

## Supplementary Data

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## Extraction Data

### Experimental Labeling List

| Name | Acid          | Concentration | Feedstock   | Feedstock Mass (g) | Dissolution Vol (L) | Dissolution time (hr) |
|------|---------------|---------------|-------------|--------------------|---------------------|-----------------------|
| 3-1_ | citric        | 0.1           | Tail2a      | 20                 | 1                   | 24                    |
| 3-2_ | acetic        | 0.1           | Tail2a      | 20                 | 1                   | 24                    |
| 3-3_ | oxalic        | 0.1           | Tail2a      | 20                 | 1                   | 24                    |
| 4-1a | citric        | 0.5           | Tail2a      | 20                 | 1                   | 18.5                  |
| 4-1b | citric        | 1.0           | Tail2a      | 20                 | 1                   | 19                    |
| 4-2a | acetic        | 0.5           | Tail2a      | 20                 | 1                   | 19.25                 |
| 4-2b | acetic        | 1.0           | Tail2a      | 20                 | 1                   | 19.5                  |
| 4-3a | oxalic        | 0.5           | Tail2a      | 20                 | 1                   | 20.25                 |
| 4-3b | oxalic        | 1.0           | Tail2a      | 20                 | 1                   | 21.5                  |
| 5-1a | citric        | 0.5           | Tail2a      | 30                 | 1                   | 6                     |
| 5-1b | citric        | 0.5           | Tail2a      | 30                 | 1                   | 15                    |
| 5-1c | citric        | 0.5           | Tail2a      | 30                 | 1                   | 24                    |
| 5-1d | citric        | 0.5           | Tail2a      | 30                 | 1                   | 72                    |
| 5-1e | citric        | 0.5           | Tail2a      | 30                 | 1                   | 427                   |
| 5-2a | oxalic        | 0.5           | Tail2a      | 30                 | 1                   | 6                     |
| 5-2b | oxalic        | 0.5           | Tail2a      | 30                 | 1                   | 15                    |
| 5-2c | oxalic        | 0.5           | Tail2a      | 30                 | 1                   | 24                    |
| 5-2d | oxalic        | 0.5           | Tail2a      | 30                 | 1                   | 72                    |
| 5-2e | oxalic        | 0.5           | Tail2a      | 30                 | 1                   | 427                   |
| 6-1a | hydrochloric  | 0.1           | Tail2a      | 20                 | 1                   | 18                    |
| 6-1b | hydrochloric  | 0.5           | Tail2a      | 20                 | 1                   | 18                    |
| 6-1c | hydrochloric  | 1.0           | Tail2a      | 20                 | 1                   | 18                    |
| 7-1a | sulfuric      | 0.1           | Tail2a      | 20                 | 1                   | 18                    |
| 7-1b | sulfuric      | 0.5           | Tail2a      | 20                 | 1                   | 18                    |
| 7-1c | sulfuric      | 1.0           | Tail2a      | 20                 | 1                   | 18                    |
| 7-2a | citric/oxalic | 0.5           | Tail2a      | 30                 | 1                   | 15                    |
| 7-2b | citric/oxalic | 0.5           | Tail2a      | 30                 | 1                   | 72                    |
| 7-3a | citric        | 0.5           | Tail2a      | 30                 | 1                   | 72                    |
| 7-3b | citric        | 0.5           | Tail2a      | 30                 | 1                   | 72                    |
| 7-4a | oxalic        | 0.5           | Tail2a      | 30                 | 1                   | 72                    |
| 7-4b | oxalic        | 0.5           | Tail2a      | 30                 | 1                   | 72                    |
| 7-5_ | citric        | 0.5           | Tail2a      | 30                 | 1                   | 15                    |
| 8-1a | oxalic        | 0.5           | Residue5-1a | 20                 | 1                   | 16                    |
| 8-1b | oxalic        | 0.5           | Residue5-1b | 20                 | 1                   | 16                    |
| 8-1c | oxalic        | 0.5           | Residue5-1c | 20                 | 1                   | 16                    |

