90              | 1.04                         | 4.78                  | 1.38E-05                 | 7.15E-05                 |
| I2    | 5580        | 23.05              | 0.97                         | 4.61                  | 1.05E-05                 | 6.78E-05                 |
| I3    | 19920       | 20.48              | 1.05                         | 4.10                  | 9.31E-06                 | 6.37E-05                 |
| I4    | 29040       | 23.83              | 1.03                         | 5.96                  | 6.42E-06                 | 4.25E-05                 |
| I5    | 84540       | 24.66              | 0.91                         | 6.17                  | 7.85E-06                 | 2.89E-05                 |
| I6    | 94260       | 24.34              | 0.91                         | 6.09                  | 4.80E-06                 | 1.81E-05                 |

**APPENDIX D** Experiment data @ pH 6

| Run # | Time (secs) | Mass of Sample (g) | Mass of HNO <sub>3</sub> (g) | Flow rate (g sol/min) | m <sub>Si</sub> (mol/kg) | m <sub>Ca</sub> (mol/kg) |
|-------|-------------|--------------------|------------------------------|-----------------------|--------------------------|--------------------------|
| D0    | 720         | 23.07              | 1.05                         | 1.92                  | 0.00E+00                 | 0.00E+00                 |
| D1    | 3420        | 23.07              | 1.05                         | 1.92                  | 3.76E-06                 | 8.71E-05                 |
| D2    | 9300        | 19.67              | 1.04                         | 0.56                  | 3.02E-05                 | 1.16E-04                 |
| D3    | 13800       | 23.27              | 1.05                         | 1.16                  | 5.65E-05                 | 9.88E-05                 |
| D4    | 27300       | 22.97              | 1.06                         | 1.15                  | 2.65E-05                 | 9.89E-05                 |
| D5    | 90660       | 22.65              | 1.06                         | 1.13                  | 2.66E-05                 | 8.75E-05                 |
|       |             |                    |                              |                       |                          |                          |
| N0    | 120         | 25.64              | 1.01                         | 12.82                 | 0.00E+00                 | 0.00E+00                 |
| N1    | 720         | 25.64              | 1.01                         | 12.82                 | 5.66E-06                 | 2.61E-05                 |
| N2    | 6120        | 29.24              | 1.07                         | 14.62                 | 3.77E-06                 | 2.14E-05                 |
| N3    | 13500       | 28.70              | 1.06                         | 14.35                 | 2.69E-06                 | 1.45E-05                 |
| N4    | 65418       | 28.08              | 1.01                         | 12.21                 | 2.99E-06                 | 8.73E-06                 |
| N5    | 88314       | 28.33              | 0.05                         | 14.91                 | 2.75E-06                 | 7.33E-06                 |
|       |             |                    |                              |                       |                          |                          |
| O0    | 78          | 28.10              | 1.03                         | 21.62                 | 0.00E+00                 | 0.00E+00                 |
| O1    | 67278       | 28.10              | 1.03                         | 21.62                 | 2.14E-06                 | 9.76E-06                 |
| O2    | 80220       | 30.36              | 1.07                         | 15.18                 | 2.74E-06                 | 1.08E-05                 |
|       |             |                    |                              |                       |                          |                          |
| P0    | 96          | 28.98              | 1.05                         | 18.11                 | 0.00E+00                 | 0.00E+00                 |
| P1    | 2136        | 28.98              | 1.05                         | 18.11                 | 1.94E-06                 | 1.60E-05                 |
| P2    | 5496        | 29.42              | 1.05                         | 18.39                 | 2.19E-06                 | 1.60E-05                 |
| P3    | 39705       | 27.16              | 1.06                         | 15.52                 | 2.16E-06                 | 1.35E-05                 |
| P4    | 43320       | 29.32              | 0.91                         | 14.66                 | 2.48E-06                 | 1.34E-05                 |
| P5    | 65970       | 33.64              | 1.05                         | 13.46                 | 2.22E-06                 | 1.21E-05                 |
| P6    | 87435       | 27.87              | 1.06                         | 12.39                 | 2.71E-06                 | 1.09E-05                 |

**APPENDIX D** Experiment data Hr

| Run # | Final mass (g) | Time (secs) | Final $A_{sp}$ ( $m^2 g^{-1}$ ) | Flow rate (g sol/min) | $m_{Si}$ (mol/kg) | $m_{Ca}$ (mol/kg) | Mass of Sample (g sol) | Mass of $HNO_3$ (g) |
|-------|----------------|-------------|---------------------------------|-----------------------|-------------------|-------------------|------------------------|---------------------|
| Hr0   | 0.98           | 240         | 0.30                            | 5.56                  | 0.00              | 0.00              | 22.22                  | 0.92                |
| Hr1   | 0.98           | 3840        | 1.20                            | 5.56                  | 5.49E-05          | 2.52E-04          | 22.22                  | 0.92                |
| Hr2   | 1.02           | 7440        | 2.22                            | 5.72                  | 4.40E-05          | 1.23E-04          | 22.89                  | 0.94                |
| Hr4   | 0.98           | 14640       | 3.32                            | 5.76                  | 2.01E-05          | 5.46E-05          | 23.02                  | 0.88                |
| Hr8   | 0.98           | 27222       | 3.42                            | 7.80                  | 4.99E-06          | 2.97E-05          | 28.86                  | 0.88                |
| Hr12  | 0.97           | 50100       | 4.56                            | 5.66                  | 3.68E-06          | 2.61E-05          | 28.29                  | 0.94                |
| Hr19  | 0.98           | 68400       | 5.00                            | 4.52                  | 4.38E-06          | 2.99E-05          | 22.58                  | 0.90                |
| Hr25  | 1.00           | 85680       | 6.06                            | 7.88                  | 2.63E-06          | 1.87E-05          | 23.64                  | 0.92                |
| Hr72  | 0.96           | 249480      | 11.13                           | 3.11                  | 3.83E-06          | 3.15E-05          | 24.89                  | 0.77                |