|       |          |     |             |    |     |    |
|-------|----------|-----|-------------|----|-----|----|
| 8-1d  | oxalic   | 0.5 | Residue5-1d | 20 | 1   | 16 |
| 8-2a  | citric   | 0.5 | Residue5-2a | 20 | 1   | 16 |
| 8-2b  | citric   | 0.5 | Residue5-2b | 20 | 1   | 16 |
| 8-2c  | citric   | 0.5 | Residue5-2c | 20 | 1   | 16 |
| 8-2d  | citric   | 0.5 | Residue5-2d | 20 | 1   | 16 |
| 9-1a  | oxalic   | 0.5 | Residue6-1a | 10 | 0.5 | 72 |
| 9-1b  | oxalic   | 0.5 | Residue6-1b | 10 | 0.5 | 72 |
| 9-1c  | oxalic   | 0.5 | Residue6-1c | 10 | 0.5 | 72 |
| 9-2a  | oxalic   | 0.5 | Residue7-1a | 10 | 0.5 | 72 |
| 9-2b  | oxalic   | 0.5 | Residue7-1b | 10 | 0.5 | 72 |
| 9-2c  | oxalic   | 0.5 | Residue7-1c | 10 | 0.5 | 72 |
| 10-1a | sulfuric | 0.5 | Tail2a      | 30 | 1   | 72 |
| 10-1b | sulfuric | 1.0 | Tail2a      | 30 | 1   | 72 |

### 20g/L Organic Acid Extraction

| Name    | Tail2a mass (g) | Na+ [mg/L] |         | NH4+[mg/L] |        | K+ [mg/L] |         | Ca2+ [mg/L] |         | Mg2+ [mg/L] |          |
|---------|-----------------|------------|---------|------------|--------|-----------|---------|-------------|---------|-------------|----------|
|         |                 | Result     | Avg     | Result     | Avg    | Result    | Avg     | Result      | Avg     | Result      | Avg      |
| 4-1a    | 20.05           | 32.543     | 32.5695 | 1.301      | 1.2765 | 17.433    | 17.0165 | 40.794      | 40.716  | 259.578     | 259.9415 |
| extract |                 | 32.596     |         | 1.252      |        | 16.6      |         | 40.638      |         | 260.305     |          |
| 4-1b    | 20.15           | 32.71      | 32.55   | 1.393      | 1.39   | 2.649     | 2.51    | 38.052      | 38.11   | 266.025     | 266.28   |
| extract |                 | 32.395     |         | 1.39       |        | 2.373     |         | 38.16       |         | 266.543     |          |
| 4-2a    | 20.20           | 15.067     | 15.14   | 1.632      | 1.58   | 8.374     | 7.25    | 17.21       | 17.24   | 98.223      | 98.52    |
| extract |                 | 15.204     |         | 1.518      |        | 6.134     |         | 17.275      |         | 98.82       |          |
| 4-2b    | 20.25           | 16.135     | 16.17   | 1.266      | 1.27   | 3.931     | 3.24    | 18.796      | 18.80   | 109.472     | 109.23   |
| extract |                 | 16.214     |         | 1.266      |        | 2.556     |         | 18.796      |         | 108.993     |          |
| 4-3a    | 20.20           | 80.356     | 80.31   | 1.05       | 1.12   | 7.316     | 6.03    | 128.24      | 127.90  | 21.203      | 21.59    |
| extract |                 | 80.27      |         | 1.187      |        | 4.75      |         | 127.567     |         | 21.98       |          |
| 4-3b    | 20.00           | 73.305     | 73.4285 | 1.451      | 1.508  | 3.453     | 3.307   | 117.987     | 117.998 | 19.191      | 19.177   |
| extract |                 | 73.552     |         | 1.565      |        | 3.161     |         | 118.009     |         | 19.163      |          |

### 30g/L Organic Acid Extraction

| Name    | Tail2a mass (g) | Na+ [mg/L] |         | NH4+[mg/L] |        | K+ [mg/L] |        | Ca2+ [mg/L] |         | Mg2+ [mg/L] |          |
|---------|-----------------|------------|---------|------------|--------|-----------|--------|-------------|---------|-------------|----------|
|         |                 | Result     | Avg     | Result     | Avg    | Result    | Avg    | Result      | Avg     | Result      | Avg      |
| 5-1a    | 30.30           | 29.504     | 29.5625 | 0.665      | 0.7095 | 1.95      | 1.9465 | 32.607      | 32.6825 | 234.327     | 232.4115 |
| extract |                 | 29.621     |         | 0.754      |        | 1.943     |        | 32.758      |         | 230.496     |          |
| 5-1b    | 30.05           | 39.954     | 39.7955 | 0.795      | 0.7015 | 2.213     | 2.3045 | 50.049      | 50.1195 | 321.76      | 321.036  |
| extract |                 | 39.637     |         | 0.608      |        | 2.396     |        | 50.19       |         | 320.312     |          |
| 5-1c    | 30.20           | 47.18      | 47.188  | 0.444      | 0.507  | 2.608     | 2.4665 | 62.634      | 62.606  | 392.762     | 392.583  |
| extract |                 | 47.196     |         | 0.57       |        | 2.325     |        | 62.578      |         | 392.404     |          |
| 5-1d    | 30.35           | 78.932     | 78.732  | 0.658      | 0.6325 | 3.7       | 3.6405 | 124.893     | 124.751 | 687.409     | 687.8595 |
| extract |                 | 78.532     |         | 0.607      |        | 3.581     |        | 124.609     |         | 688.31      |          |
| 5-2a    | 30.10           | 53.097     | 52.9825 | 0.768      | 0.7175 | 3.374     | 3.1025 | 88.617      | 88.798  | 16.985      | 17.591   |
| extract |                 | 52.868     |         | 0.667      |        | 2.831     |        | 88.979      |         | 18.197      |          |
| 5-2b    | 30.00           | 79.744     | 80.2195 | 0.832      | 0.778  | 4.217     | 3.8585 | 128.567     | 128.819 | 23.589      | 23.6155  |
| extract |                 | 170.454    |         | 0.262      |        | 6.691     |        | 271.134     |         | 34.855      |          |

### 20g/L Strong Acid Extraction

| Name    | Tail2a mass (g) | Na+ [mg/L] |         | NH4+[mg/L] |        | K+ [mg/L] |        | Ca2+ [mg/L] |          | Mg2+ [mg/L] |          |
|---------|-----------------|------------|---------|------------|--------|-----------|--------|-------------|----------|-------------|----------|
|         |                 | Result     | Avg     | Result     | Avg    | Result    | Avg    | Result      | Avg      | Result      | Avg      |
| 6-1a    | 20.30           | 37.131     | 37.2945 | 1.542      | 1.4405 | 1.413     | 1.5805 | 44.435      | 44.3105  | 321.783     | 321.0715 |
| extract |                 | 37.458     |         | 1.339      |        | 1.748     |        | 44.186      |          | 320.36      |          |
| 6-1b    | 20.15           | 59.949     | 60.3055 | 0.82       | 0.7475 | 2.579     | 2.621  | 78.646      | 78.699   | 540.486     | 540.1635 |
| extract |                 | 60.662     |         | 0.675      |        | 2.663     |        | 78.752      |          | 539.841     |          |
| 6-1c    | 20.05           | 71.841     | 71.5065 | -0.005     | -0.005 | 2.998     | 2.904  | 101.682     | 101.6185 | 648.177     | 647.9585 |
| extract |                 | 71.172     |         | -0.005     |        | 2.81      |        | 101.555     |          | 647.74      |          |
| 7-1a    | 20.5            | 40.118     | 40.6025 | 1.852      | 1.7795 | 3.752     | 3.5905 | 68.894      | 69.0805  | 365.978     | 360.973  |
| extract |                 | 41.087     |         | 1.707      |        | 3.429     |        | 69.267      |          | 355.968     |          |
| 7-1b    | 20.6            | 66.853     | 67.456  | 0.565      | 0.5335 | 5.48      | 5.057  | 113.098     | 113.044  | 615.127     | 613.9835 |
| extract |                 | 68.059     |         | 0.502      |        | 4.634     |        | 112.99      |          | 612.84      |          |
| 7-1c    | 20.5            | 89.036     | 88.418  | 0          | 0      | 3.957     | 4.1055 | 133.509     | 133.908  | 777.994     | 778.042  |
| extract |                 | 87.8       |         | 0          |        | 4.254     |        | 134.307     |          | 778.09      |          |

### 30g/L 0.5M Organic Acid Extraction

| Name    | Tail2a mass (g) | Na+ [mg/L] |          | NH4+[mg/L] |        | K+ [mg/L] |         | Ca2+ [mg/L] |          | Mg2+ [mg/L] |          |
|---------|-----------------|------------|----------|------------|--------|-----------|---------|-------------|----------|-------------|----------|
|         |                 | Result     | Avg      | Result     | Avg    | Result    | Avg     | Result      | Avg      | Result      | Avg      |
| 7-2a    | 30.6            | 81.855     | 81.672   | 0.388      | 0.4145 | 7.433     | 7.8715  | 132.904     | 132.591  | 26.899      | 26.803   |
| extract |                 | 81.489     |          | 0.441      |        | 8.31      |         | 132.278     |          | 26.707      |          |
| 7-2b    | 30.65           | 169.236    | 169.265  | 0.44       | 0.4505 | 11.944    | 11.699  | 283.601     | 283.7185 | 36.311      | 36.449   |
| extract |                 | 169.294    |          | 0.461      |        | 11.454    |         | 283.836     |          | 36.587      |          |
| 7-3a    | 30.65           | 81.971     | 81.75    | 0.761      | 0.873  | 7.041     | 8.06    | 126.301     | 126.5555 | 708.745     | 710.351  |
| extract |                 | 81.529     |          | 0.985      |        | 9.079     |         | 126.81      |          | 711.957     |          |
| 7-3b    | 40.95           | 99.859     | 100.0965 | 0.731      | 0.6515 | 9.611     | 9.964   | 166.274     | 166.441  | 868.108     | 868.2565 |
| extract |                 | 100.334    |          | 0.572      |        | 10.317    |         | 166.608     |          | 868.405     |          |
| 7-4a    | 30.05           | 172.561    | 173.022  | 0.813      | 0.796  | 14.351    | 13.652  | 276.608     | 276.7265 | 36.213      | 36.3205  |
| extract |                 | 173.483    |          | 0.779      |        | 12.953    |         | 276.845     |          | 36.428      |          |
| 7-4b    | 40.4            | 234.304    | 234.362  | 0.66       | 0.592  | 17.355    | 17.3185 | 385.121     | 384.7825 | 49.133      | 49.2245  |
| extract |                 | 234.42     |          | 0.524      |        | 17.282    |         | 384.444     |          | 49.316      |          |
| 7-5     | 30.15           | 39.777     | 39.5965  | 0.572      | 0.4815 | 4.221     | 4.091   | 49.153      | 49.258   | 317.09      | 317.3955 |
| extract |                 | 39.416     |          | 0.391      |        | 3.961     |         | 49.363      |          | 317.701     |          |

## Recycle Extraction with Oxalic, Citric, and Strong Acids

| Name        | Tail2<br>a<br>mass<br>(g) | Na+ [mg/L] |         | NH4+[mg/L] |       | K+ [mg/L] |        | Ca2+ [mg/L] |         | Mg2+ [mg/L] |         |
|-------------|---------------------------|------------|---------|------------|-------|-----------|--------|-------------|---------|-------------|---------|
|             |                           | Result     | Avg     | Result     | Avg   | Result    | Avg    | Result      | Avg     | Result      | Avg     |
| 8-1a        | 20.1                      | 55.433     | 55.476  | 1.373      | 1.330 | 4.757     | 4.493  | 94.251      | 93.909  | 20.369      | 20.2835 |
| extrac<br>t |                           | 55.519     |         | 1.288      |       | 5         |        | 4.229       |         | 93.567      |         |
| 8-1b        | 20.2                      | 48.623     | 48.6205 | 2.728      | 2.653 | 3.468     | 3.5415 | 80.61       | 80.559  | 19.407      | 19.606  |
| extrac<br>t |                           | 48.618     |         | 2.579      |       | 5         |        | 3.615       |         | 80.508      |         |
| 8-1c        | 20.25                     | 47.27      | 47.2005 | 1.904      | 1.936 | 3.473     | 3.27   | 76.18       | 76.06   | 20.021      | 19.8635 |
| extrac<br>t |                           | 47.131     |         | 1.969      |       | 5         |        | 3.067       |         | 75.94       |         |
| 8-1d        | 20.3                      | 45.983     | 45.8435 | 0.999      | 1.061 | 2.752     | 3.3775 | 71.036      | 71.1305 | 18.237      | 18.1045 |
| extrac<br>t |                           | 45.704     |         | 1.123      |       | 5         |        | 4.003       |         | 71.225      |         |
| 8-2a        | 20.2                      | 15.772     | 15.887  | 5.107      | 5.18  | 1.131     | 1.1415 | 20.86       | 20.843  | 268.249     | 268.075 |
| extrac<br>t |                           | 16.002     |         | 5.253      |       | 5         |        | 1.152       |         | 20.826      |         |
| 8-2b        | 20.05                     | 15.715     | 15.831  | 6.373      | 6.331 | 1.308     | 0.654  | 22.875      | 22.597  | 246.596     | 246.8   |
| extrac<br>t |                           | 15.947     |         | 6.29       |       | 5         |        | 0           |         | 22.319      |         |
| 8-2c        | 20.35                     | 14.843     | 14.838  | 2.044      | 2.101 | 1.539     | 1.3165 | 31.927      | 31.764  | 200.55      | 198.924 |
| extrac<br>t |                           | 14.833     |         | 2.158      |       | 5         |        | 1.094       |         | 31.601      |         |
| 8-2d        | 19.05                     | 10.173     | 10.167  | 9.666      | 9.782 | 1.236     | 1.271  | 29.64       | 29.656  | 106.408     | 106.358 |
| extrac<br>t |                           | 10.161     |         | 9.898      |       | 5         |        | 1.306       |         | 29.672      |         |
| 9-1a        | 10.3                      | 119.631    | 119.609 | 0          | 0.206 | 8.119     | 7.811  | 231.4       | 231.334 | 26.411      | 26.104  |
| extrac<br>t |                           | 119.588    |         | 0.412      |       | 5         |        | 7.503       |         | 231.269     |         |
| 9-1b        | 10                        | 100.691    | 100.431 | 0.795      | 0.831 | 6.593     | 6.6175 | 183.084     | 182.916 | 24.905      | 24.788  |
| extrac<br>t |                           | 100.171    |         | 0.867      |       | 5         |        | 6.642       |         | 182.749     |         |
| 9-1c        | 10.05                     | 78.942     | 78.8895 | 1.047      | 1.037 | 5.149     | 5.355  | 156.256     | 156.162 | 22.583      | 22.7605 |
| extrac<br>t |                           | 78.837     |         | 1.027      |       | 5         |        | 5.561       |         | 156.068     |         |
| 9-2a        | 10.15                     | 117.591    | 117.731 | 0          | 0     | 7.161     | 7.388  | 194.965     | 195.031 | 24.902      | 24.821  |
| extrac<br>t |                           | 117.872    |         | 0          |       | 5         |        | 7.615       |         | 195.097     |         |
| 9-2b        | 10.05                     | 88.848     | 88.7525 | 0          | 0     | 5.707     | 5.382  | 144.768     | 144.675 | 20.278      | 20.6385 |
| extrac<br>t |                           | 88.657     |         | 0          |       | 5         |        | 5.057       |         | 144.582     |         |
| 9-2c        | 10.05                     | 77.378     | 77.314  | 0          | 0     | 5.802     | 5.3525 | 147.202     | 147.003 | 20.666      | 20.747  |
| extrac<br>t |                           | 77.25      |         | 0          |       | 5         |        | 4.903       |         | 146.804     |         |
| 10-1a       | 30.6                      | 171.765    | 170.924 | 0          | 0     | 13.036    | 15.225 | 283.221     | 284.384 | 695.518     | 698.346 |
| extrac<br>t |                           | 170.084    |         | 0          |       | 5         |        | 17.414      |         | 285.547     |         |
| 10-1b       | 30.7                      | 207.426    | 207.744 | 0          | 0     | 20.593    | 20.570 | 386.04      | 386.206 | 698.507     | 698.502 |

|         |  |        |  |   |  |       |   |        |  |        |   |
|---------|--|--------|--|---|--|-------|---|--------|--|--------|---|
| extract |  | 208.06 |  | 0 |  | 20.54 | 5 | 386.37 |  | 698.49 | 5 |
| t       |  | 2      |  |   |  | 8     |   | 2      |  | 8      |   |

## Carbonation Data

### Particle Size Data

| Reaction Pressure (bar) | Avg d10 | Avg d50 | Avg d90 | SD 10  | SD 50  | SD 90  | Sphercicity |
|-------------------------|---------|---------|---------|--------|--------|--------|-------------|
| 2                       | 0.607   | 0.831   | 2.08    | 0.0341 | 0.0138 | 0.106  | 0.87        |
| 3                       | 0.648   | 0.895   | 1.99    | 0.0432 | 0.0058 | 0.0823 | 0.87        |
| 4                       | 0.664   | 0.934   | 1.92    | 0.0233 | 0.0147 | 0.0231 | 0.87        |
| 5                       | 1.34    | 1.97    | 4.61    | 0.05   | 0.078  | 0.137  | 0.87        |
| 6                       | 0.681   | 0.945   | 2.03    | 0.0408 | 0.0549 | 0.0515 | 0.87        |
| 7                       | 0.607   | 0.844   | 2.12    | 0.0211 | 0.0219 | 0.03   | 0.87        |
| 8                       | 0.556   | 0.764   | 1.81    | 0.0193 | 0.0211 | 0.0835 | 0.87        |

### Initial Conditions and Pressure Data

| Initial Pressure (bar) | Initial Mass of Ca(OH) <sub>2</sub> (g) | Final Pressure (bar) | Empty Dish + Paper (g) | Dried Cake on Dish (g) | Liquid Removed (mL) | Pressure Difference (bar) |
|------------------------|---|----------------------|------------------------|------------------------|---------------------|---------------------------|
| 2                      | 7.505                                   | 0.914                | 109.215                | 111.492                | 40                  | 1.086                     |
| 3                      | 7.490                                   | 1.362                | 114.113                | 119.228                | 40                  | 1.638                     |
| 4                      | 7.489                                   | 2.115                | 108.106                | 113.604                | 40                  | 1.885                     |
| 5                      | 7.495                                   | 2.783                | 109.918                | 116.754                | 40                  | 2.217                     |
| 6                      | 7.736                                   | 3.700                | 119.146                | 126.861                | 120                 | 2.300                     |
| 7                      | 7.551                                   | 4.690                | 108.943                | 116.769                | 65                  | 2.310                     |
| 8                      | 7.530                                   | 5.710                | 123.552                | 132.252                | 70                  | 2.290                     |
| 9                      | 7.577                                   | 6.700                | 105.016                | 114.745                | 40                  | 2.300                     |

### Volumes, Temperatures, and CO<sub>2</sub> Data

| Initial Pressure (bar) | Volume of Liquid (mL) | Volume of Gas (mL) | Avg Temperature (°C) | Ideal Gas Constant (mL atm/mol K) | Avg Temp (K) | CO <sub>2</sub> Spent (mol) | CO <sub>2</sub> Provided (mol) | CO <sub>2</sub> Efficiency (%) |
|------------------------|-----------------------|--------------------|----------------------|-----------------------------------|--------------|-----------------------------|--------------------------------|--------------------------------|
| 2                      | 750                   | 750                | 23                   | 82.057                            | 296          | 0.033                       | 0.062                          | 54.3                           |
| 3                      | 750                   | 750                | 23                   | 82.057                            | 296          | 0.051                       | 0.093                          | 54.6                           |
| 4                      | 750                   | 750                | 23                   | 82.057                            | 296          | 0.058                       | 0.124                          | 47.1                           |
| 5                      | 750                   | 750                | 23                   | 82.057                            | 296          | 0.068                       | 0.154                          | 44.3                           |
| 6                      | 750                   | 750                | 23                   | 82.057                            | 296          | 0.071                       | 0.185                          | 38.3                           |
| 7                      | 750                   | 750                | 23                   | 82.057                            | 296          | 0.071                       | 0.216                          | 33.0                           |
| 8                      | 750                   | 750                | 23                   | 82.057                            | 296          | 0.071                       | 0.247                          | 28.6                           |
| 9                      | 750                   | 750                | 23                   | 82.057                            | 296          | 0.071                       | 0.278                          | 25.6                           |

## Carbonate Precipitation Efficiency

| Initial Pressure (bar) | Calcium Provided (mol) | Mass of Product (g) | Theoretical Yield (g CaCO <sub>3</sub> ) | Percent Yield (%) | Mineralized CO <sub>2</sub> (mol) | Mineralized CO <sub>2</sub> (%) |
|------------------------|------------------------|---------------------|--|-------------------|-----------------------------------|---------------------------------|
| 2                      | 0.101                  | 2.28                | 10.142                                   | 22                | 0.023                             | 37                              |
| 3                      | 0.101                  | 5.12                | 10.122                                   | 51                | 0.051                             | 55                              |
| 4                      | 0.101                  | 5.50                | 10.120                                   | 54                | 0.055                             | 45                              |
| 5                      | 0.101                  | 6.84                | 10.128                                   | 67                | 0.068                             | 44                              |
| 6                      | 0.104                  | 7.72                | 10.454                                   | 74                | 0.077                             | 42                              |
| 7                      | 0.102                  | 7.83                | 10.204                                   | 77                | 0.078                             | 36                              |
| 8                      | 0.102                  | 8.70                | 10.176                                   | 85                | 0.087                             | 35                              |
| 9                      | 0.102                  | 9.73                | 10.239                                   | 95                | 0.097                             | 35                              |

## Ex-Situ Base Addition Precipitation Data

| Trial               | Mass CaCl <sub>2</sub> (g) | Mass of Product (g) | Theoretical Mass CaCO <sub>3</sub> (g) | Yield (%) | Amount of CO <sub>2</sub> (mol) | CO <sub>2</sub> Mineralized (%) |
|---------------------|----------------------------|---------------------|--|-----------|---------------------------------|---------------------------------|
| 120 mL NaOH + 3 Bar | 11.35                      | 5.31                | 10.32                                  | 51        | 0.092                           | 58                              |
| 120mL NaOH + 6 Bar  | 11.28                      | 7.51                | 10.25                                  | 73        | 0.185                           | 41                              |
| 240mL NaOH + 3 Bar  | 11.25                      | 5.67                | 10.23                                  | 55        | 0.092                           | 62                              |
| 240mL NaOH +6 Bar   | 11.26                      | 9.28                | 10.24                                  | 91        | 0.185                           | 50                              |

## In-Situ Base Addition Precipitation Data

| Trial                      | Mass CaCl <sub>2</sub> (g) | Mass of Product (g) | Theoretical Mass CaCO <sub>3</sub> (g) | Yield (%) | Amount of CO <sub>2</sub> (mol) | CO <sub>2</sub> Mineralized (%) |
|----------------------------|----------------------------|---------------------|--|-----------|---------------------------------|---------------------------------|
| 6 Bar + 120mL NaOH In-Situ | 11.35                      | 8.77                | 10.32                                  | 85        | 0.092                           | 45                              |
| 6 Bar + 240mL NaOH In-Situ | 11.28                      | 9.83                | 10.25                                  | 95        | 0.185                           | 52                              |